Strength in Adversity:
Stress Appraisal, Well-being, and Coping in a World of Global Crises

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"Happiness can be found, even in the darkest of times, if one only remembers to turn on the light."

A. P. W. B. Dumbledore

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I want to dedicate this thesis to my grandmother Helga, who has always given me her unconditional support. Also, many thanks and hugs to my family and friends (special thanks are directed towards my Ulmer Psychos), who have all constantly provided their support, and to Phi for always being there for me. Without you, this work would not have been possible.

Zusammenfassung

Der Beginn des 21. Jahrhunderts scheint eine Zeit globaler Krisen zu sein. Von bewaffneten Konflikten und Naturkatastrophen bis hin zu finanziellen Turbulenzen, Flüchtlingsströmen und Hungerkrisen hat die Welt mit einer Vielzahl von Herausforderungen zu kämpfen, die alle von den ständigen Bedrohungen durch den Klimawandel überschattet werden. Trotz der vielfältigen Natur dieser Krisen teilen sie alle ein gemeinsames Merkmal - die Belastung, die sie auf das psychische Wohlbefinden der Menschen ausüben. In drei Artikeln untersucht die vorliegende kumulative Dissertation die Zusammenhänge zwischen verschiedenen Facetten der Stressbewertung, dem Wohlbefinden und Bewältigungsstrategien. Dies erfolgt sowohl querschnittlich als auch im Laufe der Zeit und im Hinblick auf die globale COVID-19-Pandemie und den Russisch-Ukrainischen Krieg. Artikel 1 untersucht die Beziehungen zwischen allgemeinen Sorgen über die COVID-19-Pandemie (als eine Form der Stressbewertung) und verschiedenen Maßen des Wohlbefindens basierend auf den querschnittlichen Daten von N = 665 deutschen Erwachsenen, die im April 2020 erhoben wurden. Darüber hinaus werden die moderierenden Effekte von Bewältigungsstrategien untersucht. Im Unterschied zu Artikel 1 wird die Stressbewertung über die COVID-19-Pandemie in Artikel 2 in verschiedene Facetten (Angst vor COVID-19, finanzielle Sorgen und soziale Isolation) differenziert. Hier werden Zusammenhänge zwischen diesen Facetten der Stressbewertung und mehreren Maßen des Wohlbefindens in einem Strukturgleichungsmodell berichtet. Querschnittsdaten von N = 480 deutschen Erwachsenen wurden von März bis Mai 2021 erhoben. Schließlich hebt Artikel 3 die Veränderung von Sorgen (als eine Form der Stressbewältigung) bezüglich des Russisch-Ukrainischen Krieges in einer Messung mit drei Erhebungszeitpunkten von N = 175 deutschen Erwachsenen über einen Zwei-Monats-Zeitraum mit Beginn des Krieges hervor. Darüber hinaus werden auf Grundlage eines latenten Wachstumsmodells zeitliche Veränderungen im Einsatz von Bewältigungsstrategien untersucht sowie deren Beziehungen zu Sorgen. Die übergreifenden Ergebnisse aller drei Artikel skizzieren die querschnittlichen Beziehungen und zeitlichen Dynamiken von individuellen Stressbewertungen in Bezug auf Wohlbefinden und Bewältigungsstrategien während zweier globaler Krisen. Zusammenfassend trägt diese Dissertation zum Verständnis der psychologischen Herausforderungen durch globale Krisen, der Natur emotionaler Reaktionen und der adaptiven Rolle von Bewältigungsstrategien bei.

Abstract

The beginning of the 21st century seems to be a time of global crises. From armed conflicts and natural disasters to financial turmoil, refugee displacement, and hunger crises, the world has been struggling with various challenges, all overshadowed by the constant threats posed by climate change. Despite the diverse nature of these crises, they all share a common feature - the strain they place on people's psychological well-being. In three contributions, the present cumulative dissertation investigates associations between different facets of stress appraisal, well-being, and coping strategies. This is done both cross-sectionally and over time, with a focus on the global COVID-19 pandemic and the Russo-Ukrainian War. Contribution 1 investigates the relationships between general worries about the COVID-19 pandemic (as a form of stress appraisal) and various measures of well-being based on the cross-sectional data of N = 665 German adults collected in April 2020. In addition, the moderating effects of coping strategies are explored. Unlike in Contribution 1, stress appraisal regarding the COVID-19 pandemic in Contribution 2 was differentiated into different facets (fear of COVID-19, financial worries, social isolation). Here, associations between these facets of stress appraisal and several measures of well-being are reported in a structural equation model. Cross-sectional data of N = 480 German adults was collected from March until May 2021. Lastly, Contribution 3 highlights the change of worries about the Russo-Ukrainian war (as a form of stress appraisal) in a three-wave measurement of N = 175 German adults over two months starting with the beginning of the conflict. Further, based on a latent growth model, temporal changes in the use of coping strategies and their relations to worries are examined. The overarching results outline the cross-sectional relations and temporal dynamics of individual stress appraisals in relation to well-being and coping strategies during two global crises. In summary, this dissertation enhances the understanding of the psychological challenges posed by global crises, the nature of emotional responses, and the adaptive role of coping strategies.

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Chapter 1

Introduction

1. Introduction

Residing in an interconnected world yields substantial advantages for individuals and society alike. For example, fast and efficient transportation systems present myriad opportunities for exchanging goods and traveling to the remotest corners of the earth becomes possible for a broad population. However, this strong interconnection also poses dangers and risks, as the world has experienced firsthand with the COVID-19 pandemic. A single virus spread from China to nearly the entire world within only a few months (World Health Organisation, 2024). While individuals were primarily limited to issues in their immediate surroundings about 150 years ago, today, they must grapple with challenges that are exponentially larger and more threatening in scale. For instance, every person on our planet is affected by the consequences of climate change, which is one of the most prominent global crises of our time (see, for example, the Global Risks Report 2023 published by the World Economic Forum, 2023). Global crises are events that extend their impact across vast populations, such as the ongoing Russo-Ukrainian War. This impact makes them an important subject to examine in the field of health psychology since they can threaten people's mental health and well-being (e.g., Chudzicka-Czupała et al., 2023; Pieh et al., 2020). However, how people react to and are impacted by global crises can still vary interindividually, and intraindividual stress appraisal may also change over time (Bendau et al., 2021; Park et al., 2021). For example, the lockdown restrictions during the COVID-19 pandemic were a source of distress for some while offering moments of relaxation and self-reflection for others. Furthermore, the relationship between indicators of a person's overall health, such as well-being (Diener et al., 2017), and a stressor differs based on individual resources and coping strategies (e.g., Park et al., 2021). Policymakers and researchers tend to neglect this variability, as solutions and strategies are usually developed in a political or societal context. In conclusion, adopting a one-size-fits-all approach in handling the negative psychological impacts of global crises seems insufficient.

Building upon the research question of how individual stress appraisal during global crises is related to well-being and different coping strategies, the present dissertation

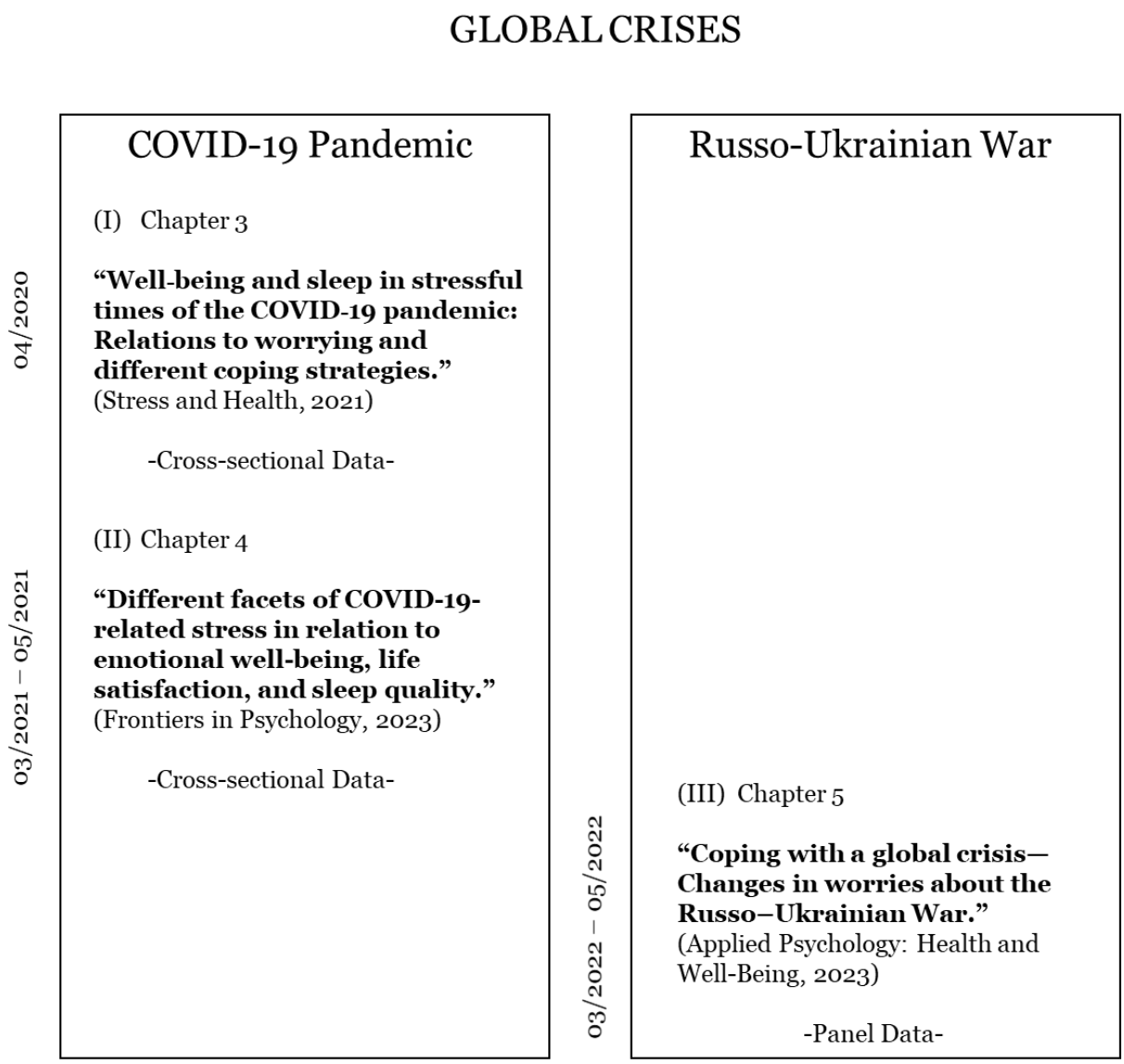
examines the multifaceted nature of individual stress appraisal, various measures of well-being, and four specific coping strategies (problem-focused, meaning-focused, social, and avoidance coping). This overarching goal is investigated in three different contributions, all offering different insights into these various aspects of people's feelings and behavior during global crises. The investigations are based on German study samples and are rooted in the analysis of two specific global crises that unfolded during the development of this dissertation: the COVID-19 pandemic and the Russo-Ukrainian War.

1.1 Structure of this Dissertation

In alignment with the stated research objective, this dissertation is organized into five chapters. Following this brief introduction (Chapter 1), the subsequent chapter (Chapter 2) presents the theoretical background and defines the relevant constructs (stress appraisal, well-being, and coping). This holds significant importance, emphasized, for example, by Hinkle (1974), given that the definitions and measurements of the relevant constructs profoundly shape the outcomes obtained. The theoretical background is further divided into five subsections, beginning with an introduction to global crises (section 2.1), which form the contextual framework of this research. The description and classification of global crises are followed by a theoretical embedding of the central construct of this dissertation, namely stress appraisal (section 2.2). Next, well-being (section 2.3) and coping (section 2.4) are described. These sections present how these two constructs are defined and relate to stress appraisal. Finally, the aims of this dissertation (section 2.5) conclude the second chapter. Chapters 3, 4, and 5 are each dedicated to one of the three contributions of this dissertation. For an overview, see Figure 1. In Chapter 6, the central findings (section 6.1), as well as further insights (section 6.2) of the three contributions, are discussed. Further, limitations and open questions for future research are presented (section 6.3), and final conclusions are drawn (section 6.4).

Figure 1

Overview of the Context, the Time Point of the Data Collection, and the Type of Data of the Three Contributions of this Dissertation.



Chapter 2

Theoretical Background

2. Theoretical Background

2.1 Global Crises

Global or international crises is a widely used term, and most people can easily name examples of such events, such as military conflicts or economic crises. However, so far, this term lacks a single common definition suitable for scientific research. In reference to the Global Risks Report 2023 (World Economic Forum, 2023), a global crisis can be characterized as an occurrence or circumstance that induces a markedly adverse effect on the global population, GDP, or natural resources. While this definition provides a valuable description of a global crisis from a societal, political, or economic perspective, it does not explicitly address the perspective of the individual. A more psychologically oriented framework to describe global crises stems from the view of life-span developmental psychology, which differentiates three potential influences on human development, namely age-graded, history-graded, and nonnormative-graded influences (Baltes et al., 1980). Age-graded influences are factors typically linked to an individual's age and have predictable effects on development, such as biological maturation or retirement. History-graded and non-normative influences, unlike age-graded influences, are (often) unusual and unpredictable events (Baltes et al., 1980). However, while history-graded influences confront a large number of people during a specific time period irrespective of their age or individual life circumstances (e.g., military conflicts or pandemics), non-normative influences only affect a small number of people (e.g., accident or illness; Baltes et al., 1980). Given this differentiation of potential developmental tasks during a person's life span, one could argue that global crises can be seen as history-graded influences in an individual's life span. Notably, this classification does not draw any conclusion about whether such events are positive or negative for the individual (Filipp, 2001). In the case of global crises, however, the impact per se is negative (see the classification of a global crisis in reference to the Global Risks Report 2023 mentioned above as an occurrence with a markedly adverse effect). Therefore, global crises can be interpreted as adverse normative history-graded events. However, it is important to note that even though many individuals are confronted with the same event in the case of global crises, their appraisal of it and their reactions to it do not

necessarily have to be the same. Finally, global crises have to be distinguished from "major" or "critical life events" which are widely used terms in stress research, usually describing non-normative negative life events affecting a small number of people, such as, for example, a divorce or a job loss (Filipp, 2001; Monroe & Slavich, 2020) in contrast to global crises which affect a large number of individuals.

There are numerous ways to further differentiate global crises into overarching categories. For instance, the Global Risks Report 2023 (World Economic Forum, 2023) differentiates economic (e.g., global economic crisis), environmental (e.g., climate change), geopolitical (e.g., conflicts in the Middle East), societal (e.g., involuntary migration), and technological (e.g., cybercrime) global risks that can cause global crises. A broader distinction categorizes only three types of global crises: man-made, natural, and health crises (Kohrt et al., 2019). Man-made crises encompass, among others, armed conflicts and climate change. Natural crises include natural disasters like floods, hurricanes, or earthquakes, and health crises are major infectious and non-infectious disease outbreaks. Despite these differentiations, various types of crises often co-exist, overlap, or mutually condition each other. For instance, natural disasters can lead to famine and disease outbreaks in the aftermath. Regardless of the type, however, global crises have in common that they often significantly impact people's well-being and can induce a great deal of stress and worries. For example, the risk of depression and anxiety disorders rose significantly during the COVID-19 pandemic (Santomauro et al., 2021), and Riad et al. (2022) found elevated levels of worries about the Russo-Ukrainian War in a Czech study sample. However, it is important to note that the appraisal of such worries and stressors, as well as potential coping efforts, can vary between individuals (see, for example, the standard deviations for worries about the Russo-Ukrainian War in the study by Riad et al., 2022) but also between different events, such as the COVID-19 pandemic and the Russo-Ukrainian War, which are investigated in this dissertation.

2.1.1 Impact of the COVID-19 Pandemic and the Russo-Ukrainian War

This dissertation focuses on the relationships between stress appraisal, well-being, and coping regarding two distinct global crises that unfolded during the creation of this dissertation: the COVID-19 pandemic and the Russo-Ukrainian War. The COVID-19 pandemic, which can be categorized as a societal (World Economic Forum, 2023) or health crisis (Kohrt et al., 2019), was caused by the novel airborne

coronavirus SARS-CoV-2 that rapidly spread worldwide from Wuhan, China, in December 2019 (Lu et al., 2020). Manifesting symptoms ranged from mild to severe respiratory complications, which, according to estimates, caused the death of 13-16 million people (Msemburi et al., 2023). However, such estimates must be interpreted cautiously since measuring excess death rates is a complex task (Acosta, 2023). Despite the challenges in estimation, the impact of the COVID-19 pandemic has been profound. Governments worldwide responded with a spectrum of measures to prevent the virus's spread. These measures encompassed lockdowns, social distancing, quarantine, mask mandates, and travel restrictions that significantly affected the economy, society, work, and daily life (e.g., Borio, 2020; Bundesagentur für Arbeit, 2020). Furthermore, the mental health of individuals was also significantly affected by the pandemic. For example, studies reported an increase in anxiety (Jungmann & Witthöft, 2020) and stress (Lakhan et al., 2020), as well as a decrease in quality of life (Dale et al., 2022). In 2021, global vaccination campaigns were initiated to alleviate the virus's severity and prevent further infections (Zheng et al., 2022). Then, around two years after the outbreak of the coronavirus SARS-CoV-2, when the COVID-19 pandemic finally was more or less under control, another global crisis emerged: The Russo-Ukrainian War.

The Russo-Ukrainian War can be categorized as a geopolitical (World Economic Forum, 2023) or man-made crisis (Kohrt et al., 2019) and started with the annexation of Crimea in 2014 and finally escalated with the Russian invasion of Ukraine in February 2022 (Delanty, 2023). Since then, thousands of people on both sides have lost their lives or had to flee their homes (OHCHR, 2023; UNHCR, 2023). Overall, the Russo-Ukrainian War has resulted in significant geopolitical, humanitarian, and economic consequences worldwide. For instance, according to the OECD (2022), the change in the forecast for GDP growth dropped for many countries around the world. In the early days of the conflict, many European countries, including Germany, were unsure how the situation would unfold and whether the military conflict would spread to other European countries. For many Europeans, the possibility of involvement in the war was unimaginable and surreal, as they had been living in peace for decades (Delanty, 2023). As a result, such uncertain situations can potentially lead to worries and stress in the population and impact people's health. For example, in a German study sample (where also the data of the presented contributions of this dissertation were collected), 41% reported being worried about the expansion of the war, and 21%

reported worrying about an economic crisis (European Commission, 2022). However, these results also demonstrate that not everyone was equally affected by this stressor, as 59% were not worried about an expansion of the war. One possibility to explain this finding lies within individual stress appraisals, which will be further described in the following section.

2.2 Stress Appraisal

2.2.1 Appraisal Theories of Stress

People have to deal with various types of problems, threats, or challenges (stressors) throughout their lives (Filipp, 2001). Different stressors can range from personal issues such as health problems or financial difficulties to national or even global events like the COVID-19 pandemic or the Russo-Ukrainian War, which are investigated in this dissertation. In general, one can distinguish between a stress exposure (objectively observable events/stressors) and a stress response (individual reaction to events/stressors), as, for example, Harkness and Hayden (2020) point out. In contrast to the objective nature of a stressor (stress exposure), the stress response is the result of an individual appraisal process and is thus subjective. A stress response includes feelings like fear, anxiety, or worry and is influenced by various intra- and interindividual factors (Harkness & Hayden, 2020). This dissertation centers on examining the unique stress responses exhibited by individuals either during or in reaction to global crises. Several theories abound to elucidate stress responses, drawing from research in social, developmental, personality, and health psychology (for an overview, see, for example, Wentura et al., 2002). The Transactional Model of Stress and Coping by Lazarus and Folkman (1984) forms the foundational framework of this dissertation, as this theory posits that the stress response is profoundly shaped by cognitive assessments (appraisals) of an event.

Specifically, the Transactional Model of Stress and Coping, introduced by Lazarus and Folkman (1984), delineates stress as an individual's cognitive assessment of the interplay between themselves and the environment in terms of its significance to well-being (for more information on well-being, see section 2.3), particularly when resources are strained or surpassed. According to this definition, stress can be considered a process that is based on subjective cognitive appraisals and is the result of perceiving that one’s own resources are not fit to deal with external or internal demands. In that matter, the model distinguishes between primary and secondary

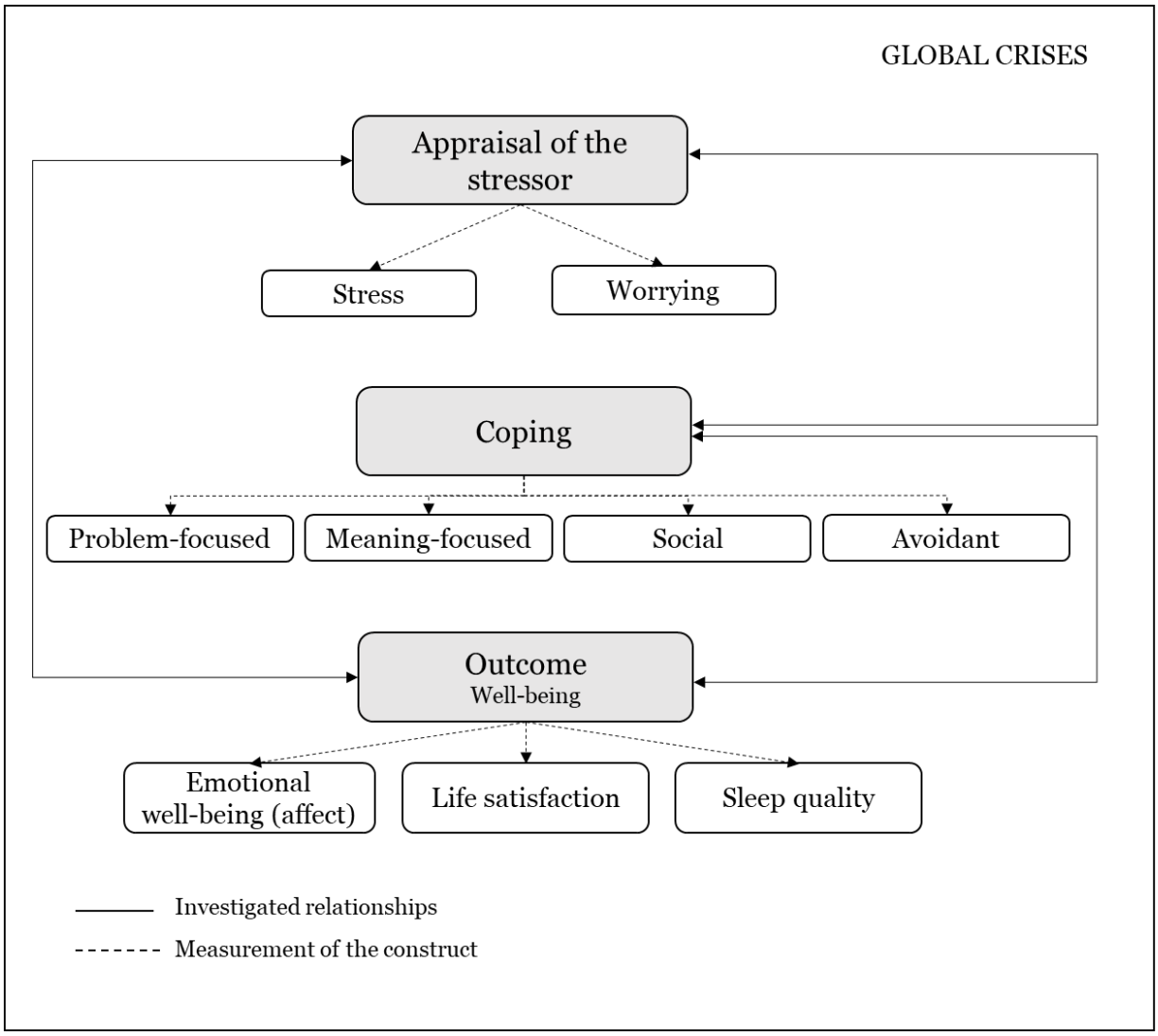
stress appraisal. Primary stress appraisal, according to Lazarus and Folkman (1984), is the initial assessment that an individual undertakes upon encountering a potential stressor. It involves an evaluation of whether a particular situation, originating externally or internally, holds significance for one's personal well-being. According to the authors of the model, if a stressor is considered relevant, it can be appraised as either positive (benign) or negative (stressful) when it perils personal needs or goals. Once a situation has been identified as stressful, the secondary stress appraisal comes into play. Secondary appraisal assesses available resources and strategies for dealing with a specific stressor. It is important to emphasize that, despite the implication in the notation, primary stress appraisal does not inherently precede secondary stress appraisal. Rather both types of appraisal interact dynamically (Smith & Kirby, 2011). Stressful appraisal can further be differentiated as harmful (loss), threatening, or challenging (Lazarus & Folkman, 1984). Appraisal of harm or loss addresses the aftermath of situations where some sort of harm (e.g., illness or injury) has already occurred in contrast to an appraisal of threat or challenge, which relates to events that may unfold in the future. Unlike threatening stressors, which hold the potential for future harm or loss, challenging stressors hold the potential for future personal growth. This inclusion of anticipatory stressors represents a crucial cornerstone for this work, as it also allows for the integration of worries into the theoretical framework of stress appraisal (for more information on worry, see section 2.2.2). Apart from the evaluation of the specific stressor, appraisal processes are also profoundly influenced by individual perceptions, beliefs, motivation, values, and goals, as well as situational factors such as novelty, predictability, uncertainty, or duration (Lazarus & Folkman, 1984). Stress appraisal processes are essential for psychological growth and development and can yield positive effects, as demonstrated by the beneficial impact of stress on longevity (Minois, 2000). Conversely, stressors can also prove detrimental, particularly when they persist over an extended period or ineffective coping strategies are employed (Gouin, 2011; Marin et al., 2011).

Generally, if a stressor is evaluated as stressful a psychological and physiological (e.g., activation of the sympathetic nervous system or elevated heart rate; Weber et al., 2022) stress response is triggered, which enhances the mobilization of resources and coping mechanisms (for more information on coping see section 2.4) and induces emotions such as fear or anxiety (Folkman & Lazarus, 1985). It is important to highlight recent advancements that attempt to integrate the Transactional Model of Stress and Coping

by Lazarus and Folkman (1984) with appraisal theories of emotion, see, for example, Smith and Kirby (2011). Appraisal theories of emotion aim at explaining the occurrence of specific emotions via the cognitive assessment (appraisal) of the interplay between the person and a specific situation. Among others, after the development of the Transactional Model of Stress and Coping, Richard Lazarus also proposed a model of appraisal of emotions with his colleague Craig Smith (Smith & Lazarus, 1990). This model again proposes a primary and secondary appraisal, where primary appraisal evaluates the relevance of a circumstance for an individual's well-being, and secondary appraisal evaluates potential resources and coping options. Appraisals that might threaten a person's well-being lead to negative emotions, and appraisals that enhance a person's well-being lead to positive emotions. Taken together, the Transactional Model of Stress and Coping (Lazarus & Folkman, 1984) and appraisal theories of emotion (e.g., Smith & Lazarus, 1990) share a common theoretical framework through the central role of cognitive appraisal in eliciting specific emotions and stress. Furthermore, as Lazarus (1990) himself pointed out, stress and emotion are interconnected as they can be viewed as two representations of the same construct. Arguably, the transactional model of stress and coping can, therefore, be seen as a subset within the overarching framework of appraisal theories of emotion. This advancement offers important insights into the relationship between stress appraisal and worries (see section 2.2.2), as investigated in this dissertation. Building upon the Transactional Model of Stress and Coping and appraisal theories on emotion, a schematic depiction of the proposed model for the investigated variables of this dissertation adapted to the context of global crises can be seen in Figure 2. It is important to note that it is not a goal of this dissertation to verify the model in Figure 2, especially since the relationships proposed by the Transactional Model of Stress and Coping (Lazarus & Folkman, 1984) should be tested with longitudinal designs, which are not integrated in this dissertation. Figure 2 instead serves as a schematic depiction of the classification of the constructs and their investigated relationships in this work.

Figure 2

Schematic Representation of the Investigated Constructs and their Operationalization in the Context of Global Crises in adaption to the Transactional Model of Stress and Coping (Lazarus & Folkman, 1984).



2.2.2 Worrying as Stress Appraisal

Potential stressors, such as the emergence of the COVID-19 pandemic or the Russo-Ukrainian War, often induce feelings of worry. Although most people are familiar with this term and how it feels to be worried, giving a precise definition for it is less straightforward. Borkovec et al. (1983) describe worrying as a (relatively) uncontrollable and unpleasant chain of thoughts and images triggered by a fear-inducing stimulus. Worrying individuals tend to direct their attention inward, focusing on thoughts, concerns, or anxieties rather than external stimuli (Borkovec et al., 1983). This inward attention represents the cognitive facet of worrying, wherein individuals commonly engage in prolonged reflection or preoccupation with potential problems, uncertainties, or negative outcomes. The emotional dimension of worrying is intricately connected to feelings of fear and anxiety. Worries even serve as a key symptom in diagnosing generalized anxiety disorder (GAD; Olatunji et al., 2010).

Since worrying usually centers around the potential negative outcomes of future events, situations considered threatening compared to harmful or challenging (see section 2.2.1) are most likely to provoke worrying. Importantly, a concept that is closely related to worry and, therefore, needs to be distinguished from it is rumination. While both constructs describe intrusive negative thoughts, rumination, in contrast to worries, focuses more on past events than future events (Watkins et al., 2005). In line with these insights, worrying can be interpreted as a specific type of anticipatory stress appraisal as described by appraisal theory. Smith & Kirby (2011) who attempted to combine the Transactional Model of Stress and Coping (Lazarus & Folkman, 1984) with appraisal theories of emotion (e.g., Smith & Lazarus, 1990) describe that specifically fear and anxiety arise when a situation is considered as having a high motivational relevance (situation is considered important) in combination with the perception of low psychological abilities to deal with and adjust to the potentially undesired situation which results in the appraisal of threat. Fear and anxiety, in turn, are critical aspects of worrying, as described above. Therefore, both the emergence of a feeling of stress and worries can be explained by appraisal theory (see Figure 2) and potentially are related to diminished well-being (see section 2.3). Therefore, in this dissertation, worrying is viewed as a specific form of a cognitive and affective stress response that consists primarily of negative thoughts and feelings concerning possible future events.

Worrying, as well as its relation to health, is influenced by various factors such as the object of worrying (oneself/ingroup vs. society/world), its domain (e.g., health or safety), or people's values and beliefs (Boehnke et al., 1998; Schwartz et al., 2000). For example, worries about one's own person or loved ones (micro worries) but not worries concerning society or the world (macro worries) correlate with diminished mental health (Boehnke et al., 1998; Schwartz & Melech, 2000). In fact, previous research linked worries with a variety of mental disorders, such as anxiety disorder or depression (Hong, 2007; Szabó, 2011). Nevertheless, worrying is an everyday phenomenon (Verkuil et al., 2007) and can also prepare to cope with potential future stressors (Borkovec et al., 1983), for example, by mentally playing out different potential outcomes of a situation.

Worries and stress often arise in novel and uncertain situations. Therefore, it seems close at hand that they might arise during global crises. Consequently, all three contributions of this dissertation investigate individual stress appraisals. The first and second contributions (Chapters 3 and 4) depict general and specific forms of stress appraisal during the COVID-19 pandemic and primarily illustrate the association of stress appraisal with well-being. The third contribution (Chapter 5) depicts how stress appraisal (worries) develops over time during the beginning of the Russo-Ukrainian war and how it relates to coping strategies.

2.3 Well-being

Well-being represents an integral part of appraisal theories as situations are evaluated with respect to the impact of a person's well-being (see section 2.2). This can include both an individual's physical and mental well-being. However, in this dissertation, only the psychological aspects of well-being are highlighted. Therefore, defining how well-being is understood in this work is essential. Well-being, in the meaning it is investigated in this dissertation, was described by Ed Diener nearly four decades ago (Diener, 1984). Well-being, or subjective well-being, can be defined as an individual's overall evaluation of his or her life as well as emotional experiences and is often colloquially referred to as happiness (Diener et al., 2009; Diener, Heintzelman, et al., 2017). This definition expands on the early idea of well-being as the absence of mental illness as it adds a positive perspective on life (Diener et al., 2009). Despite this concise and straightforward definition, well-being is a complex psychological construct

comprising both cognitive and affective components, each contributing distinct aspects of how individuals evaluate their lives and emotions (Diener & Chan, 2011; Diener & Diener, 1996). The cognitive components can be seen as a form of evaluation reflecting on one's satisfaction with global or specific aspects of life (e.g., life satisfaction or sleep quality), while the affective components represent specific emotions that arise in response to life events (e.g., positive or negative affect; Diener, Heintzelman, et al., 2017). Due to its multifaceted nature, various constructs emerged to measure well-being. Among the most common are life satisfaction (cognitive) and positive and negative affect (affective). Diener, Heintzelman, et al. (2017) argue that since these facets of well-being can be separated in factor analysis and show different relations to other psychological measures (e.g., depression; Watson, Clark, & Carey, 1988), researchers should address different aspects of a person's well-being individually. Specifically, the call for more research to distinguish possible relationships between various measures of mental health (e.g., stress and worries) with different measures of well-being, which will be considered in this dissertation by measuring different facets of well-being (positive and negative affect, emotional well-being, life satisfaction, sleep quality).

Well-being is usually measured through self-report surveys. Popular examples are the Satisfaction with Life Scale from Diener et al. (1985), measuring life satisfaction; the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen., 1988), measuring positive and negative affect; and the World Health Organization Well-Being Index (WHO-5), measuring emotional well-being (Topp et al., 2015), which are all integrated in this dissertation (see Contributions 1 and 2). However, apart from these more common indicators of well-being, additional domain-specific evaluations can also be encompassed within the broader construct of well-being. One such facet of well-being is sleep, which is also closely related to people's psychological and physical health. For instance, insufficient sleep is associated with stress and a higher mortality risk (Fernandez-Mendoza et al., 2020; van Leeuwen et al., 2018). Additionally, poor sleep quality represents a risk factor for diminished psychological health (Scott et al., 2021). Two measures of well-being, namely the revised Psychological General Well-Being Index (PGWB-R; Revicki et al., 1996) and the Well-being Questionnaire (W-BQ; Bradley, 1994), have also incorporated items pertaining to sleep as an integral aspect of well-being. Therefore, subjective sleep quality (and duration) will be included in this dissertation as a distinct measure of well-being apart from life satisfaction, emotional

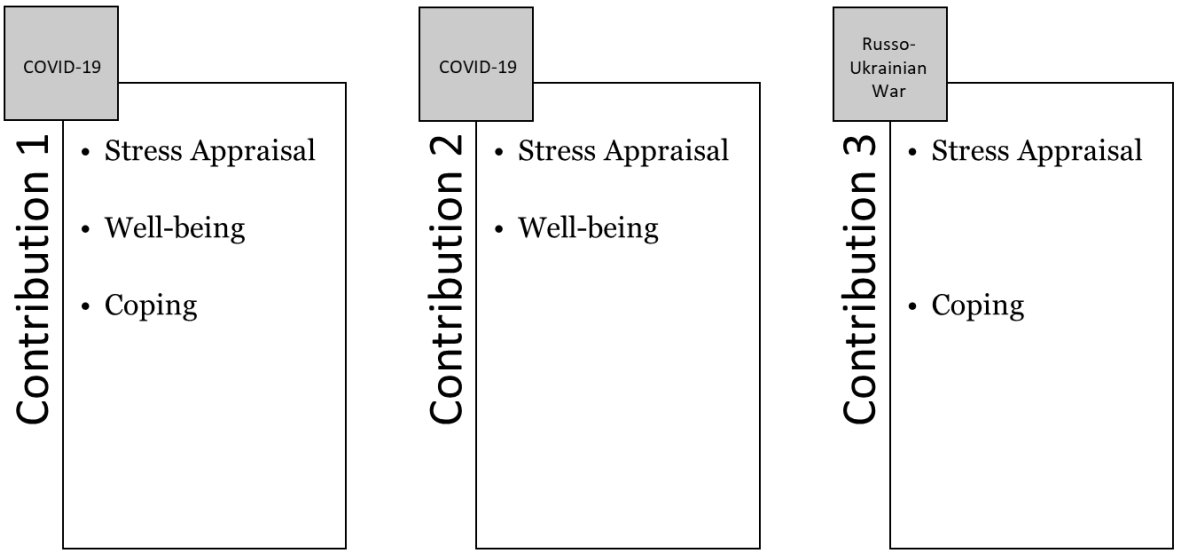
well-being, and positive and negative affect. Subjective sleep quality can be described as a cognitive evaluation of one's overall satisfaction with sleep (Buysse, 2014).

Interestingly, Diener and Diener (1996) propose in their study that individuals tend to gravitate towards an individual set point of subjective well-being. Notably, this set point typically resides in the positive spectrum, with most people reporting a sense of happiness. Their examination across 43 nations found that in 86% of the studied nations, the average level of subjective well-being was above the neutral point. According to Bojanowska and Zalewska (2016), the two aspects of life that are most strongly associated with happiness are health and relationships, followed by knowledge, work, material goods, and freedom. Diener and Chan (2011), along with Diener, Pressman, et al. (2017), even argue that high well-being not only correlates with better health but also contributes to it. Therefore, while well-being evidently plays a pivotal role in shaping an individual's quality of life, its connection with various facets of psychological health is equally significant. One noteworthy association is the interplay between well-being and stress (e.g., Schlosser, 1990); higher stress levels are usually associated with lower levels of well-being. However, under the right conditions (depending on the situation, the person, and the chosen coping strategies), coping efforts can mitigate potential negative relationships (see section 2.4).

Well-being is investigated in Contribution 1 (Chapter 3) and Contribution 2 (Chapter 4) of this dissertation (see Figure 3), whereas in both contributions, well-being was operationalized by an emotional- and cognitive-oriented measure. In the first contribution, well-being was measured as positive and negative affect (emotional) as well as sleep quality (cognitive), and in the second contribution, it was measured as emotional well-being (emotional), life satisfaction (cognitive), and sleep quality (cognitive).

Figure 3

Investigated Constructs for each Contribution of this Dissertation.



2.4 Coping with Stress

2.4.1 Coping in the Transactional Model of Stress and Coping

Like well-being, coping is an integral part of the stress appraisal process and its outcome (well-being). Precisely, coping, in accordance with the Transactional Model of Stress and Coping, involves ongoing adjustments in cognitive and behavioral efforts aimed at handling particular external and/or internal challenges perceived as surpassing the individual's available resources (Lazarus & Folkman, 1984). In this sense, coping is a complex and dynamic process that is influenced both by the person and the context but also by their shared relationship (Folkman & Moskowitz, 2004). Noteworthy is that this definition makes no assumption whether these efforts are effective. In fact, each coping mechanism has the potential to be effective and adaptive or ineffective and maladaptive depending on the specific situation (Lazarus & Folkman, 1984). Consequently, it is crucial to evaluate coping efforts and potential outcomes (well-being) independently and to delineate the effectiveness of specific coping strategies in varying situations (Lazarus, 1993). In the context of this dissertation, I, therefore, delve into diverse global crises (different situations) and explore how individuals navigate them individually. This is crucial because each crisis, despite sharing common traits, possesses its own distinct characteristics, necessitating

separate examination to comprehend the nuances of coping strategies employed by individuals.

2.4.2 Coping Strategies

Despite the context and the person, the choice of coping strategies to tackle a problem influences the outcome. There exists a myriad of different coping mechanisms to deal with a global crisis and other stressful events. In light of this diversity, researchers have endeavored to integrate coping strategies into broader constructs. Lazarus & Folkman (1984) distinguished between problem-focused coping, in which individuals seek to modify the source of stress, and emotion-focused coping, where the emphasis is on altering one's emotional response to the stressor. Folkman extended this differentiation by introducing meaning-focused coping, which highlights positive emotions during the stress process (Folkman, 2008; Folkman & Moskowitz, 2000). In the following years, other distinctions have been proposed, such as active versus avoidant coping (Holahan & Moos, 1987), cognitive versus behavioral (Jensen et al., 1995), or assimilative versus accommodative coping (Brandtstädter & Renner, 1990). Given the broad spectrum encapsulated within these two-dimensional constructs, a desire arose to pay more attention to individual specific strategies that overarching categories might otherwise overshadow. In this sense, Carver and Scheier (1989) published the COPE inventory, which assesses 14 different coping strategies with four items each. Carver (1997) then expanded and refined the COPE inventory, creating the Brief COPE, which assesses 14 strategies through two items each. The Brief COPE has since emerged as one of the most widely utilized coping questionnaires in psychological research (Kato, 2015) and represents the basis of the coping strategies investigated in this dissertation (for more explanations, see the following section 2.4.3).

2.4.3 Coping Strategies Investigated in this Dissertation

While the notion of evaluating numerous coping facets indeed carries its advantages, it is not without drawbacks. The approach, though comprehensive, lacks parsimony and economic efficiency. Moreover, it introduces challenges when attempting to compare results across various research studies that may employ different coping questionnaires and assess different facets of coping (Skinner et al., 2003). Hence, it is essential to strike a balance between constructs that are not overly encompassing and an excessive number of finely detailed facets of coping. Thus, this dissertation delves into four distinct facets of coping: problem-focused, meaning-focused, social, and

avoidance coping, which have been differentiated in factor analysis in previous research (e.g., Baumstarck et al., 2017; Litman, 2006; O'Connor & O'Connor, 2003). These coping strategies were extensively investigated, addressing a diverse set of characteristics and relationships. This potentially enables the comparison of the results of this dissertation with results from other research studies.

Problem-focused coping entails addressing the specific stressor directly, such as devising plans to alter the current situation, and therefore corresponds to the problem-focused coping originally described by Lazarus & Folkman (1984). Meaning-focused coping or positive thinking, as described by Baumstarck et al. (2017), seeks to positively reframe the stressful situation, for example, through acceptance or humor, without altering the underlying problem itself. Avoidant coping strategies, including behaviors like self-distraction, denial, or substance use, reflect attempts to distance oneself from a negative situation, seeking a form of escape or avoidance, which was already described by Holahan & Moos (1987). Both avoidance and meaning-focused coping (as they are described in this work) could be subsumed under the construct of emotion-focused coping (Lazarus & Folkman, 1984). Social coping, which is often mistakenly confused with social support, encompasses the deliberate effort to reach out for support within one's social network (O'Connor & O'Connor, 2003). It may involve seeking emotional reassurance, practical help, or engaging in open communication to draw upon the strength of interpersonal connections and fits both into the problem- and emotion-focused coping category by Lazarus & Folkman (1984). In contrast to social coping, social support, which has long been recognized as an important protective factor when dealing with stress, describes the feeling that a social network exists or that one is cared for (Taylor, 2011). Due to this imprecise usage of the two terms, social coping is sometimes considered a resource rather than a coping strategy (Parker & Endler, 1992). However, as social coping extends beyond the mere existence of social support (actively seeking out support), including specific actions like seeking instrumental or emotional help that a person employs to address a stressor, it unequivocally does qualify as a specific coping strategy that should not be confused with the mere existence of social support and therefore deserves to be further investigated as a distinct construct within the realm of coping.

According to Lazarus (1993), the concept of coping can be further divided into two interconnected dimensions: dispositional and situational coping. Dispositional coping represents stability or consistency of employed coping strategies across diverse

conditions. Situational coping represents instability or change across and within situations. If the emphasis lies on coping consistency over time and across various encounters, it aligns with the trait concept of coping. Conversely, if the focus is on contextual influences and coping inconsistency over time and across encounters, it aligns with the state concept of coping. Both dispositional and situational coping constitute integral aspects of the coping process, offering distinct insights into how individuals navigate stressors, including global crises. This dissertation specifically unravels the complexities of how individuals navigate the challenges posed by global crises by incorporating different coping strategies. This allows for a richer understanding of coping tendencies and dynamics in direct response to global crises, shedding light on the diverse strategies employed by individuals in response to the ever-evolving landscape of stressors during such events.

There are trends in coping research to describe, for example, problem- and meaning-focused strategies as more adaptive (Duangdao & Roesch, 2008; Wang et al., 2019) and avoidance coping as a more maladaptive coping strategy (Littleton et al., 2007). It is important to refrain from making broad conclusions about the adaptiveness of different coping strategies across various contexts, as described above. Therefore, at his point, I will not delve further into this topic. Instead, conclusions will be derived from the obtained results in relation to the specific contexts of the COVID-19 pandemic and the Russo-Ukrainian War. Coping is specifically explored in Contribution 1 (Chapter 3) and Contribution 3 (Chapter 5; see Figure 3) of this dissertation. In both contributions, all four depicted coping strategies (problem-focused, meaning-focused, social, and avoidance coping) are included. As can be seen in Figure 3, Contribution 1 investigates coping with the COVID-19 pandemic, whereas Contribution 3 highlights coping with the Russo-Ukrainian War.

2.5 Aims of the Present Dissertation

As mentioned in the previous chapters, this dissertation's main goal is to investigate individual stress appraisal during global crises and its relationships to health-related constructs. Therefore, the present dissertation seeks to comprehensively explore the multifaceted nature of stress appraisal, well-being, and coping during two exemplary global crises, the COVID-19 pandemic and the Russo-Ukrainian War. To investigate this overarching goal, this dissertation is structured in two interconnected research aims that are explored in three different contributions.

The first aim is to describe the associations between stress appraisal and well-being. Understanding how these variables interplay might contribute to a more holistic comprehension of individuals' overall well-being and mental health during times of global crises. In addition, the potential moderating role of coping in this relationship is investigated. The first aim of this dissertation is the subject of Contribution 1 and Contribution 2 and centers around stress appraisal regarding the COVID-19 pandemic. For an overview of the investigated constructs for each contribution, see Figure 3. The first contribution explores general worries (as a specific type of stress appraisal) regarding the COVID-19 pandemic and its relation to well-being. Well-being is measured as positive and negative affect for an emotional-oriented aspect of well-being and sleep quality for a cognitive-oriented aspect. To test the moderating role of coping in this relationship, the use of four different coping strategies to deal with the COVID-19 pandemic is assessed (problem-focused, meaning-focused, social, and avoidance coping). Besides the associations of well-being with stress appraisal, the relationships between these various coping strategies and the two measures of well-being are also depicted to complete the picture of the interconnections between these three variables. Since the measure for COVID-19 worries in Contribution 1 already included different aspects of worries that were, however, not specifically explored, the second contribution further differentiates between the stress appraisal of different contents regarding the COVID-19 pandemic. These aspects were social isolation, fear of COVID-19, financial worries, and their associations with well-being. To be able to report more generalizable results, different measures of well-being were included (emotional well-being, life satisfaction, and sleep quality), again representing emotional and cognitive-oriented measures.

The second aim of this research, which is expounded on in Contribution 3, refers to the analysis of the relationship between stress appraisal (specifically worries about the war) and coping. This association was explored in the context of the Russo-Ukrainian War because the military escalation in Ukraine had just started at the time of data collection of Contribution 3, and the COVID-19 pandemic had already subsided significantly. The assessed coping strategies are problem-focused, meaning-focused, social, and avoidance coping, the same four strategies already investigated in Contribution 1 as a moderator of the association between stress appraisal and well-being. By implementing a panel design, the data allows the investigation of not only associations between these variables but also how stress appraisal and coping efforts,

as well as their relationship, evolve as the crisis unfolds (Contribution 3).

Building upon these research objectives, this dissertation ties together the threads of stress appraisal, well-being, and coping. The insights gained from this dissertation aspire to deepen the understanding of the psychological intricacies in the context of the impact of global crises on the individual and can potentially inform interventions and support systems aimed at promoting resilience, well-being, and health in the face of adversity. The exploration of these research aims relies on German study samples and is, as already mentioned above, grounded in the analysis of two distinct global crises that unfolded during this dissertation's development: the COVID-19 pandemic (as discussed in Contributions 1 and 2) and the Russo-Ukrainian War (as explored in Contribution 3; see Figure 1). Therefore, patterns and trends that contribute to a more nuanced understanding of the broader implications and responses associated with global crises may be uncovered, and hopefully, overarching results can be drawn.

Chapter 3

Well-being and Sleep in Stressful Times of the COVID-19 Pandemic: Relations to Worrying and Different Coping Strategies

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RESEARCH ARTICLE

Well-being and sleep in stressful times of the COVID-19 pandemic: Relations to worrying and different coping strategies

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Abstract

The present study examined the relationships between emotional well-being (positive and negative affect), sleep-related variables (sleep quality, sleep duration, and change in sleep quality and duration compared to weeks before lockdown), and worrying about coronavirus disease (COVID-19) challenges during the beginning of the outbreak in Europe. In addition, four different coping strategies were investigated. The study was conducted in Germany with data from 665 participants (53.8% female; 18–73 years), who completed an online questionnaire in April 2020. The results revealed that COVID-19 worry was associated with impaired well-being and sleep. Meaning- and problem-focused coping were the most frequently used coping strategies, and showed positive associations with well-being and sleep. Social and avoidance coping were associated with decreased well-being and worse sleep outcomes. Three coping strategies showed moderating effects. People who worried more showed higher levels of positive affect when they used problem-focused coping compared to those who did not. Similarly, highly worried participants showed lower levels of negative affect when they reported using meaning-focused coping more often. In contrast, social coping increased the risk of high negative affect levels in worried participants. In conclusion, problem-focused and meaning-focused coping strategies seemed to be most effective in coping with COVID-19 challenges.

KEYWORDS
coping, COVID-19, sleep, well-being, worrying

1 | INTRODUCTION

The newly emerged SARS-CoV-2 virus, first discovered in China at the end of 2019 (Lu et al., 2020), had spread around the globe within the first few months of 2020, and instantly posed a great challenge for countries, the society, and people alike. Job loss, home schooling, and social isolation, due to the lockdown restrictions as well as the risk of infecting oneself and loved ones, are examples of what people were confronted with during the beginning of the COVID-19 pandemic in several countries. For many, the COVID-19 pandemic constituted an ongoing source of worrying and stress, which may have led to impaired well-being and sleeping problems, as studies

have suggested (American Psychiatric Association, 2020; Rajkumar, 2020; Sønderskov et al., 2020; Umucu & Lee, 2020; Zacher & Rudolph, 2020). Stressful live events usually trigger the use of certain coping strategies to reduce stress and enhance well-being and sleep (Lazarus & Folkman, 1984). However, not all coping strategies are equally efficient in doing so, and some may even have adverse effects. Therefore, in this study, we examined the relationships between worrying, well-being, sleep, and coping strategies, and further investigated the protective role of COVID-19-related coping efforts on the relationship between COVID-19-related worrying, emotional well-being, and sleep.

1.1 | Worrying about COVID-19 and its effects on well-being and sleep

The ongoing COVID-19 pandemic has profoundly changed the lives of people worldwide. Suddenly people had to worry about the things they previously considered naturally given. During the early stages of the COVID-19 pandemic, people worried about the possibility of becoming infected with the SARS-CoV-2 virus, their future, and the social or psychological effects of lockdown measures. Among these concerns, the most prominent according to general surveys (American Psychiatric Association, 2020; Qiu et al., 2020; Statista, 2020) were worrying for oneself and even more so for loved ones about contracting COVID-19 and worrying about a possible negative impact on the future economy. Worrying can be defined as an uncontrollable chain of thoughts and images accompanied by negative feelings (Andrews & Borkovec, 1988; Verkuil et al., 2007). In accordance with the transactional model of stress and coping from Lazarus and Folkman (1984), which represents the theoretical framework of this study, worrying about COVID-19 can be considered a form of primary stress appraisal. Primary appraisal stands for the first evaluation of a stressor, represented here by the COVID-19 pandemic; it can be defined as either positive, irrelevant, or dangerous. According to the transactional model, stress occurs when an external or internal demand exceeds a person's individual resources to handle a specific stressor. We assume that the more the people are worried about the COVID-19 pandemic, the more likely they are to regard the COVID-19 as a potentially dangerous stressor, and experience lower well-being. A recent study from Zacher and Rudolph (2020) supports this assumption. The authors found that during the period between March and May in 2020, positive affect levels and life satisfaction decreased in the German population. In addition, Sønderskov et al. (2020) reported lower well-being scores during the COVID-19 pandemic in a Danish sample compared to a sample from 2016, and Sibley et al. (2020) found that people during the lockdown in New Zealand reported higher levels of mental distress.

Stress increases the risk for various health issues (Andrews & Borkovec, 1988; Borkovec et al., 1983; Brosschot & Van Der Doef, 2006), and it also has negative effects on a person's overall well-being (Ganster & Rosen, 2013; Lazarus & Folkman, 1984). Worrying specifically was found in previous research to be associated with higher levels of negative affect and lower levels of positive affect (McLaughlin et al., 2007; Paolini et al., 2006). Also, a recent study by Umucu and Lee (2020) found that COVID-19 stress was associated with decreased well-being. Furthermore, Zacher and Rudolph (2020) also reported higher levels of threat appraisal to be related to lower positive affect, higher negative affect, and lower life satisfaction. Based on these findings and the transactional model of stress and coping (see below), we assume that people who show higher levels of worrying about the COVID-19 pandemic also report lower levels of positive affect and higher levels of negative affect.

Another important indicator of a person's overall health is sleep, since many studies have found positive relationships between sleep and health (Benham & Charak, 2019; Fernandez-Mendoza et al., 2020). However, despite there being many studies stating that stress can have negative effects on sleep (Liu et al., 2016; Sadeh et al., 2004; Yang et al., 2018), literature regarding the association between worrying and sleep is still scarce. Some studies have reported sleep disturbance due to worrying to be a prominent issue. In a study by Marques et al. (2016), 33.2% of the study sample reported frequent sleep disturbance due to worry. In a study by Dregan et al. (2013), 37.9% of the participants who reported having sleep problems named worrying as the main reason. Furthermore, people who attributed sleep disturbance to worrying were also more stressed in general (Kelly, 2003; Marques et al., 2016). Studies on the COVID-19 pandemic and its effects on sleep reported on the one hand positive changes such as later sleep onset-wakeup times, reduced social jetlag, reduced sleep restriction, and longer sleep duration, and on the other hand negative changes such as more sleep disturbances, and a decrease in sleep quality (Blume et al., 2020; Hetkamp et al., 2020; Marelli et al., 2020; Sinha et al., 2020). Lockdown restrictions seemed to have both positive and negative effects on sleep in the general population, yet in a study by Mandelkorn et al. (2020), more than half of the participants (58%) reported that they were unsatisfied with their sleep during the early stages of the pandemic. Kocevska et al. (2020) also found both negative and positive changes in sleep quality. Research investigating the associations between stress, worrying, and sleep during the COVID-19 pandemic is still scarce. Xiao et al. (2020) observed worse sleep quality in the Chinese medical staff who reported more stress. Huang and Zhao (2020) also found that health care workers, who represent a highly stressed occupational group during the pandemic, to report lower sleep quality compared to others, and Kocevska et al. (2020) found that worrying about COVID-19 is associated with worse sleep quality. Fortunately, people are not completely helpless during challenging times because they usually do have ways to cope with situations like the COVID-19 pandemic and its negative effects on well-being and sleep.

1.2 | Coping with the COVID-19 pandemic, well-being, and sleep

Since the COVID-19 pandemic represents a source of great stress, people had to find ways to deal with new challenges and negative feelings. However, there are many ways to cope with stressful live

events. Coping means any cognitive or behavioural effort to master external or internal challenges, when personal resources are viewed as insufficient (Folkman & Lazarus, 1988). Research has shown that which strategy is best varies in different contexts and therefore strategies cannot generally be differentiated as good and bad (Folkman et al., 1986). Concerning COVID-19, many different coping strategies, such as seeking social support from friends and family, accepting the situation, reacting with humour, avoiding information, or buying stocks are imaginable. The coping strategies most often used to deal with the COVID-19 pandemic have not been sufficiently investigated. Folkman and Lazarus (1980) originally differentiated problem-focused and emotion-focused strategies. In recent research, many researchers have attempted to structure different coping strategies into broader concepts, such as approach and avoidance, or cognitive and behavioural coping strategies (Skinner et al., 2003). In 1997, Carver developed the COPE inventory, which assesses 14 different coping strategies and is currently one of the most used coping questionnaires (Kato, 2015). Although such a detailed differentiation clearly has its advantages, it also makes research on coping very heterogeneous, which is why we focus on four broader concepts of coping strategies that are based on the COPE inventory before (Baumstarck et al., 2017; Zacher & Rudolph, 2020). The four coping styles are problem-focused, meaning-focused, social, and avoidance coping.

Problem-focused coping is directly aimed at the stressor (Carver, 2011), and is positively associated with stress-related growth, quality of life, and positive affect (Göral et al., 2006; Moskowitz et al., 2009; Shermeyer et al., 2019; Smith et al., 2008). Recent studies from Umucu and Lee (2020) and Zacher and Rudolph (2020) confirm these findings for COVID-19-specific problem-focused coping. The association between problem-focused coping and negative affect is ambiguous. Some studies found a negative association (Moskowitz et al., 2009; Shermeyer et al., 2019), while others were not able to confirm these results (Smith et al., 2008; Zacher & Rudolph, 2020). Meaning-focused coping refers to searching for meaning in adversity (Carver, 2011). It is associated with better quality of life, higher levels of positive affect, and lower levels of negative affect (Hofstetter et al., 2005; Moskowitz et al., 2009; Pogrebtsova et al., 2018). Meaning-focused coping regarding COVID-19 was also positively related to general well-being and positive affect (Umucu & Lee, 2020; Zacher & Rudolph, 2020). Social coping refers to seeking social support, and shows no association with positive affect, and a positive association with negative affect in previous research (Moskowitz et al., 2009; Smith et al., 2008). Studies investigating social coping during the COVID-19 pandemic were, for the most part, able to confirm these results (Umucu & Lee, 2020; Zacher & Rudolph, 2020). Through the use of avoidance coping people attempt to escape a current stressful situation (Carver, 2011). To date, avoidance coping seems to be a rather dysfunctional coping style, since it shows negative associations with stress-related growth and positive affect as well as positive associations with depression, anger, and negative affect (Moskowitz et al., 2009; Smith et al., 2008). Zacher and Rudolph (2020) confirmed a positive relationship between COVID-19-related avoidance strategies and negative affect.

Research on coping and sleep is still scarce, especially considering the effects of COVID-19. Morin et al. (2003) found no differences in the usage of problem-focused coping in people with insomnia and good sleepers, although others have reported positive effects of problem-focused coping on sleep duration and quality (Faber & Schlarb, 2016; Morin et al., 2003). Meaning-focused coping was found to be positively related to sleep quality by Hofstetter et al. (2005). To the best of our knowledge, no study has investigated the association between social coping, especially during the COVID-19 pandemic, and sleep. Avoidance coping was related to sleep disturbances, an indicator of sleep quality, in one study (Hoyt et al., 2009) and not related to sleep quality in another study (Hofstetter et al., 2005). Findings regarding the association between avoidance coping and sleep quality are thus so far inconclusive. Sleep duration was not related to avoidance coping in a study by Sadeh et al. (2004). Even though many studies have directly linked different coping strategies with good or bad outcomes for well-being and sleep, it is important to investigate whether coping strategies might efficiently buffer associations between stressors and well-being or sleep outcomes (see Dardas & Ahmad, 2015).

1.3 | Coping as a moderator between COVID-19 worry, well-being, and sleep

So far, studies concerning COVID-19-specific coping and well-being during the early stages of the COVID-19 pandemic focused on the associations between stress appraisal, the use of coping strategies, and aspects of well-being. However, to the best of our knowledge, no study has tested possible moderation effects of COVID-19-specific coping on the relationship between COVID-19-related stress or worry and aspects of well-being. It is possible, however, that certain coping strategies could buffer or even enhance the relationships between COVID-19 worry, well-being, and sleep, and therefore may be considered as effective or ineffective coping strategies. For this reason, we investigated moderation effects of the aforementioned four coping strategies in relation to COVID-19 worry, well-being and sleep.

1.4 | Aims of the study

Previous research linked greater worrying and stress with worse outcomes for well-being and sleep in general as well as for well-being during the early stages of the COVID-19 pandemic. However, the relationship between stress or worrying due to COVID-19 and sleep has not been sufficiently examined so far. Therefore, the first aim of this study was to investigate whether well-being (positive and negative affect), sleep quality and duration, and changes in sleep quality and duration due to the COVID-19 pandemic were associated with COVID-19 worry during the early stages of the COVID-19 outbreak in Germany in 2020. Based on the transactional model of stress and coping and the results of previous research, we expect

higher levels of worrying about COVID-19 to be associated with greater negative affect, lower positive affect, and worse sleep parameters (poor sleep quality, short sleep duration, negative changes in sleep quality, and duration).

The second aim of the study was to examine which COVID-19-specific coping strategies were used most often during the early stages of the COVID-19 pandemic. The third aim was to investigate how COVID-19-specific coping relates to well-being and sleep. Based on previous findings, we expect positive relations for problem- and meaning-focused coping with well-being and sleep. In addition, we expect social coping to be positively related to negative affect and to be unrelated to positive affect. Regarding the association between social coping and sleep, no predictions could be postulated. We expect greater avoidance coping to be associated with lower well-being. Even though research about avoidance coping and subjective sleep quality is scarce and inconclusive, we assume avoidance coping might further be related to worse sleep quality and a negative change in sleep quality due to the COVID-19 pandemic, since it was found to be related to sleep disturbances, an aspect of sleep quality, in a study before and also shows negative relationships with various subjective well-being measures. No associations between avoidance coping and sleep duration or changes in sleep duration due to the COVID-19 pandemic are expected.

The fourth aim of the study was to explore whether the four coping strategies examined were useful in dealing with COVID-19. Therefore, the possible moderating effects of the coping strategies on the relationship between COVID-19 worries and well-being (positive and negative affect) as well as on the relationship between COVID-19 worries and sleep (sleep quality and duration) will be investigated.

2 | METHODS

The study was approved by the institutional Ethics Committee and all participants gave informed consent. Data collection took place from 1 to 19 April 2020, during which time lockdown restrictions were in force in Germany. The nationwide lockdown began on 22 March and lasted until 3 May. Schools, stores (with the exception of supermarkets, drug stores, and pharmacies), as well as many nonessential companies were closed. Employees were asked to work at home. Travelling was restricted and international borders were closed. Furthermore, a contact ban was imposed, which only committed contact to only one other person apart from one's own household outdoors.

2.1 | Participants

A total of 692 participants completed the online questionnaire, that was distributed via social media and mailing lists in Germany. Three outliers and 24 underaged participants were excluded. The remaining sample consisted of 665 participants, whose age ranged from 18 to 73, with a mean age of 36 (SD = 14). Of the total study sample, 53.8% were female (one person reported as diverse); 47.5% reported having a university degree; 19.6% completed vocational training; 57.7% were currently employed, and worked for more than 20 h a week, 14.3% worked less than 20 h due to the COVID-19 pandemic, 8.6% reported being unemployed or working less than 20 h, 16.6% were students and 2.9% reported being retired. Participants' professions represented a variety of different work sectors (e.g., finance, administration, healthcare, security, education, science, or building industry). None of the participants were tested positive for COVID-19 infection; 42 participants reported having or had COVID-19 like symptoms, but not a test result. Seventy-seven percent of the study sample reported good or very good sleep quality during the beginning of the COVID-19 pandemic, and 78.8% of the study sample slept on average seven or more hours a night. Most of the study sample reported no changes in sleep quality (65.2%) or duration (52.9%). A decline in sleep quality was reported by 23.3%, and an improvement in sleep quality was reported by 11.6% of the study sample. Similarly, sleep duration decreased for 15.3% of the participants and increased for 31.8%.

2.2 | Measurement instruments

The online questionnaire included questions about demographics, current employment status, and the following measures.

2.2.1 | Worry about COVID-19

At the time of the inquiry no published questionnaire assessing COVID-19 worries was available. On the basis of a study in which items about worrying were adapted to the Ebola crisis in 2014 (Thompson et al., 2017), we created six items to assess three important aspects of worrying about COVID-19, which have already been described. Two items measured worrying about a possible infection (I am scared of getting infected by the COVID-19 pathogen, the possibility of contracting COVID-19 is bothering me), two items measured worrying about the future (I worry about my future because of the current COVID-19 pandemic, the possible consequences due to the COVID-19 pandemic are stressing me), and two items measured worrying about lifestyle limitations and burdens (I feel constricted in my way of life, my life changed significantly due to the COVID-19 pandemic). Participants were asked to rate on a 5-point Likert scale how well every item applied to them (1 = *not at all*, 5 = *exactly*). To test dimensionality, we performed a confirmatory factor analysis with three components (consisting of two items as described above) and one higher order factor using LISREL. This second-order factor model provided a good fit with χ^2 (6) = 10.50, p = 0.11 (RMSEA = 0.033; CFI = 0.998; RFI = 0.988). Second-order factor loadings (0.92, 0.51, 0.46) were significant (p´s < 0.001). Because we were interested in a global measure of COVID-19 worry, one mean score of all six items was computed (α = 0.75).

2.2.2 | Positive and negative affect

To assess the positive and negative affect, the Positive and Negative Affect Schedule (PANAS) was used (Breyer & Bluemke, 2016; Watson et al., 1988). The PANAS measures positive and negative affect with 10 items each, which can be summarized into one mean score each for positive and negative affect. Every item represents an adjective, and the participants rate how intensely they felt this specific emotion or feeling during the past two weeks. Items are answered on a scale from 1 (*not at all*) to 5 (*extremely*). The reliability and validity of the PANAS are satisfactory (Breyer & Bluemke, 2016). The reliabilities of positive and negative affect for this study were satisfactory (α = 0.85; 0.82, respectively).

2.2.3 | Sleep duration and subjective sleep quality

Sleep duration and subjective sleep quality were measured using items of the Pittsburg Sleep Quality Index (PSQI; Backhaus & Riemann, 1996; Buysse et al., 1989). The PSQI is a widely used instrument to measure sleep quality—consisting of seven subscales—which offers good validity and reliability (Backhaus & Riemann, 1996). For sleep duration, the participants rated how long, on average, they slept in the past two weeks. Unlike in the original questionnaire, we decided to use sleep duration as a continuous variable to not lose variance. Subjective sleep quality was measured with the 'sleep quality'-subscale, asking participants to rate their overall sleep quality for the past two weeks. We used an eight-point format, and added two additional items (on most days in the last two weeks I slept well; my sleep in the last two weeks was not restorative). All the three items were correlated (r = 0.76 and above), and therefore, aggregated into one mean score, with higher scores indicating better subjective sleep quality. The reliability of sleep quality for this study was good (α = 0.93).

2.2.4 | Change in sleep quality and sleep duration

We used two single-item measures of sleep quality and duration from the PSQI (Buysse et al., 1989) and adapted the response format to assess subjective change due to the COVID-19 pandemic. Participants were asked to rate on a 5-point-Likert scale their sleep quality (Compared to the time before the COVID-19 pandemic, I now sleep 1 = *a lot worse*, 5 = *a lot better*) and their sleep duration (Compared to …. I now sleep 1 = *much shorter*, 5 = *much longer*).

2.2.5 | COVID-19-specific coping

Coping strategies were measured with the Brief-COPE from Carver (1997), which was adapted to the consequences of the COVID-19 pandemic. The Brief-COPE is a short form of the COPE inventory, one of the most frequently used coping questionnaires (Kato, 2015), and includes 14 different coping strategies, each measured by two items (Carver, 1997). Two items assessing self-blame were not included, due to inadequacy in the context of the COVID-19 pandemic. Two items measuring religious coping were also excluded, as they did not fit to our proposed higher-order coping strategies. All the 12 measured coping strategies of the Brief-COPE were reduced into four higher order coping strategies, similar to those used by Baumstarck et al. (2017), Litman (2006), and Zacher and Rudolph (2020). Acceptance, positive reframing, and humour items were subsumed under the construct of meaning-focused coping (α = 0.68). Problem-focused coping included active coping and planning items (α = 0.75). Self-distraction, behavioural disengagement, denial, and substance use items were summarized as avoidance coping (α = 0.53), and instrumental support, emotional support, and venting items as social coping (α = 0.77).

2.2.6 | Control variables

Peoples' preferred sleep time and sleep quality are strongly influenced by individuals' chronotype. Late chronotypes tend to have later sleep onset and offset times and report a lower sleep quality compared to early chronotypes (Roenneberg & Merrow, 2007; Roeser, Meule, et al., 2012). Late chronotypes also show lower levels of well-being and higher levels of stress compared to early chronotypes (Buschkens et al., 2010; Roeser, Obergfell, et al., 2012). Therefore, we included chronotype as a control variable. Chronotype was measured using the Composite Scale of Morningness (CSM; Randler, 2014; Smith et al., 1989), which is a widely used chronotype self-reporting questionnaire to assess daily preferences for activity. The CSM consists of 13 items, which can be aggregated into one global score. Higher values indicate a greater tendency toward morningness. Values range from 22 to 55. According to Randler (2008), the CSM scale offers good psychometric properties. Reliability was α = 0.90.

In addition, we included age, gender, and education as control variables because they showed significant correlations with the relevant variables (see Table 2). Education was operationalized as a dichotomous variable that differentiated between participants with a university degree and those with less education.

2.3 | Statistical analysis

The first and third aim of the study were analysed based on bivariate correlations with a significance level of $p < 0.05$. The second aim of the study was to investigate which coping strategies were used most often during the start of the COVID-19 pandemic and was tested via a repeated measures ANOVA with Bonferroni-adjusted post-hoc analyses with a significance level of $p < 0.05$. Moderations effects were investigated using multiple regression analyses. In the first step worrying about COVID-19, control variables (chronotype, age, gender, education), and all four coping strategies served as predictors for the measures of well-being (positive and negative affect) and

different sleep characteristics (sleep quality and duration). In the second step interactions between worrying about COVID-19 and the four coping strategies were included. Since response formats differed between variables, all predictors were transformed into z-scores to avoid problems of multicollinearity (Cohen et al., 2003). We expected chronotype to be associated with worrying, coping strategies, sleep, and well-being, and therefore included chronotype as a control variable. All calculations were conducted using IBM SPSS Statistics, version 26, and Microsoft Excel 2016. Descriptive statistics of all relevant variables are shown in Table 1.

3 | RESULTS

Based on the four aims of this study, the results are presented in four sections. First, correlations of worrying about COVID-19 with positive and negative affect and sleep variables are reported. Second, we explore the usage of the four different investigated coping-strategies during the early stages of the COVID-19 pandemic. Third, how these coping strategies relate to well-being and sleep are described. Finally, we report whether these coping-strategies act as moderators for the relationship between COVID-19 worry with positive and negative affect and sleep.

3.1 | Worrying about COVID-19, well-being, and sleep

All bivariate correlations are shown in Table 2. As expected, worrying about COVID-19 showed a positive correlation with negative affect, and negative correlations with positive affect and all sleep variables. The higher the reported worry about COVID-19, the higher the negative affect, and the lower the positive affect. Highly worried participants also reported lower sleep quality, shorter sleep duration, and a negative change in sleep quality and duration compared to weeks before the emergence of COVID-19. The correlations differ in size, but the pattern of the results confirmed our hypotheses.

3.2 | COVID-19-specific coping strategies

Descriptive statistics revealed that meaning- and problem-focused coping were the most used coping strategies during the beginning of the COVID-19 pandemic, followed by social coping and avoidance coping (see Table 1). To test whether these differences were statistically significant, we conducted a repeated measures ANOVA that included all the four coping strategies. Since Mauchly's test indicated a violation of the sphericity assumption (χ^2 [5] = 75.06, $p < 0.001$), a Greenhouse-Geisser correction was applied. Significant differences were found for the use of the four coping strategies (F [2.80, 1860.771] = 1161.77, $p < 0.001$, $\eta^2 = 0.64$). Bonferroni-adjusted post-hoc analysis revealed that meaning- and problem-focused coping were used significantly more than social coping ($M_{difference} = 1.61$, 95%-CI [1.48,1.73], $p < 0.001$; $M_{difference} = 1.71$, 95%-CI [1.58,1.84], $p < 0.001$) and avoidance coping ($M_{difference} = 2.04$, 95%-CI [1.92,2.17], $p < 0.001$; 2.15, 95%-CI [2.03,2.26], $p < 0.001$). Avoidance coping was used significantly less than social coping ($M_{difference} = 0.43$, 95%-CI [0.32, 0.55], $p < 0.001$). No significant differences were found between the usage of problem- and meaning-focused coping. Control analyses (analyses of covariance) revealed that, after controlling for age, gender, and education, all significant differences remained stable.

3.3 | COVID-19-specific coping, well-being, and sleep

In this section, we focus on the correlations with COVID-19-specific coping (see Table 2). In accordance with our predictions, problem-

TABLE 1 Descriptive statistics

	M	SD	Min	Max	Skewness	Kurtosis
COVID-19 worry	2.63	0.79	1.00	5.00	0.28	−0.27
Positive affect	2.88	0.69	1.00	5.00	0.15	−0.09
Negative affect	2.12	0.67	1.00	4.40	0.48	−0.12
Sleep quality	5.79	1.86	1.00	8.00	−0.72	−0.49
Change in sleep quality	2.86	0.71	1.00	5.00	−0.11	1.52
Sleep duration	7.49	1.12	4.00	12.00	−0.04	1.02
Change in sleep duration	3.21	0.83	1.00	5.00	0.05	0.31
Chronotype	37.55	7.25	16.00	55.00	−0.25	−0.21
Problem-focused coping	4.31	1.04	1.00	6.00	−0.65	0.25
Meaning-focused coping	4.41	0.88	1.83	6.00	−0.37	−0.37
Social coping	2.70	1.02	1.00	6.00	0.36	−0.51
Avoidance coping	2.27	0.63	1.00	4.75	0.61	0.87

Note: $N = 665$.

TABLE 2 Bivariate correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 COVID-19 worry	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Positive affect	−0.18***	1	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Negative affect	0.55***	−0.16***	1	-	-	-	-	-	-	-	-	-	-	-	-
4 Sleep quality	−0.30***	0.36***	−0.36***	1	-	-	-	-	-	-	-	-	-	-	-
5 Change in SQ	−0.27***	0.23***	−0.28***	0.58***	1	-	-	-	-	-	-	-	-	-	-
6 Sleep duration	−0.08*	0.02	−0.04	0.29***	0.20***	1	-	-	-	-	-	-	-	-	-
7 Change in SD	−0.10*	0.09*	−0.12**	0.31***	0.40***	0.50***	1	-	-	-	-	-	-	-	-
8 Chronotype	−0.09*	0.21***	−0.11**	0.12**	−0.00	−0.13**	−0.07	1	-	-	-	-	-	-	-
9 Problem-f. coping	0.13**	0.32***	−0.00	0.10*	0.10*	0.06	0.16***	0.08*	1	-	-	-	-	-	-
10 Meaning-f. coping	−0.25***	0.30***	−0.24***	0.26***	0.25***	0.18***	0.20***	−0.03	0.39***	1	-	-	-	-	-
11 Social coping	0.34***	−0.01	0.43***	−0.10*	−0.07	0.06	0.03	−0.14***	0.31***	0.06	1	-	-	-	-
12 Avoidance coping	0.24***	−0.14***	0.32***	−0.17***	−0.13**	0.01	−0.04	−0.10*	−0.01	−0.06	0.17***	1	-	-	-
13 Education	0.02	0.11**	0.00	0.03	0.03	−0.05	0.01	0.08*	0.10*	0.09*	0.09*	−0.21**	1	-	-
14 Gender	0.15**	−0.15**	0.14**	−0.14**	−0.03	0.06	0.05	−0.04	0.13**	−0.10*	0.23**	0.02	0.00	1	-
15 Age	0.01	0.08*	−0.14**	0.01	−0.08*	−0.26**	−0.19**	0.22**	−0.07	−0.19**	−0.16**	−0.17**	0.13**	−0.09*	1

Note: $N = 665$.

Gender: 1 = male, 2 = female; one participant reported divers and was not included in the correlation with the gender variable. Education: 1 = no university degree, 2 = university degree.

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$.

TABLE 3 Moderating effects of coping

		Criteria			
		Negative affect		Positive affect	
Step	Predictor	β	p	β	p
1	Age	−0.11	0.001	0.07	0.04
	Gender	0.01	0.88	−0.14	<0.001
	Education	0.04	0.23	0.04	0.22
	Chronotype	0.01	0.87	0.15	<0.001
	COVID-19 worry	0.40	<0.001	−0.14	0.001
	Problem-focused coping	−0.10	0.003	0.29	<0.001
	Meaning-focused coping	−0.13	<0.001	0.15	<0.001
	Social coping	0.29	<0.001	0.01	0.74
	Avoidance coping	0.15	<0.001	−0.06	0.11
	–	$F(9654) = 55.34$, $p < 0.001$, $R^2 = 0.43$		$F(9654) = 22.41$, $p < 0.001$, $R^2 = 0.23$	
2	Worry x Problem	0.04	0.32	0.10	0.01
	Worry x Meaning	−0.09	0.008	−0.04	0.30
	Worry x Social	0.07	0.03	−0.05	0.23
	Worry x Avoidance	0.02	0.45	0.04	0.23
	–	$F(13,650) = 40.01$, $p < 0.001$, $R^2 = 0.43$		$F(13,650) = 16.18$, $p < 0.001$, $R^2 = 0.23$	

Note: $N = 665$.

Gender: 1 = male, 2 = female. Education: 1 = no university degree, 2 = university degree.

focused coping showed positive relationships with positive affect, sleep quality, and change in sleep quality and duration; however, unexpectedly, no relationship with negative affect and sleep duration. Meaning-focused coping was expectedly associated with higher positive affect, lower negative affect, better sleep quality, longer sleep duration and a positive change in sleep quality and duration compared to the weeks before COVID-19 lockdown restrictions. As we predicted, higher levels of social coping were linked to higher levels of negative affect as well as to worse sleep quality. Other variables were not related to social coping. As hypothesized, avoidance coping was negatively linked to positive affect, sleep quality, and change in sleep quality, and positively linked to negative affect. No relationship between avoidance coping and sleep duration or change in sleep duration was found. Control analyses (partial correlations) showed that all predicted correlations remained significant after controlling for age, gender, and education. In sum, the pattern of the bivariate correlations showed positive correlations for problem- and meaning-focused coping and negative correlations for social and avoidance coping with factors of well-being and sleep. However, the findings do not imply that certain strategies are generally better than others. Therefore, we focused on the protective function of coping efforts regarding the relationship between worry about COVID-19, well-being, and sleep.

3.4 | Moderating effects of COVID-19-specific coping

To test the possible moderating effects of the measured coping strategies between COVID-19 worry, well-being, and sleep, we conducted several multiple regression analyses (see Table 3). The results show that the relationship between COVID-19 worry and positive affect was moderated by problem-focused coping. People with higher levels of worrying reported higher positive affect when they used problem-focused strategies more frequently, than those who used them less frequently (see Figure 1a). These differences in positive affect levels were less pronounced in individuals with lower levels of worrying. Other coping strategies showed no moderating effect for positive affect. The relationship between worrying about COVID-19 and negative affect was moderated by meaning-focused and social coping. People who experienced more worrying showed lower negative affect the more frequently they reported using meaning-focused coping. These differences were again less pronounced in individuals with lower levels of worrying (see Figure 1b). In contrast, higher levels of social coping were associated with greater negative affect in worried individuals (see Figure 1c).

The regression analysis for moderating effects on change in sleep quality revealed marginally significant moderating effects of

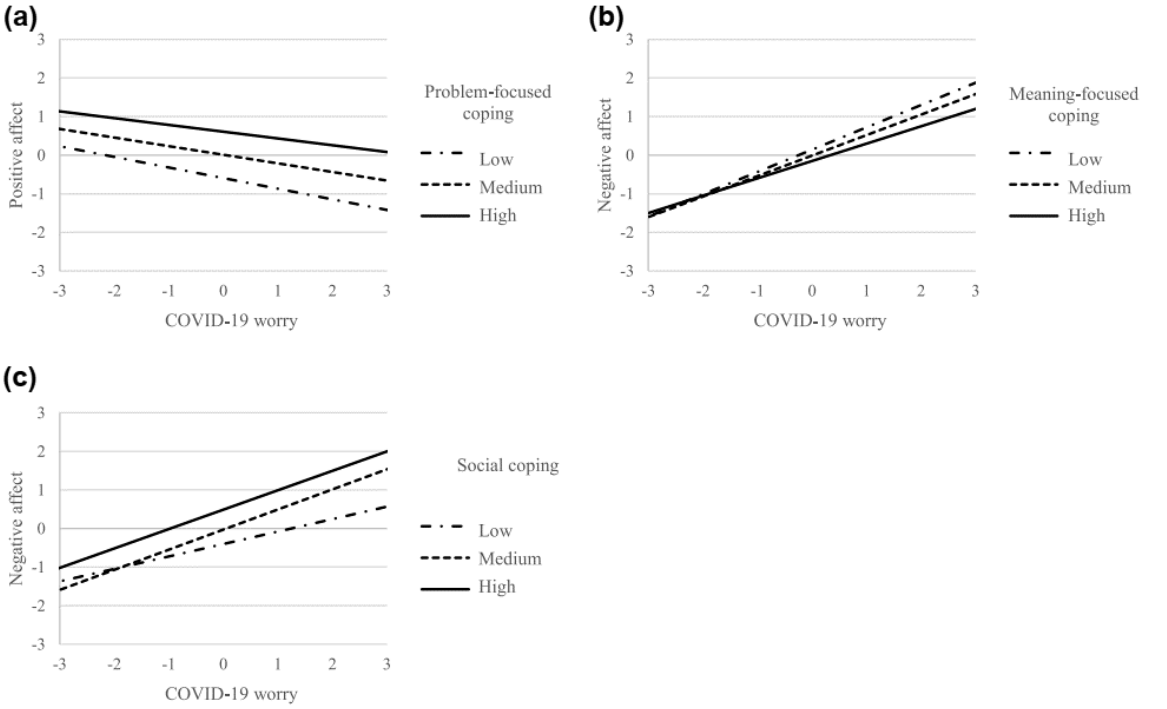

FIGURE 1 Moderating effects of (a) problem-focused, (b) meaning-focused and (c) social coping strategies on the relationship between COVID-19 worry and positive and negative affect (variables are z-standardised). Depicted are conditional regressions. One standard deviation below and above was used to categorize coping

problem-focused coping ($ß_{worryxproblem}$ = 0.06, p = 0.10), meaning-focused coping ($ß_{worryxmeaning}$ = 0.06, p = 0.06), and social coping ($ß_{worryxsocial}$ = −0.06, p = 0.09) with significant regression models (F [4660] = 16.77, R^2 = 0.09, p < 0.001; F [4,660] = 20.80, R^2 = 0.011, p < 0.001; F [4660] = 13.49, R^2 = 0.07, p < 0.001). These moderating effects are comparable to those of coping on positive and negative affect regarding strength and direction. Higher levels of problem- and meaning-focused coping were associated with positive changes in sleep quality for highly worried participants, and higher levels of social coping were associated with negative changes in sleep quality. For sleep quality and duration, and change in sleep duration, no moderating effects were found.

4 | DISCUSSION

The results of this study demonstrated that worrying about COVID-19, a form of primary stress appraisal, is associated with aspects of well-being and different sleep characteristics. Our findings that people who worried more about COVID-19 experienced lower levels of positive affect and higher levels of negative affect support previous research by Umucu and Lee (2020) and Zacher and Rudolph (2020) regarding relations between primary stress appraisal due to COVID-19 and measures of well-being during the beginning of the pandemic. Our results further elucidate associations between COVID-19 worry and sleep, which thus far have still been insufficiently examined. Worrying about COVID-19 was linked to various sleep parameters (sleep quality, sleep duration, and change in sleep quality and duration compared to the weeks before the COVID-19 lockdown) in a negative way and therefore might be a possible risk factor for impaired sleep. Though the global measure of COVID-19 worry in our study was associated with negative reports of well-being and sleep we do not know, however, whether the strength of these relationships varies depending on the specific content of the COVID-19 worries. Various COVID-19 worries must not necessarily be equally stressful to different people and therefore may lead to differences in their relationships with other variables, as results of Taylor et al. (2020) indicate for well-being measures. Yet, systematic research is needed to test the significance of these findings.

Our results further revealed that the two most frequently used coping strategies to deal with negative changes during the early stages of the ongoing COVID-19 pandemic were meaning- and problem-focused coping, which fortunately were also related to better outcomes for peoples' well-being. Overall, meaning-focused coping seemed to be the best strategy to deal with the stressful consequences of the COVID-19 pandemic. It showed positive relationships to all well-being and sleep measures. High levels of positive reappraisal and humour, however, might also bear the risk of underestimating the perilous effects that COVID-19 can have on people's physical or mental health. Therefore, further research is

needed to elucidate how and why COVID-19 coping strategies are used, and whether seemingly positive coping strategies, such as meaning-focused coping, may also show negative relationships depending on the specific situation, stressor, or person. Many years back Lazarus and Folkman (1984) already pointed out that efficient coping strategy depend on the specific situation and person. Problem-focused coping as well seemed to be a useful coping mechanism since it showed positive correlations with positive affect. Surprisingly, there was no association with negative affect. A possible explanation for a non-existent relationship with negative affect might be the dimensionality of the PANAS. Negative affect is measured by emotions that refer to social relationships (e.g., hostile, guilty, ashamed) which do not directly relate to problem-focused coping. Positive affect, however, includes states of positive arousal (attentive, inspired, active) which is stronger associated with problem-solving strategies.

So far, few studies concerning sleep during the COVID-19 pandemic and its relationship to different coping strategies are available, which highlights the importance of our findings that meaning- and problem-focused coping also showed positive correlations with people's sleep quality and duration. Since problem- and meaning-focused coping are positively related to well-being and sleep practitioners might be able to enhance these in COVID-19 affected populations by implementing interventions that highlight the importance of different coping strategies and provide guidance and instructions on how to use them. The question remains, why problem-focused coping was only related to sleep quality but not to sleep duration. It is possible that sleep duration is closer linked to positive than negative affect, as our results suggest, and problem-focused coping as well only showed relations to positive affect. Considering a possible mediating effect, this might explain the missing link with sleep duration.

Social and avoidance coping showed only negative relationships with well-being and sleep but were also used less frequently than meaning-focused and problem-focused coping. Social coping displayed a negative correlation with negative affect and sleep quality, and no correlation with any of the remaining variables. Even though social coping consequently seems to be a rather dysfunctional coping strategy, social support per se is not harmful after all, as many studies have confirmed (Taylor, 2011). It is possible that the action of seeking social support reflects a certain helplessness of individuals to cope with the ongoing situation by themselves. Consequently, having social support is an important protective factor for people's overall well-being and health; however, relying on others to solve a problem might not be the best strategy to cope with stress. Avoidance coping was the strategy which showed the most negative relationships to well-being and sleep but was also used least often. Avoidance coping was associated with negative outcomes for all well-being and sleep measures except for sleep duration and change in sleep duration to which it was not related. Therefore, ignoring COVID-19, denying it, or diverting oneself does not seem to be a recommendable coping strategy to deal with the consequences of the COVID-19 pandemic. These findings are in line with previous research, which also links avoidance coping with several indicators of impaired well-being (Moskowitz et al., 2009; Smith et al., 2008; Zacher & Rudolph, 2020).

Furthermore, three of the four coping strategies moderated the relationship between worrying about COVID-19 and well-being. Worried participants who engaged in problem-focused coping showed higher levels of positive affect, than those who did not. Interestingly, problem-focused coping was the only coping strategy showing moderation effects on positive affect. As we mentioned above, positive and negative affect are not opposites of one dimension but include different emotional domains. One possible interpretation for this finding could be that instrumental actions regulate (dampen) the negative correlation between worry and positive arousal because of their energizing function. The function of meaning-focused coping might be palliative because worried people who used meaning-focused coping more often reported lower levels of negative affect than to those who used meaning-focused coping less often. Thus, both coping strategies are adaptive during the COVID-19 pandemic but unfold their stress-regulating potential in different emotional states. Social coping on the other hand had a negative moderating effect on worried individuals. People who experienced higher levels of negative affect than those who did not use social coping. This may be because they asked for social support but not necessarily receiving it. Furthermore, relying on others may not be helpful in dealing with negative emotions.

Similar results were found for the moderating effects of coping on change in sleep quality, although the results were only marginally significant. Problem- and meaning-focused coping were associated with less negative effects of COVID-19 worry on the change in sleep quality, whereas social coping was associated with enhanced negative effects of COVID-19 worry in highly worried participants. Why the examined coping strategies did not moderate the relationship between worrying about COVID-19 and the other sleep parameters needs to be further investigated. One possible explanation might be that coping strategies primarily influence people's well-being and mood, which might then subsequently have a positive or negative effect on sleep in the next step. It is also possible that sleep is more affected by other factors such as working hours or childcare. Overall, these results highlight the importance of investigating different coping strategies people use to cope with the negative effects of the COVID-19 pandemic. Given that the study was conducted in Germany, the question of generalizability is obvious. There is evidence that there are cultural differences in the use of coping strategies and the experience of wellbeing (Chun et al., 2002). However, it is unclear whether these also exist in times of a pandemic. Further account should be taken to the spread of the virus, lockdown measures, or policies that are introduced and withdrawn at different times. Our data allow no comparisons. However, it would be interesting to further investigate whether these findings are generalizable to different forms of stressors and experiences of people living in other countries.

5 | LIMITATIONS

Although the present study highlights important associations between aspects of well-being, sleep, worrying, and different coping strategies used during the early stages of the COVID-19 pandemic, it is also limited in certain ways. First, the results of this study rely on cross-sectional data, which is not applicable to causal interpretations. Further research is needed to investigate causal relationships, or to include a broader set of control variables, such as current work situation, childcare, financial status, or social isolation. In particular, longitudinal data could offer the possibility of modelling changes over time. We had no information about the well-being status of our study sample before the pandemic and therefore cannot make any statement about changes in well-being due to the COVID-19 pandemic. Our study sample also included a high percentage of highly educated individuals, which limits generalization to the general population. Furthermore, we relied on self-reports in this study. These estimations may be influenced by the current cognitive and emotional states or common method variance, and consequently, may not be sufficiently accurate. In addition, this study sample consisted of German participants. It is possible that reactions to and perceptions of COVID-19 challenges are not comparable to other parts of the world, considering the diverse strategies used by different countries to manage the COVID-19 pandemic as well as the varied welfare and health care systems. There is no data that compares to what extent the results vary depending on country-specific differences or variations in current lockdown restrictions.

6 | CONCLUSIONS

These results showed that COVID-19 worry, a form of primary stress appraisal, was an important factor for people's overall well-being and sleep during the early stages of the COVID-19 pandemic. However, negative associations between COVID-19 worry and well-being can be attenuated by using coping strategies. In particular, meaning- and problem-focused strategies proved to be the most beneficial and the most used coping strategies. It seems many people have advantageous coping strategies at their disposal, which help to regulate COVID-19-related impairments to their general well-being by actively solving the current problem or by adjusting one's cognitive standards and assumptions regarding it.

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CONFLICT OF INTEREST

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

DATA AVAILABILITY STATEMENT

The data supporting the findings of this study are available from the corresponding author Saalwirth, C. on request. Raw data were generated at the Bundeswehr University Munich, Germany.

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3.1 Summary of Contribution 1

This first contribution examined bivariate correlations between stress appraisal (a global measure of worrying about COVID-19) and people's well-being (positive and negative affect, sleep quality, and sleep duration). The findings underscore the potential adverse impact of COVID-19-related worries on well-being since worries were linked to diminished positive affect, heightened negative affect, worse sleep quality, and shorter sleep duration.

In addition, the moderating effects of four different coping strategies (meaning-focused, problem-focused, social, and avoidance coping) on the relationship between worrying and well-being were examined. Meaning-focused coping—engaging with purpose and positive aspects in challenging circumstances—and problem-focused coping—actively addressing and resolving issues—appeared beneficial in navigating the challenges posed by the COVID-19 pandemic. The utilization of these coping strategies mitigated the negative relationship between worries and well-being. Conversely, social coping—seeking support from others—exacerbated the link between worries and well-being. No moderation of avoidance coping—ignoring or denying the existence of stressors—was found. These results are supported by the findings that more meaning-focused and problem-focused coping were associated with enhanced well-being, while social and avoidance coping were associated with diminished well-being. Intriguingly, social and avoidance coping were less frequently employed than meaning-focused and problem-focused coping, suggesting a prevalent inclination toward more adaptive coping strategies, which represents new findings in this research area.

Building upon these findings, the subsequent contribution depicted in the following chapter further deepens the knowledge about stress appraisal and well-being during the COVID-19 pandemic by differentiating different facets of COVID-19 stress appraisal within a structural equation model and implementing additional measures of well-being. While studies at the time of the data collection had already shown that different types of worries existed (American Psychiatric Association, 2020; Park et al., 2020; Statista, 2020) their unique relationships to various measures of well-being was not sufficiently explored yet.

Chapter 4

Different Facets of COVID-19-related Stress in relation to Emotional Well-being, Life Satisfaction, and Sleep Quality

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Different facets of COVID-19-related stress in relation to emotional well-being, life satisfaction, and sleep quality

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Introduction: As the COVID-19 pandemic has shown, it is of great importance to investigate how people can maintain their mental health during chronically stressful times. This study therefore investigated which facets of COVID-19-related stress (Fear of COVID-19, financial worries, and social isolation) impacted people the most during a third COVID-19 infection wave from March until May 2021 and how these facets relate to well-being (emotional well-being and life satisfaction) and sleep quality.

Methods: A study sample of 480 German participants (M_{age}=43, SD_{age}=13.7, 20–69years, 50.8% female) completed a cross-sectional online questionnaire.

Results: As predicted, social isolation was reported most often, followed by fear of COVID-19 and financial worries. In accordance with our expectations more social isolation and financial worries predicted lower emotional well-being and sleep quality. In contrast to our hypothesis, fear of COVID-19 only predicted emotional well-being and not sleep quality. Life satisfaction was solely predicted by financial worries and not by social isolation and fear of COVID-19, which only partly confirmed our hypotheses. These associations remained stable after controlling for age, gender, household income, and living alone.

Discussion: Financial worries, although reported the least often, were the strongest and most stable predictor for emotional well-being, sleep quality, and life satisfaction. Implications for future research and practice are discussed.

KEYWORDS

COVID-19, financial worries, loneliness, social isolation, fear

1. Introduction

With the beginning of the COVID-19 pandemic in 2019/2020, the lives of many people around the globe changed drastically. New challenges, fears, and restrictions arose, which constituted an ongoing source of stress. Various negative outcomes such as higher depression rates (Pieh et al., 2020), lower well-being (Zacher and Rudolph, 2021), and worse sleep quality (Mandelkorn et al., 2020), were observed in numerous countries which were driven by multiple new stressors that came along with the COVID-19 pandemic and attempts to confine infection rates to a minimum (e.g., contact bans, closing of nonessential companies and stores, and mandatory home office). Worrying about one's financial situation (Park et al., 2020; Statista, 2020), social isolation, or uncertainty about how long social distancing requirements would be in place, were frequently reported at the beginning of the COVID-19 pandemic (Groarke

et al., 2020; Park et al., 2020). However, one of the most prominent sources of stress was the fear of oneself or, even more so, loved ones contracting COVID-19 (American Psychiatric Association, 2020; Hetkamp et al., 2020; Statista, 2020; Bendau et al., 2021). Whether these facets of COVID-19-related stress are still present approximately 1 year after the SARS-CoV-2 outbreak will be investigated in this study. In addition, some studies suggested a negative relationship between COVID-19-related stress and people's well-being and sleep quality (Cellini et al., 2020; Zacher and Rudolph, 2021), yet little is known about which aspects of COVID-19-related stress impact people the most and how they differentially relate to well-being and sleep. To close this research gap, we further examine the relationship between various measures of well-being and sleep quality with three diverse facets of COVID-19-related stress, namely fear of COVID-19, financial worries, and social isolation.

1.1. COVID-19-related stress

The first wave of COVID-19 infections in Germany was characterized by a great deal of uncertainty about the novel disease, strict lockdown restrictions, reduced social contacts, and frightening media content. Consequently, fear of COVID-19 was a common phenomenon. In a study from Bäuerle et al. (2020) with over 15,000 German residents, 59% of the study sample reported experiencing fear of COVID-19. Other studies have reported an increase in virus anxiety during the first wave (Jungmann and Witthöft, 2020), as well as a decrease in quality of life during the first months of the pandemic (Dale et al., 2022).

However, a rapid initial increase in fear of COVID-19 is an expected reaction. Fear is an important emotional response to new, ambiguous, and threatening stressors which often fosters adequate behavior (Lazarus, 1991). For example, increased fear of COVID-19 was associated with positive health behavior such as wearing a medical face mask, regularly washing hands, social distancing, or a positive attitude toward vaccination (Harper et al., 2020; Bendau et al., 2021; Knowles and Olatunji, 2021). Nevertheless, fear is predominantly associated with avoidance and escape tendencies and can also have negative effects on peoples' well-being if it chronically manifests (Lazarus, 1991). Interestingly, a study by Hetkamp et al. (2020), in line with the results of the aforementioned studies, found elevated levels of fear of COVID-19 during a period of 50 days in March and April 2020, yet fear of COVID-19 decreased to initial levels before the lockdown restrictions within only 6 weeks. These results are also supported by Skoda et al. (2021), who found a strong increase in COVID-19-related fear, which rapidly decreased even below initial levels. Bendau et al. (2021) replicated these results, with fear of COVID-19 decreasing from the end of March until the middle of June in 2020. These findings demonstrate that the population displayed a habituation to the novel and threatening stressor of COVID-19 within only a few weeks, which is in line with previous research showing that people feel less anxious when they are continually exposed to a stressor (Diener and Diener, 1996; Suh et al., 1996). Even though, the opposite effect can occur as well (Ritter et al., 2016).

Whereas fear of COVID-19 was frequently reported during the COVID-19 pandemic, it is far from being a homogenous construct and can comprise many different aspects, such as a fear of getting sick, worries about insufficient food supplies, or the fear of close contact with foreigners. How multilayered fear of COVID-19 was defined by previous research can easily be seen by examining the various questionnaires that were developed to measure fear of COVID-19, such as the COVID Stress Scales (Taylor et al., 2020), the Fear of COVID-19 Scale (Ahorsu et al., 2020), or the Fear of the Coronavirus Questionnaire (Mertens et al., 2020). However, when Mertens et al. (2021) investigated several different questionnaires, a core element "fear of health" crystallized which was found in all the investigated questionnaires. For example, "fear of health" was represented by the subscales "contamination" and "danger" in the COVID Stress Scales (Taylor et al., 2020). It seems that "fear of health" embodies the underlying key component, which is why it should particularly be considered when examining fear of COVID-19.

In addition to fear of COVID-19, people also frequently reported being impacted by the restrictive policies during the pandemic regarding their social interactions. Due to the quarantine, the restriction of social contacts, and working from home everyone's social life was impacted heavily, which can result in a feeling of loneliness. For example, in a study by Groarke et al. (2020) 27% of the British study sample reported experiencing loneliness during the first lockdown. Such changes in social routines can also lead to stress and worries when social support and sources of joy and happiness cease. In a study by Park et al. (2020), changes in social routines and uncertainty about how long social distancing requirements would last were the COVID-19 stressors that were reported most often (yet not as the most stressful). Although social isolation was apparently a very common facet of stress during the pandemic, it has gained less attention than fear of COVID-19 in previous research.

In addition to social isolation, people were also worried about the economic stability of their countries as well as their own financial situation at the beginning of the pandemic (American Psychiatric Association, 2020; Park et al., 2020; Statista, 2020). This worry was presumably driven by either the actual loss of one's job or the fear of losing it in the near future. For example, in Germany, the number of people in short-time work increased drastically with the beginning of the pandemic (Bundesagentur für Arbeit, 2020). Overall, the financial situation of many people worsened during the course of the pandemic (Ma et al., 2022). Considering that the rate of unemployment in Germany in April 2020 increased by 18.6% compared to the previous year, this worry seems to be a comprehensible reaction (Bundesagentur für Arbeit, 2020).

With the pandemic, many novel forms of stress (e.g., the fear of COVID-19, social isolation, and financial worries) emerged that the population had to deal with, but not all of these aspects of stress affected people in the same way. How stressors caused by the pandemic are experienced depends partly on the characteristics of the specific stressor itself, but also on how this stressor is appraised by the individual, as described by the transactional model of stress (Lazarus and Folkman, 1984). With respect to fear of COVID-19, social isolation, and financial worries differences in the population's stress appraisal can therefore be expected, as previous research suggests (Park et al., 2020). Social restrictions due to lockdown measures basically impact everyone's life, in contrast to financial worries, which only affect a smaller portion of the population (Park et al., 2020) and fear of COVID-19, which is more strongly experienced in specific

parts of the population (e.g., people with pre-existing illnesses, Bendau et al., 2021). We therefore expect a lower degree of financial worries and fear of COVID-19 than of social isolation.

1.2. Relations to well-being and sleep quality

Whether certain facets of stress are present in a population, though, does not indicate anything about how these facets of stress are related to general indicators of mental health, such as subjective well-being and sleep quality. Subjective well-being comprises, according to (Diener, 1984), an emotional and a cognitive evaluation of one's present state, both of which will be investigated in this study. We always refer to both constructs when using the term "well-being" in the following text. As numerous research has reported, both well-being (Sønderskov et al., 2020; Zacher and Rudolph, 2021) and sleep quality (Blume et al., 2020; Hetkamp et al., 2020) declined in the population in the beginning of the pandemic. This is likely a result of the increased psychological stress caused by a multitude of novel stressors. Furthermore, several studies have confirmed a negative relationship between COVID-19-related stress and people's well-being (Horesh et al., 2020; Umucu and Lee, 2020; Zacher and Rudolph, 2021) and sleep quality (Cellini et al., 2020). However, most of the research investigating COVID-19-related stress did not distinguish between different facets of stress and their specific associations with indicators for positive adaptation, such as well-being and sleep quality.

A few studies have provided evidence for significant relationships between the stress facet fear of COVID-19, well-being, and sleep. For example, Duong (2021) reported lower life satisfaction and increased sleep disturbances for people with higher levels of fear of COVID-19, and Taylor et al. (2020) reported fear of COVID-19 to be associated with higher depression scores, which can be seen as an indicator of lower well-being (Rapaport et al., 2005).

Social isolation, as another facet of pandemic-related stress, showed a relationship to sleep quality and well-being as well. For example, Horesh et al. (2020) found loneliness during the pandemic to be related to higher levels of psychological distress and lower levels of quality of life. Voitsidis et al. (2020) reported a relation between loneliness and sleeping problems. Furthermore, high social support was associated with better sleep quality whereas low social support was associated with anxiety and stress (Xiao et al., 2020). These results are very concerning considering that social restrictions were in force for several months in numerous countries and prevented people from getting social support, which has beneficial effects on peoples' mental health and well-being (Taylor, 2011). The mental burden caused by a lack of social contact may even have increased over the course of the pandemic, unlike fear of COVID-19. The uncertainty about the pandemic and its threat potential presumably decreased the more people knew about the novel virus, whereas the loss of social support may have even become more stressful over time.

Furthermore, Pieh et al. (2020) reported a higher risk for mental health problems for people with no work or a low income, confirming a relationship between the COVID-19-related stress facet of financial worries and well-being. Besides well-being financial worries also have been associated with sleep disturbances in past research (Danielsson et al., 2016). Bearing in mind that stressors that are perceived as uncertain, ambiguous, and existentially threatening lead to fear, financial worries may have had a great impact on people's well-being during the pandemic, especially because job insecurity was proven to be negatively associated with well-being in previous research (Witte, 1999). In addition, a study by Park et al. (2020) showed that even though financial concerns were not among the most common COVID-19 stressors (which were those related to changes in social contact), participants who experienced financial worries appraised these as extremely stressful, even more so than fear of COVID-19 and social isolation. In conclusion this means, that financial worries in the general population might not be appraised as very stressful on average, but the association with well-being and sleep might be particularly strong, because financial worries threaten people's ability to secure a living.

Overall, even though, many studies have confirmed that different aspects of COVID-19-related stress are associated with lower well-being and sleep quality, little is known about which stressors impact people the most and how these differentially relate to their well-being and sleep quality.

1.3. Aims of the study

First, we aim to compare reported financial worries and social isolation to fear of COVID-19 and investigate whether these aspects of stress differ in mean values. Because COVID-19 related fear had already decreased during the first months of the pandemic (Hetkamp et al., 2020), we assume that it is appraised as less stressful than social isolation, which was among the most prominent aspects of COVID-19-related stress in previous research (Park et al., 2020). We further assume the mean value of fear of COVID-19 to be higher than the mean value of financial worries, which were only reported by a small fraction of the population in previous research (see Park et al., 2020) and should therefore not affect the general population's stress appraisal as much as fear of COVID-19 would.

The second aim of the study is to investigate the relationships of fear of COVID-19, financial worries, and social isolation with various measures of well-being and sleep quality. Because of previous research, we assume that all investigated aspects of COVID-19-related stress correlate negatively with well-being and sleep quality. Subsequently, we also examine whether these relationships vary in strength and aim to propose a structural equation model relating all the variables to identify the most crucial facets of COVID-19-related stress in predicting people's well-being and sleep quality. We hypothesize that social isolation and financial worries show a stronger relationship with well-being and sleep quality than fear of COVID-19, since people might have habituated to the threat of COVID-19 (Hetkamp et al., 2020) and social isolation and financial worries may have gained importance over time.

2. Methods

To assess current well-being, sleep quality and different aspects of COVID-19 stress participants completed a cross sectional online questionnaire that was distributed over social media. The study was approved by the appropriate ethics committee. Data collection took place in Germany from the end of March until the middle of May 2021 when COVID-19 cases and incidence rates were on the rise again

(reflecting the third wave of the outbreak in Germany). The peak number of infections, with a 7-day incidence rate of 170 cases per 100,000 inhabitants, was reached at the end of April. Case numbers then slowly started to decline again (RKI, 2021). During this time, several lockdown restrictions were in place, such as a contact ban (only one contact outside of one's own household), the closure of nonessential stores and sports facilities, mandatory home office, and a dusk-to-dawn curfew.

2.1. Participants

A total of 485 participants completed the online questionnaire. Participants had to be at least 18 years old; otherwise no inclusion criteria had to be met. Five participants were excluded from the analyses due to unreliable response patterns or being defined as outliers. Outliers were defined as scores above or below three standard deviations from the mean value or with a significant Mahalanobis distance (Tabachnick et al., 2007). Of the remaining 480 participants, 50.8% were female, and the mean age was 43 years ($SD = 13.7$), with a range from 20 to 69 years. Nearly one third of the study sample (30.4%) had a university degree. A total of 72.9% of the participants were currently employed, 4.8% were currently unemployed, 14% were students or in training, and for 8.3%, none of the options were representative. Regarding household income, 12.8% of the study sample earned less than 1,000€ per month (low-income earners), 58.7% earned up to 3,000€ a month, and 25.8% earned more than 3,000€ a month. The remaining 44 participants made no statement concerning their household income. Out of all the participants 24% had received at least one dose of COVID-19 vaccine, and 25.2% lived alone.

2.2. Measurement instruments

Apart from the descriptive statistics and control variables, we measured three different aspects of COVID-19 related stress (fear of COVID-19, financial worries, and social isolation) as well as well-being and sleep quality with the questionnaires described in further detail below.

2.2.1. COVID-19-related stress

2.2.1.1. Fear of COVID-19

We assessed fear of COVID-19 with the two subscales, "danger" (D) and "contamination" (C), of the established COVID stress scales (CSS) developed by Taylor et al. (2020). All items assessed the past 4 weeks. Because the two scales were highly correlated ($r = 0.64$, $p < 0.001$) and loaded on a single factor in previous research (Taylor et al., 2020) the mean score of all 12 items was calculated. The reliability of the scale was good ($\alpha = 0.92$).

2.2.1.2. Social isolation and financial worries

Three items assessed how strongly the COVID-19 pandemic had affected the participants' social life during the previous 4 weeks. The items were based on the format of the CSS and can be found in Table 1. The scale ranged from 1 (*strongly disagree*) to 5 (*strongly agree*). The mean score was computed (S = Social isolation). The reliability of the scale was found to be satisfactory ($\alpha = 0.78$).

TABLE 1 Items.

Scale	Item
S	I feel lonely because of the contact ban
S	Missing social interactions are stressing me
S	I spend considerably less time with my loved ones/friends
F	I am worried about my financial situation
F	My financial situation worsened due to the COVID-19 pandemic
F	I am or was dependent of financial (state) support because of COVID-19

S, social isolation; F, financial worries.

Three additional items with a 5-point Likert scale were used to evaluate financial worries (F) due to COVID-19 in the past 4 weeks. The item format again corresponded to the one of the CSS (see Table 1). The participants rated how strongly the ongoing COVID-19 pandemic had influenced their financial situation. Higher scores reflected more financial worries. The mean score was calculated. The scale showed good reliability ($\alpha = 0.85$).

To investigate whether the items assessing social isolation and financial worries loaded on two separable factors a confirmatory factor analysis was conducted. The analysis confirmed a two-factor solution ($X^2(8) = 15.416$, $p = 0.054$; CFI = 0.999, RMSEA = 0.044), which allowed a differentiation of the two facets.

2.2.2. Well-being

In this study we used two measures to assess two different aspects of well-being, namely emotional well-being, which represents the emotional evaluation, and life satisfaction, which represents the cognitive evaluation of well-being.

2.2.2.1. Emotional well-being

Emotional well-being was measured with the 5-item World Health Organization Well- Being Index (WHO-5). The WHO-5 is a widely used questionnaire to assess emotional well-being. Participants rated their emotional well-being for the past 4 weeks on a 6-point Likert scale with higher scores indicating higher positive affect. The mean score for all five items was calculated. The reliability of the scale was good ($\alpha = 0.89$).

2.2.2.2. Life satisfaction

The well-established Satisfaction with Life Scale was used to measure the participants' overall satisfaction with life (Diener et al., 1985). The scale consists of five items, where participants rated how satisfied they are with their life on a 7-point Likert scale. A higher mean score reflects a higher satisfaction with life. Reliability of the scale was good ($\alpha = 0.89$).

2.3. Sleep quality

To measure subjective sleep quality during the previous 4 weeks, a modified version of the subscale "subjective sleep quality" of the

Pittsburgh Sleep Quality Index (PSQI; Buysse et al., 1989) was used. To increase variability the original 4-point Likert-scale was increased to an 8-point Likert-scale. Unlike in the original questionnaire higher scores indicate better sleep quality (1 = very bad, 8 = very good) to ease the interpretation of the data because higher scores also indicate better emotional well-being and life satisfaction.

2.4. Control variables

Age, gender, household income, living alone (yes or no), and vaccination status (vaccinated or not vaccinated) were included as control variables. Household income was measured with a Likert scale ranging from 1 to 10 (1 = a net income of less than 250€ per month, 10 = a net income of more than 4,000€ per month). Since, vaccination status did not show any significant correlations with the relevant variables (see Table 2), it was not included in the further analyses.

2.5. Statistical analysis

To examine the first aim of the study, we conducted a repeated-measures ANOVA with a Bonferroni-adjusted *post-hoc* analysis with a significance level of $p < 0.05$ to test whether the three aspects of COVID-19-related stress (fear of COVID-19, social isolation, and financial worries) differ in mean values. Since all three constructs were measured with the same response (5-point-Likert scale) and a similar question format, we directly compared the mean values without any transformation of the original data.

The relationships between the three facets of COVID-19-related stress (fear of COVID-19, social isolation, and financial worries), well-being, and sleep quality, representing the second aim of the study, were first investigated *via* bivariate correlations with a significance level of $p < 0.05$. Secondly, we further calculated a structural equation model (SEM) to test whether the associations between one facet of COVID-19-related stress, well-being and sleep quality remained significant after controlling for the other facets of COVID-19-related stress. The structural equation model was based on our hypotheses and the bivariate correlations. The two well-being measures (emotional well-being and life satisfaction) and sleep quality served as the criteria that were predicted by the three facets of COVID-19-related stress (fear of COVID-19, social isolation, and financial worries). The predictors and criteria were allowed to covary. Analysis was based on maximum likelihood estimates. All variables were modeled as latent variables, which were predicted by the corresponding items, except for fear of COVID-19, which was predicted by the respective means of the "danger" and "contamination" scales. To test whether the results remained stable after controlling for the control variables we included age, gender, household income, and living alone in the model. All control variables were significantly correlated with one or more well-being measures (see Table 2). The control variables were defined as additional predictors for emotional well-being, life satisfaction, and sleep quality and were allowed to covary with each other and the facets of COVID-19-related stress. The analysis was based on the full information maximum likelihood (FIML) method which allowed us to estimate parameters in the presence of missing data in the household income variable.

All calculations were conducted using JASP, version 0.14.1, and RStudio, version 1.3.1093. The descriptive statistics of all relevant variables are shown in Table 3.

3. Results

3.1. Facets of COVID-19-related stress

The repeated-measures ANOVA revealed that social isolation (S) was reported as the most stressful, followed by fear of COVID-19 (G),

TABLE 2 Bivariate correlations.

	1	2	3	4	5	6	7	8	9	10	11
1. Fear of COVID-19	1										
2. Financial worries	0.19***	1									
3. Social isolation	0.19***	0.23***	1								
4. Emotional well-being	−0.20***	−0.34***	−0.32***	1							
5. Life satisfaction	−0.05	−0.39***	−0.06	0.49***	1						
6. Sleep quality	−0.13**	−0.21***	−0.18***	0.48***	0.34***	1					
7. Age	0.08	0.05	−0.14**	0.16***	−0.09	−0.06	1				
8. Gender	−0.10*	0.10*	−0.11*	0.03	−0.14	0.10*	−0.03	1			
9. Household income	−0.04	−0.29***	−0.12*	0.15**	0.23***	0.11*	0.14**	0.13**	1		
10. Living alone	0.06	−0.00	0.76	0.09	0.16**	0.6	−0.01	−0.07	0.16***	1	
11. Vaccination status	−0.07	0.03	0.04	−0.07	−0.02	−0.00	−0.18***	0.03	−0.04	−0.09*	1

$N = 480$ for all correlations except for household income ($N = 436$) due to missing data; gender: 1 = female, 2 = male; living alone 1 = yes, 2 = no; vaccination status 1 = vaccinated (partially or fully), 2 = not vaccinated; *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

and worrying about one's financial situation (F; see Table 3). The repeated-measures ANOVA was significant ($F(2, 958) = 329.134$, $p < 0.001$, $\eta^2 = 0.41$). The Bonferroni-adjusted *post-hoc* analysis revealed that all three mean differences were significant (M(S-G) = 0.719, 95%-CI [0.690, 0.981], $p < 0.001$; M(S-F) = 1.555, 95%-CI [1.409, 1.70], $p < 0.001$; M(G-F) = 0.836, 95%-CI [0.573, 0.864], $p < 0.001$). In accordance with our assumption, the feeling of social isolation was reported to be more stressful than the fear of COVID-19 and financial worries, which were reported to be least stressful.

3.2. COVID-19-related stress, well-being, and sleep quality

3.2.1. Correlations

The correlations of all relevant variables can be found in Table 2. Emotional well-being and sleep quality were, as hypothesized, significantly negatively correlated with all three facets of COVID-19-related stress and showed the highest correlations with social isolation and financial worries. Therefore, the more COVID-19-related stress experienced, the worse the participants' emotional well-being and sleep quality. Yet, life satisfaction was only significantly negatively correlated with financial worries and was not related to fear of COVID-19 and social isolation; therefore, our hypotheses were only partly confirmed.

3.2.2. Structural equation model

The resulting model is depicted in Figure 1 (values in brackets on the left side of the model). A significant likelihood ratio test ($X^2(138) = 382.389$, $p < 0.001$), a comparative fit index (CFI) of 0.951, a normed fit index (NFI) of 0.925, a standardized root mean square residual (SRMR) of 0.044, and a root mean square error of approximation (RMSEA) of 0.061 indicated an acceptable model fit. Emotional well-being was predicted by all three aspects of COVID-19-related stress, corresponding to the results of the bivariate correlations. However, the relationship with fear of COVID-19was weaker when controlling for the other two facets of COVID-19-related stress. The relationship between life satisfaction and financial worries was strengthened when controlling for fear of COVID-19 and social isolation. In addition, the associations between sleep quality and social isolation and financial worries remained significant, unlike the association between sleep quality and fear of COVID-19. Financial worries were further revealed to be a stronger predictor compared to social isolation, which showed a weakened relationship with sleep quality compared to the correlations.

The resulting model when controlling for age, gender, household income, and living alone is depicted in Figure 1. A significant likelihood ratio test ($X^2(190) = 514.143$, $p < 0.001$), a CFI of 0.937, a NFI of 0.905, a SRMR of 0.040, and a RMSEA of 0.060 indicated an acceptable model fit. All the significant paths from the first model remained stable and significant after controlling for age, gender, household income, and living alone (see Figure 1).

TABLE 3 Descriptive statistics.

	M	*SD*	Min	Max	Skewness	Kurtosis
Fear of COVID-19	2.71	0.93	1.00	5.00	0.02	−0.58
Financial worries	1.88	1.11	1.00	5.00	1.24	0.51
Social isolation	3.43	1.11	1.00	5.00	−0.35	−0.74
Emotional well-being	3.64	1.08	1.40	6.00	−0.27	−0.88
Life satisfaction	4.83	1.30	1.00	7.00	−0.73	−0.15
Sleep quality	5.10	1.73	1.00	8.00	−0.44	−0.65

$N = 480$.

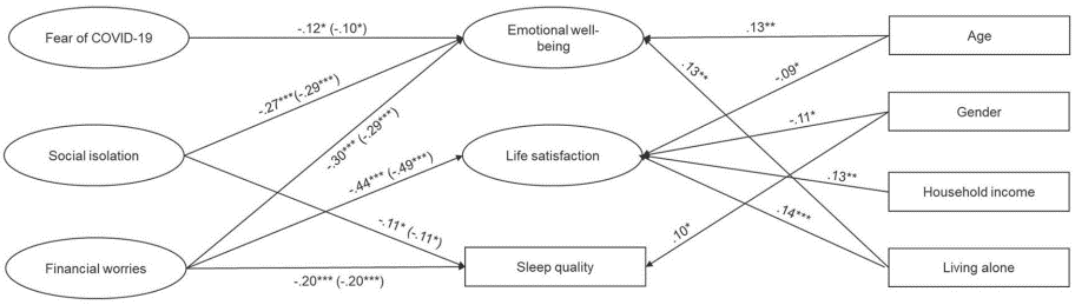

FIGURE 1
Structural equation model depicting the relationship between the three facets of COVID-19 stress, well-being, and sleep quality before and after controlling for age, gender, household income, and living alone. $N = 480$; gender: 1=female, 2=male; living alone: 1=yes, 2=no; *$p<0.05$, **$p<0.01$, ***$p<0.001$. Only significant paths are depicted; values in brackets represent path coefficients for the model without the control variables; correlations between the predictors and control variables are not depicted for easier readability (see Table 2 for bivariate correlation coefficients).

4. Discussion

The COVID-19 pandemic and the subsequent social distancing policies led to various sources of stress during the early stages of the outbreak. Among these were fear of COVID-19, social isolation, and financial worries. This study was able to support previous research that found that social isolation and social restrictions were the most prominent aspects of COVID-19-related stress, followed by fear of COVID-19 and financial worries (Park et al., 2020; Statista, 2020), which confirmed the authors' hypotheses. Even though people still live under an ongoing threat of getting sick, the lack of social contact appears to be far more stressful than the fear of contracting COVID-19. This might be the case because up to the date of data collection only a small proportion of the German population (approximately 4.3%, 05/15/2021) had actually suffered from COVID-19 (RKI, 2021). Therefore, the chance of becoming infected with SARS-CoV-2 was still relatively low, and people presumably had only a few or no social contacts who had already suffered from COVID-19. Hence, the restrictions of social contact reflected a more tangible negative change in people's everyday lives than experiencing a diffuse feeling of fear of COVID-19. Furthermore, social restrictions impacted the whole population, including people who did not feel threatened by the virus, either because they did not fear getting infected or because they did not believe in its existence. This is supported by the findings of Park et al. (2020) who found that changes in social routines and uncertainty about how long social distancing requirements would last were the most prominently reported stressor in relation to the pandemic.

Nevertheless, fear of COVID-19 was still moderately present in the German population more than one and a half years after the first cases at the end of 2019, even though fear levels rapidly dropped within the first weeks of the pandemic (Hetkamp et al., 2020). This indicates that the population might have partially, but not fully habituated to the fear of COVID-19. However, since we had no data from our study sample prior to the described data collection, we can draw no conclusions about the development of fear of COVID-19 nor can we compare our statistical data to previous findings. In contrast to fear of COVID-19, financial worries were, on average, not appraised as very stressful by the general population. This may be explained by the functional German social insurance system and the several bills that were passed by the government to support people in financial need during the COVID-19 pandemic. Therefore, it is possible that in countries without comparable financial aid, this aspect of COVID-19-related stress is a more prominent issue. This should be investigated in future research to be able to compare facets of COVID-19-related stress in different countries with different social and financial structures.

The results of this study further revealed that although financial worries were not reported to be as stressful as social isolation and fear of COVID-19 in the general population, financial worries turned out to be the strongest predictor for both well-being and sleep quality, even after controlling for the other two facets of COVID-19-related stress. In fact, it was the only facet of COVID-19-related stress that was able to predict all three positive mental health indicators (emotional well-being, life satisfaction, and sleep quality). As mentioned above, only a minority of the present sample had to fear severe financial struggles, but those who did, seemed to have a greater chance of suffering from impaired well-being and sleep quality, which is in line with previous research by Park et al. (2020) and confirms our assumption that financial worries might have a great impact on people since they threaten fundamental basic needs. Furthermore, financial worries were particularly strongly associated with lower life satisfaction. Even though acute measures such as emotional well-being and sleep quality showed a negative relationship with financial worries, the global evaluation of one's life showed an even stronger relationship. Financial worries possibly represent an existential threat that overshadows many different aspects of peoples' lives and cause persistent worries and fears about the security of ones' future; this may lead to an overall feeling of dissatisfaction, and can cause mental health problems such as depression or anxiety in the long run if people are overwhelmed by it.

The same goes for a prolonged reduction of social contact due to lockdown restrictions, which was also related to lower emotional well-being and worse sleep quality even after controlling for the remaining facets of COVID-19-related stress. Social contact is an important resource when struggling with problems of any kind (Taylor, 2011), and in concordance with the transactional model of stress the lack of social support can either be a stressor, but also an impairment of an important coping strategy (Lazarus and Folkman, 1984). However, when dealing with COVID-19-related stress, seeking social support was not found to be the best coping strategy compared to meaning- and problem-focused coping in previous research (Saalwirth and Leipold, 2021). Interestingly, and in contrast to the authors' hypotheses, fear of COVID-19, although still present in the population, was only weakly correlated with emotional well-being and was not correlated with life satisfaction and sleep quality. This is an important finding considering that the population is living with the constant threat of contracting COVID-19 for quite some time. Fortunately, it seems that in general people have found a way to deal with this specific fear and remain mentally healthy under burdensome living conditions during the COVID-19 pandemic. Furthermore, this research demonstrated that these findings are independent of age, gender and household income, and therefore people in all age groups regardless of their gender or financial status are affected in the same way. Living alone also showed no substantial effect on the described relationships, not even for the COVID-19-related stress facet of social isolation. This highlights that for people living alone, the relationships between a lack of social contact and well-being and sleep quality are luckily not increased compared to those living with one or more additional household members.

4.1. Limitations

Although this research can extend previous findings on different facets of COVID-19-related stress and their associations with well-being and sleep quality, it is also limited in certain ways. First, the scales used to measure social isolation and financial worries were created on the basis of the COVID stress scales (CSS). They had not been used in other studies before and thus were not validated. In addition, we expanded the original time reference in the instructions of the WHO-5 and the CSS from 2 weeks and 1 week, respectively, to 4 weeks in order to align the time frame of other scales that were use. Also, the results are based solely on cross-sectional data, and therefore, no causal relationships could be tested. Future research should address this issue with longitudinal study designs with at least two, preferably more, data points. This would also allow to address the development of the relevant variables and to further investigate possible habituation processes of fear of COVID-19. In addition,

further analyses regarding specific subgroups of the population, for example, students or unemployed persons who might experience financial worries differently, should be included in future research. Furthermore, the data collection took place in Germany, and thus, the transferability of the study findings for other countries should be interpreted with caution. Also, we must point out that, at the time of the data collection, not enough vaccine was available to vaccinate the entire German population; this might have biased results regarding the vaccination status of the participants. In addition, other facets of COVID-19-related stress may exist that were not investigated, but may also be relevant. For example, it is imaginable that people are also stressed by changes in work routines and child care, mistrust or discontent with governmental policies, or social discrimination, as implied by previous research (Park et al., 2020). Consequently, we do not claim completeness regarding the facets of COVID-19-related stress and future studies should extend the knowledge about different aspects of stress and their differential impacts on population health.

5. Conclusion

Unexpectedly, fear of COVID-19 was not or only weakly related to peoples' emotional health and sleep quality, unlike social isolation and financial worries. Overall, financial worries turned out to be the best and most stable predictor for well-being and sleep quality. Obviously, financial worries, as an existential threat, may be a greater risk to people's mental health than the fear of getting sick during phases of ongoing health crises and pandemics and thus should receive more attention regarding their health-related consequences by researchers and policy-makers.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by Ethics Committee of the Universität der Bundeswehr München. The patients/participants provided their written informed consent to participate in this study.

Author contributions

CS and BL: conceptualization, methodology, and writing – review and editing. CS: statistical analysis, writing – original draft preparation, and project administration. BL: supervision. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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4.1 Summary of Contribution 2

Building on the first contribution, the second contribution delved deeper into the differentiation of various facets of stress appraisal regarding the COVID-19 pandemic. Moreover, correlations with two additional well-being measures (emotional well-being, life satisfaction, and sleep quality) were explored within a structural equation model, further enriching the understanding of these constructs and their interconnections. The findings revealed that, among three distinct facets of COVID-19-related stress appraisal (social isolation, fear of COVID-19, and financial worries), social isolation emerged as the most prominent, overshadowing both the fear of COVID-19 and financial worries. Additionally, the results emphasize that the frequency of reported stress appraisal does not necessarily equate to a substantial relationship with individuals' subjective well-being, enriching the knowledge about stress appraisal during the pandemic that was gained in Contribution 1. Surprisingly, while not as prevalent as social isolation and fear of COVID-19, financial worries emerged as the strongest predictor of diminished well-being. Financial worries can pose an existential threat, casting a shadow over multiple facets of people's lives and instigating persistent anxieties about future security. Social isolation and fear of COVID-19 also predicted well-being, albeit to a lesser extent.

The following and final contribution of this dissertation further extends the described findings by examining the direct association between stress appraisal and coping. Here, the same coping strategies as in Contribution 1 were investigated. The relationship between stress appraisal and coping represents the missing piece to highlight the interconnected associations between stress appraisal, well-being, and coping. By investigating worries not only cross-sectionally (as in Contributions 1 and 2) but also over the course of several weeks, potential inter-individual changes in stress appraisals during global crises are taken into account. These results may deepen the understanding of the short-term trajectories of stress appraisal during global crises. Since the COVID-19 pandemic was tailing off and the Russo-Ukrainian War had just begun while planning the data collection, worries were assessed regarding the more prominent global crisis, the war in Ukraine.

Chapter 5

Coping with a Global Crisis –Changes in Worries about the Russo-Ukrainian War

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Coping with a global crisis—Changes in worries about the Russo–Ukrainian War

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Abstract

Global crises, such as the Russo–Ukrainian War, can lead to worrying, which in turn can result in health problems when not positively coped with. This study investigates how the worries of Germans are related to general coping strategies. Three consecutive online surveys were distributed from the beginning of March until the beginning of May 2022. The surveys assessed participants' worries about the Russo–Ukrainian War and their use of four coping domains for the two preceding weeks. A total of 175 (54.3% female; $M_{age} = 33.3$, $SD = 13.6$, 18–66 years) participants completed all three questionnaires. Worries and coping (meaning-focused, problem-focused, social, and avoidance coping) declined over time. Cross-sectionally all coping domains, except meaning-focused coping, correlated positively with initial worries, indicating a higher use of coping strategies when worries were present. In line with this, the use of both social and avoidance coping declined over the course of the study when worries were reduced. Furthermore, a higher initial use of avoidance coping was associated with a stronger decline in worries. Worries and coping strategies both declined following the Russian invasion of Ukraine which suggests that worries and coping strategies adapt to one another over time.

KEYWORDS
avoidance coping, meaning-focused coping, problem-focused coping, social coping, stress

INTRODUCTION

With the Russian invasion of Ukraine on February 22, 2022, a period of peace on the European continent came to an end and a time of uncertainty for many countries and their inhabitants began. A military conflict is a dangerous and threatening situation (Murthy & Lakshminarayana, 2006), assumedly even more so when the involvement of one's own country seems possible. Under such circumstances, an increase in worry among the population is likely. One aim of this study, therefore, is to investigate how worries changed in Germans over the 2 month time period following the Russian invasion of Ukraine. A further aim of this study was to examine interindividual differences in four coping domains (meaning-focused, problem-focused, social, and avoidance coping; Baumstarck et al., 2017) and how they related to worry and changes in worry over time. Because specific coping strategies may not be equally efficient in every situation, we differentiate four broader domains of coping, namely, problem-focused coping, meaning-focused coping, social coping, and avoidance coping.

Worrying about the Russo–Ukrainian War

New, possibly dangerous situations, such as the Russian invasion of Ukraine, can lead to feelings of worry. Worrying is a relatively uncontrollable and unpleasant chain of thoughts and images that is triggered by a fear stimulus, in this study, the military conflict (Borkovec et al., 1983). Worrying is further characterized by an inward attention focus and concerns about potential outcomes of future events (Borkovec et al., 1983). From a broader theoretical perspective, worrying can also be seen as the result of a primary stress appraisal, such as that proposed in the transactional model of stress and coping by Lazarus and Folkman (1984). In this model, an individual assesses a stressor—such as potential outcomes of the Russian invasion of Ukraine—through a primary stress appraisal, categorizing it as positive, irrelevant, or distressing. A situation is considered stressful when its external or internal demands exceed the individual's perceived coping resources. Stressors can be further differentiated into appraisals of harm or loss, a possible threat, or a challenge. Whereas harmful stressors already inflict some sort of damage in the present, threatening stressors hold potential harm in the future; thus, worrying occurs when a situation is deemed threatening and could lead to harm in the future.

Past research indicates that worrying is a very common phenomenon in everyday life (Verkuil et al., 2007) and a certain amount of worrying in response to threatening life situations like the Russian invasion of Ukraine seems to be a healthy and normal response. Worrying can prepare individuals to cope with future problems (Borkovec et al., 1983). Because Germany is situated in Central Europe, the Russian invasion of Ukraine did not occur in its close vicinity. Nevertheless, there was great concern that the war might also spread. A certain amount of worrying about the Russo–Ukrainian War thus seems expectable in the German population. In interviews conducted in June and July 2022, the European Commission (2022) found that, in

comparison with the overall European population, more Germans were worried about the expansion of the war to other countries (41% vs. 33%) and possible shortages in the supply of energy and other goods (31% vs. 24%). On the other hand, Germans were similar to their European counterparts in worries about getting involved in the war (21% vs. 20%), a possible economic crisis (32% vs. 36%), or a potential nuclear war (22% vs. 25%). This makes clear that people in Germany, but also in other countries in Europe, were worried about the escalation of the Russo–Ukrainian War.

Although worrying might initially be a normal and healthy response, worrying can also have negative effects when it becomes chronic and is not successfully coped with. In line with this presumption are research findings that link excessive and problematic worrying with a higher prevalence of anxiety disorders, depression, and feelings of stress (Hong, 2007; Szabó, 2011). Several studies also differentiated different domains of worry, such as safety and health, achievement and economic, social, and meaning (Boehnke et al., 1998; Schwartz & Melech, 2000). In particular, worries about one's own person or loved ones (micro worries) in comparison with worries concerning society or the world (macro worries) are associated with poor mental health (see Boehnke et al., 1998; Schwartz & Melech, 2000).

In the present study, we focus on interindividual differences in coping strategies people use to deal with difficult situations and how these relate to worries (e.g. feelings of stress and hopelessness) regarding the Russo–Ukrainian War. People differ in their use of general coping strategies that enable them to adapt to novel, possibly harmful, life events. Studies that investigated worries during the early stages of the COVID-19 pandemic revealed that although levels of worry were high in the beginning, they also began to decline within only a few weeks (Bendau et al., 2021; Hetkamp et al., 2020). Whether a similar pattern will emerge for worries regarding the military conflict in Ukraine is a subject of investigation in the present study.

Coping strategies

Coping is defined as cognitive and behavioral efforts to handle a stressful situation that exceeds the individuals' resources to maintain or restore well-being (Lazarus & Folkman, 1984). Such efforts can include a wide range of different strategies (Carver & Scheier, 1989; Lazarus & Folkman, 1984). Although the Russian invasion of Ukraine per se objectively represents a similarly threatening situation for most European citizens, individuals differ in their appraisals of their abilities to cope with difficult situations and their choice of coping strategies. A popular and well-established questionnaire to assess different coping strategies is the brief COPE inventory, a short version of the original COPE inventory (Carver, 1997), that assesses 14 different coping strategies. However, as Skinner et al. (2003) pointed out, including a great number of different coping strategies makes it difficult to compare and summarize research findings. Researchers have thus tried to reduce the coping strategies of the COPE inventory into broader domains of coping. In this study, we focused on four global domains that have emerged from several studies (Baumstarck et al., 2017; Litman, 2006; Saalwirth & Leipold, 2021), namely, meaning-focused coping, problem-focused coping, social coping, and avoidance coping.

Problem-focused coping targets the specific problem itself directly, for example, through plans to change the current situation. In previous research (Göral et al., 2006; Saalwirth & Leipold, 2021; Zacher & Rudolph, 2021), it was associated with stress-related growth, better quality of life, and less worrying.

Meaning-focused coping, on the other hand, aims to reinterpret the stressful situation in a positive way, for example, by accepting it or taking it with humor. The problem itself hereby remains unchanged. Similarly, to problem-focused coping, meaning-focused coping was also positively related to better quality of life, better well-being, and less worrying in past cross-sectional research (Hofstetter et al., 2005; Moskowitz et al., 2009; Saalwirth & Leipold, 2021).

Social support has long been recognized as another important protective factor in coping with stress (Taylor, 2011). For example, several studies found a lack of social support to be associated with an elevated risk for impaired emotional health during the COVID-19 pandemic (Boyraz et al., 2020; Bu et al., 2020) and more social support to be associated with less stressful experiences and distress (Muñoz-Martínez & Naismith, 2022; Ye et al., 2020). In addition, social support was able to reduce negative effects of war-related trauma (Murthy & Lakshminarayana, 2006) and foster posttraumatic growth (Prati & Pietrantoni, 2009); however, social coping was also associated with higher levels of negative affect (Zacher & Rudolph, 2021) and more worrying during the COVID-19 pandemic (Saalwirth & Leipold, 2021).

Unlike the other strategies, avoidance coping has mostly been associated with negative outcomes (Littleton et al., 2007), even though there are also circumstances in which it can be useful, as Lazarus (1983) pointed out. Avoidant coping strategies include, for example, self-distraction, denial, or substance use, all of which are attempts to escape a negative situation. In recent studies, during the COVID-19 pandemic, avoidance coping was associated with lower well-being and more worrying (Saalwirth & Leipold, 2021; Zacher & Rudolph, 2021), confirming previous research findings linking avoidance coping with disadvantageous outcomes. In the present study, we investigate whether worrying about the Russo–Ukrainian War decreases or increases in people who use these coping strategies.

Because most of the coping research has focused on the effectiveness rather than the frequency of the use of coping strategies, to date, little is known about the frequency with which these four coping domains are used. In a recent study by Saalwirth and Leipold (2021), problem- and meaning-focused coping were found to be used more often than social coping and avoidance coping during the COVID-19 pandemic. Whether a similar pattern will emerge during the weeks after Russia invaded Ukraine remains to be investigated.

Aims of the study

Previous research findings link negative health outcomes to worry that is not efficiently coped with. This underlines the importance of investigating peoples' worries and their coping efforts during times of a global crisis, such as the Russo–Ukrainian War. The first aim of this study was therefore to investigate how worries about the Russo–Ukrainian War and the general use of four coping domains (meaning-focused, problem-focused, social, and avoidance coping) developed in the weeks following the beginning of the war. Because the development of the situation was not foreseeable at the time of the data collection, no assumptions were made as to how worries about the Russo–Ukrainian War and general coping efforts would change over time.

The present design with three measurement points allows latent growth modeling that can distinguish change correlations and predict change through initial values (intercepts). Change correlations show whether changes in coping use (slope) are associated with changes in worry (slope). Predictions through the intercept indicate the protective function of coping, for example, whether a high initial degree of coping predicts the decrease in worry (slope). Thus, the

second aim of this study was to investigate how changes in the four different coping domains were related to changes in worries about the Russo–Ukrainian War over time. We expected coping efforts to decrease over the course of the study if worries declined and to increase if worries rose because one can expect that the need to cope is tied to the existence of worries. A further question is whether the degree of worrying about the Ukraine conflict decreases depending on the individual's initial level of coping strategies. Because problem- and meaning-focused coping as well as social coping were mainly associated with positive outcomes in previous cross-sectional research, we also expected a higher initial use of those coping strategies (intercept) to predict a stronger decrease (slope) in worrying over time. For a higher use of avoidance coping (intercept), we expected a weaker decrease (slope) in worries over time, because avoidance coping has often been associated with disadvantageous health outcomes.

Finally, we explored the frequency with which the coping domains were used during the weeks after the Russian invasion of Ukraine; this is the third aim of the study. Here, we aimed at comparing our results to previous research by Saalwirth and Leipold (2021), in which problem- and meaning-focused coping were used more often than social and avoidance coping.

METHODS

Data were collected using a panel design consisting of three consecutive online questionnaires distributed 2 weeks apart, beginning in March and ending at the beginning of May 2022 (see Figure 1). The study was approved by the institutional Ethics Committee of the University of the Bundeswehr Munich, and all participants gave informed consent. No monetary compensation was given to the participants. The distribution of the first questionnaire started 11 days after the military conflict in Ukraine began. All three questionnaires, except for the sociodemographics section, were identical (see Figure 1). They assessed worries about the Russo–Ukrainian War and the use of different coping strategies over the preceding 2 weeks. During the first time period, German news was dominated by negative reports about the Russo–Ukrainian War, such as Russian attacks on Ukrainian civilians or the growing pressure on the capital Kiev. Reports about war crimes committed by Russian soldiers in the region of Butscha prevailed during the second time period. An attack on a nuclear power plant and attempts to evacuate Ukrainian employees were reported during the third time period. Overall though, the amount of news about the Russo–Ukrainian War in Europe decreased over the course of the study, as a report on the Swiss media coverage supports (fög – Forschungszentrum für Öffentlichkeit und Gesellschaft, 2022).

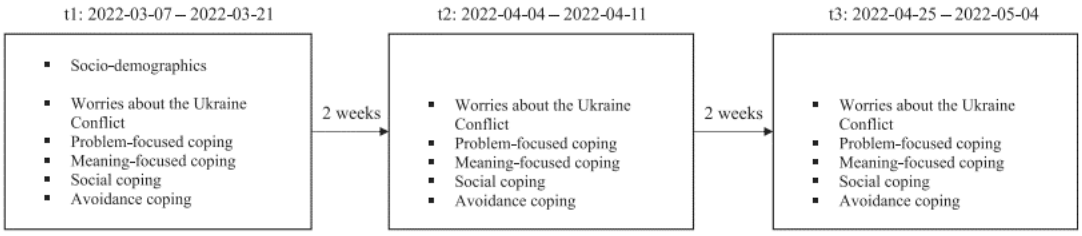

FIGURE 1 Study design.

Participants

A total of 513 participants completed the first online questionnaire (t1) that had been distributed via social media and university mailing lists in Germany. Out of the 513 participants, 246 participants (48%) who could be matched to their data from t1 filled out the second questionnaire (t2); from these, 179 (35%) answered the third questionnaire (t3).

To control for systematic patterns of attrition, participants who had completed all three questionnaires ($N = 179$) were compared with drop-outs ($N = 334$) on demographics (age, gender, education, and household income) and the relevant variables (worry and the four coping domains). The drop-out group did not differ from the study group in any of the variables, except for age (see Table S1). Participants who dropped out were slightly younger ($F(1,511) = 4.528$, $M\text{Diff}_{age} = 2.78$, $p = .034$) than participants who had participated at all three time points.

In addition, four of the remaining 179 participants had to be eliminated because of missing data or being defined as outliers. Outliers were defined as scores above or below three standard deviations from the mean value or with a significant Mahalanobis distance (Tabachnick et al., 2007). The remaining sample consisted of 175 participants between 18 and 66 years with a mean age of 33.3 years ($SD = 13.6$). A total of 95 (54.3%) participants were female, 79 participants were male (45.1%), and one participant gave no information (0.6%). In terms of education, 71 (40.6%) participants had a university degree, 85 had a high school degree (48.6%), and 19 had less than 12 years of schooling (10.8%). Participants' professions represented a variety of different work sectors. Of the participants, 12.1% earned less than 1000€ per month (low-income earners), 69.6% earned up to 3000€ a month, and 17.7% earned more than 3000€ a month. The remaining one participant (0.6%) provided no information. Nine participants (5.1%) reported having close personal contact with Ukrainian citizens.

Measurement instruments

In the three online questionnaires, we gathered information about the participants' sociodemographics as well as the following measures.

Worries about the Russo–Ukrainian War

At the time our study began, no questionnaires specifically assessing worries about the military conflict in Ukraine had been published. We, therefore, used an adapted version of the Dunny Worry Questionnaire (Freeman et al., 2020), in which participants were asked to rate on a 5-point Likert scale how worried they had been about the Russo–Ukrainian War in the past 2 weeks (1 = *none of the time*, 5 = *all of the time*). For example, the item "I've been worrying a lot" was adapted to "I've been worrying a lot about the Ukraine conflict." A mean score of all 10 items was computed. The reliability of the scale was good ($\alpha_{t1} = .89$, $\alpha_{t2} = .92$, $\alpha_{t3} = .93$).

Coping strategies

The Brief-COPE from Carver (1997) was used to assess the general use of different coping strategies over the previous 2 weeks. The Brief-COPE is a short version of the COPE inventory, a

frequently used questionnaire on coping (Kato, 2015) consisting of 14 different coping strategies, each measured by two items (Carver, 1997). The scale *self-blame* was excluded, due to inappropriateness in the context of the Ukraine conflict. The scales *religious coping* and *behavioral disengagement* did not fit our proposed model of higher order coping strategies and were therefore also not included. The remaining 11 coping strategies of the Brief-COPE were reduced into four higher order coping strategies, similar to previously proposed models by Baumstarck et al. (2017) and Saalwirth and Leipold (2021). *Problem-focused coping* consisted of the scales for active coping and planning ($\alpha_{t1} = .73$, $\alpha_{t2} = .73$, $\alpha_{t3} = .76$); *meaning-focused coping* of the scales for acceptance, positive reframing, and humor ($\alpha_{t1} = .75$, $\alpha_{t2} = .74$, $\alpha_{t3} = .75$), *social coping* of the scales for instrumental support, emotional support, and venting ($\alpha_{t1} = .81$, $\alpha_{t2} = .83$, $\alpha_{t3} = .86$); and *avoidance coping* of the scales for self-distraction, denial, and substance use ($\alpha_{t1} = .60$, $\alpha_{t2} = .58$, $\alpha_{t3} = .68$). For each of the four coping domains, a mean value of the items in the respective scale was calculated.

Statistical analysis

To investigate how worry and the four coping domains changed over time, as well as which coping strategies were used most often, repeated-measures ANOVAs (analysis of variance) with Bonferroni-adjusted post hoc analyses and a significance level of $p < .01$ (adjusted for multiple testing) were used to analyze the differences in means. Latent growth analyses were used to test whether worry and coping strategies were associated over time. The descriptive statistics of all variables can be found in Table 1.

TABLE 1 Descriptive statistics of all variables.

	M	*SD*	Min	Max	Skewness	Kurtosis
Worry t1	2.75	0.85	1.00	5.00	0.08	−0.35
Worry t2	2.29	0.83	1.00	5.00	0.71	0.24
Worry t3	2.02	0.82	1.00	4.90	1.13	1.09
Problem-focused coping t1	2.50	0.70	1.00	4.00	0.13	−0.47
Problem-focused coping t2	2.35	0.68	1.00	4.00	0.05	−0.68
Problem-focused coping t3	2.28	0.69	1.00	4.00	0.19	−0.36
Meaning-focused coping t1	2.50	0.65	1.00	4.00	−0.06	−0.64
Meaning-focused coping t2	2.41	0.65	1.00	4.00	0.22	−0.45
Meaning-focused coping t3	2.34	0.65	1.00	4.00	0.21	−0.22
Social coping t1	1.98	0.65	1.00	4.00	0.70	0.40
Social coping t2	1.89	0.65	1.00	4.00	0.77	0.16
Social coping t3	1.81	0.63	1.00	3.67	0.78	0.27
Avoidance coping t1	1.71	0.43	1.10	3.17	0.77	0.80
Avoidance coping t2	1.59	0.39	1.10	3.17	0.77	1.17
Avoidance coping t3	1.57	0.43	1.00	3.50	1.22	2.78

Note: $N = 175$.

TABLE 2 Bivariate correlations at t1.

	1	2	3	4	5	6	7
1. Worry t1	1						
2. Problem-focused coping t1	.27***	1					
3. Meaning-focused coping t1	−.18*	.13	1				
4. Social coping t1	.32***	.46***	.12	1			
5. Avoidance coping t1	.35***	.28***	.11	.36***	1		
6. Age	.19*	.09	−.26**	−.06	−.10	1	
7. Gender	.21**	.02	−.28**	.22**	.11	.19*	1

Note: $N = 175$; gender: 1 = male, 2 = female; one participant reported diverse and was not included in the correlation with the gender variable.
*$p < .05$, **$p < .01$, and ***$p < .001$.

We included age and gender as control variables in the proposed models because they had shown significant correlations with the relevant variables (see Table 2). All calculations were conducted using IBM SPSS Statistics, version 28, and Jamovi, version 2.3.13.

RESULTS

The results are presented in three main steps. First, we examine the changes in worry and the four coping domains. Second, we investigate which of the coping strategies were used most often, and third, we report the proposed latent growth models, one for each coping strategy.

Changes of worry and coping over time

To examine how worries change over time, we tested whether worries differ in their mean values between t1, t2, and t3. The repeated-measures ANOVA was significant, $F(1.69, 293.31) = 107.81$, $p < .001$. Because the Mauchly's test indicated a violation of the sphericity assumption, a Greenhouse–Geisser correction was applied. A Bonferroni-adjusted post hoc analysis revealed a significant reduction in worry for all three measurement times, with a stronger reduction from t1 to t2 than from t2 to t3 (Table 3). The effect size for the overall reduction from t1 to t3 indicated a large effect.

In addition, we investigated the developments in the different coping domains. We tested whether the aforementioned variables differed in their mean values between t1, t2, and t3. The repeated-measures ANOVAs for all coping domains were significant: problem-focused coping, $F(2, 348) = 9.03$, $p < .001$; meaning-focused coping, $F(2, 348) = 6.37$, $p = .002$; social coping, $F(2, 348) = 7.03$, $p = .001$; and avoidance coping $F(1.87, 325.96) = 3.82$, $p = .023$. Because a Mauchly's test indicated a violation of the sphericity assumption for the calculation for avoidance coping, a Greenhouse–Geisser correction was applied. The Bonferroni-adjusted post hoc analyses showed significant reductions for all coping strategies from t1 to t3 (see Table 3). For problem-focused and avoidance coping, a reduction between t1 and t2 was found as well. The effect sizes were small to medium. None of the coping domains showed a significant decrease from t2 to t3.

TABLE 3 Mean difference of worry and the four different coping strategies for t1, t2, and t3.

	t2				t3			
	*M*Diff	95% CI	*p*	Cohen's *d*	*M*Diff	95% CI	*p*	Cohen's *d*
Worry t1	0.45	[0.33; 0.57]	≤.001	0.55	0.73	[0.61; 0.85]	≤.001	0.87
Worry t2					0.15	[0.15; 0.39]	≤.001	0.33
Problem t1	0.14	[0.02; 0.27]	.022	0.21	0.22	[0.09; 0.35]	≤.001	0.32
Problem t2					0.05	[−0.05; 0.21]	.405	0.11
Meaning t1	0.09	[−0.02; 0.20]	.150	0.14	0.16	[0.05; 0.27]	.001	0.25
Meaning t2					0.07	[−0.04; 0.18]	.335	0.11
Social t1	0.10	[−0.01; 0.21]	.107	0.15	0.17	[0.06; 0.28]	≤.001	0.27
Social t2					0.08	[−0.04; 0.19]	.310	0.12
Avoidance t1	0.12	[0.05; 0.19]	≤.001	0.29	0.14	[0.07; 0.21]	≤.001	0.35
Avoidance t2					0.02	[−0.05; 0.09]	1.000	0.06

Note: $N = 175$.
Abbreviations: Avoidance, avoidance coping; Meaning, meaning-focused coping; Problem, problem-focused coping; Social, social coping.

Latent growth analyses

Next, we used latent growth analyses to investigate whether initial levels of worry and coping (intercepts) predicted the changes in worry and coping (slopes) and whether these were associated with each other. We calculated a separate model for each of the coping domains, resulting in four latent growth analyses similar to those proposed by Brailean et al. (2017). Each of the models was built by setting the loadings of each factor to 1 for the intercept latent variable and the slope parameters to 0, 1, 2 in line with the chronological spacing of the measurements. The latent variables representing the intercept and slope were allowed to correlate and the slopes of worry and the four coping domains were regressed on the intercepts of worry and coping domain. We used the mean values of worry and the coping domains at t1, t2, and t3 for each time point to estimate the latent constructs. In addition, to control for the influence of age and gender on the results, we included both as manifest variables that were allowed to correlate with the latent variables in the models. See Figure 2 for results. Indices of fit indicated an acceptable model fit for all four models.

All four coping domains at t1 were associated with worry at t1. More problem-focused, social, and avoidance coping and less meaning-focused coping were related to less worry. As expected, the decrease in worry was significantly associated with the decrease in avoidance and social coping; specifically, the stronger the decrease in worry, the stronger the decrease in avoidance and social coping. Similar results for problem-focused coping and meaning-focused coping were not found. Except for avoidance coping, none of the intercepts of the coping domains was able to predict the change in worry over time. For avoidance coping, the more people initially coped using avoidance, the stronger their worries decreased over the time span, which is contrary to our hypothesis. Furthermore, initial levels of worry did not predict the slope of the four coping domains. In addition, older participants were more worried than younger participants and showed less meaning-focused coping. Women were more worried and used

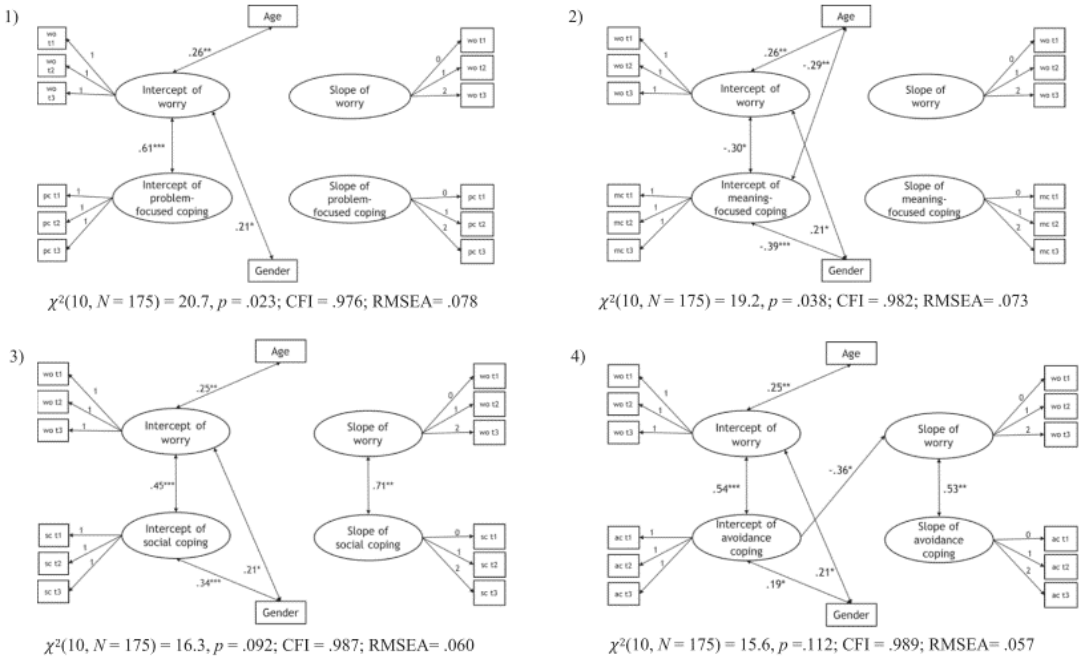

FIGURE 2 Latent growth analyses of worry and (1) problem-focused coping, (2) meaning-focused coping, (3) social coping, and (4) avoidance coping. $N = 175$; gender: 1 = male, 2 = female; one participant reported diverse and was indicated as missing; $^{*}p < .05$ $^{**}p < .01$ $^{***}p < .001$; only significant paths are shown. ac, avoidance coping; CFI, comparative fit index; mc, meaning-focused coping; pc, problem-focused coping; RMSEA, root-mean-square error of approximation; sc, social coping; wo, worry.

more social and avoidance coping than did men. All the described relationships remained stable and significant when we repeated the analyses without the nine participants that had reported having close personal contact with Ukrainian citizens.

Use of coping strategies

We further assessed whether certain coping domains were used more frequently than others and if this pattern changed over time. Again, the three repeated-measures ANOVAs for all three measurement times were significant: t1, $F(2.66, 462.56) = 92.22$, $p < .001$; t2, $F(2.59, 451.09) = 98.25$, $p < .001$; and t3, $F(2.61, 453.66) = 90.53$, $p < .001$. Because the Mauchly's test indicated a violation of the sphericity assumption, a Greenhouse–Geisser correction was applied for all three calculations. The Bonferroni-adjusted post hoc analyses revealed that meaning-focused and problem-focused coping were used most frequently, followed by social coping and avoidance coping. This pattern was the same for t1, t2, and t3 (see Table 1 for mean values). All comparisons yielded statistically significant results, except for the mean value differences between problem-focused and meaning-focused coping, which showed no difference at either t1, t2, or t3 and were therefore used equally often.

Discussion

The results of this study show that levels of worry declined in the weeks following the Russian invasion of Ukraine. Interestingly, the reduction in worry was stronger in the first time interval than in the second time interval. Because one would not expect that levels of worry would drop to zero as long as the conflict was still ongoing, it is possible that the more time passed, the closer the participants approached a level of existing, but not dominating feeling of worry. Although worry clearly decreased over time, the processes underlying the decrease remain unclear. For example, it is possible that the participants simply habituated to the new situation, as Hetkamp et al. (2020) suggested for similar findings during the beginning of the COVID-19 pandemic. However, future research is needed on how comparable the effects of different global crises on the population are. For example, although the COVID-19 pandemic and the Russo–Ukrainian War share similar features such as the threat to one's own safety or possible negative effects on the economy and one's own financial situation, they also differ in certain ways. Whereas the threat from the COVID-19 pandemic is a natural phenomenon and an invisible threat only indirectly influenced by humans, the Russo–Ukrainian War is man-made and an overt threat. Furthermore, it is also possible that a reduction in media content concerning the Russo–Ukrainian War could be responsible for the decline in worry; for example, higher media consumption was associated with more worrying during the COVID-19 pandemic (Schmidt et al., 2021).

Furthermore, a decrease in the primary stress appraisal of the threat potential for Germany might also explain our results, because it became foreseeable that imminent German participation in the war in the near future was unlikely. Whether worries about the Russo–Ukrainian War will decrease or reach a plateau, and how specific events in the ongoing military conflict possibly influence these, should be investigated in future research.

The latent growth analyses revealed that initial levels (intercept) of worry were associated with initial levels (intercept) of all four coping domains. Participants with higher levels of worry at the beginning of the data collection showed more problem-focused, social, and avoidance coping and less meaning-focused coping than participants with lower levels of worry. In general, in the presence of worry, it can be assumed that the use of coping strategies increases. This would explain the positive correlations with problem-focused, social, and avoidance coping. The question arises why a greater use of meaning-focused coping was associated with less worrying in the beginning. A possible explanation might be that meaning-focused coping led to a less threatening appraisal of the situation and helped participants to reevaluate their worries as an experimental study by Schäfer et al. (2020) suggested. The other three coping domains may unfold their possible positive effects later in the coping process. Reevaluating or accepting the situation, or taking it with humor, might be helpful, particularly in the early stages of coping with a global crisis. This explanation is supported by the initially lower level of stress appraisal and the fact that the initial use of meaning-focused coping did not predict the temporal change of worry over time. Although meaning-focused coping seems to be a useful coping strategy, it also holds the danger of underestimating a possibly hazardous situation. Future research is needed to further explore the possible negative consequences of meaning-focused coping.

Our results further demonstrated that the general use of coping strategies showed a decline in all four coping domains. In combination with the decrease in worry, these findings might be explained by a decline in the need for coping. The less people were worried, the less coping was needed to maintain or restore well-being, which can be explained by the transactional model of stress and coping (Lazarus & Folkman, 1984). Furthermore, all coping strategies developed in a

similar way, which means that the order in the frequency of the use did not change over time. For all three time points, meaning-focused and problem-focused coping were used most often, followed by social coping and avoidance coping; this is in line with previous findings from Saalwirth and Leipold (2021), who investigated coping strategies during the COVID-19 pandemic. This indicates that this distribution of general coping tendencies appears to be relatively stable across different threatening global events.

In addition, as expected, the latent growth models revealed that a decrease (slope) in worry was associated with a decrease (slope) in social and avoidance coping, which supports our assumption that the less people were worried, the less coping was needed to maintain or restore well-being (see above). This indicates that participants might have specifically used more social support or avoided the situation to handle their worries about the Russo–Ukrainian War and stopped doing so when their worries declined. The slopes of meaning-focused, as already mentioned above, and problem-focused coping were not associated with the slopes of worry. The absence of a correlation between meaning-focused coping and worries may be explained by a less threatening appraisal of the situation, leading to a reevaluation of initial worries. However, the reason behind the lack of correlation for problem-focused coping remains unanswered. It could be that problem-focused coping is specifically associated with particular domains of worry, such as safety and economics (Schwartz & Melech, 2000), which were not distinguished in our current study.

Interestingly, avoidance coping is often viewed as a negative form of coping that sometimes even has adverse effects, but our study did not confirm this. Specifically, more initial avoidance coping (intercept) predicted a stronger decline (slope) in worry. This implies that denying or avoiding dealing with the Russo–Ukrainian War might benefit the assumed habituation processes. However, whether this coping domain would be helpful in the long run needs to be further investigated. In addition, a distinction between positive distraction and avoidance should be made in future research. Unlike avoidance, positive distraction was related to positive outcomes in a study by Waugh et al. (2020). In contrast to avoidance coping, the intercepts of social coping did not predict the slope of worry. Although shortly after the Russian invasion of Ukraine, people sought more social support when they were more worried, this apparently did not affect the change in worry over time.

Furthermore, although problem-focused coping was used more frequently when participants showed higher levels of worry at t1 (indicating that the more worries were present, the more problem-focused coping was used), initial levels of problem-focused coping (intercept) showed no association with the temporal change (slope) of worry. This implies that problem-focused coping might not be the coping strategy of choice to deal with worries about the Russo–Ukrainian War, even though it is often described as a helpful coping strategy. Even if problem-focused coping was initially used more often when more worries were present, the use of it at t1 (intercept) showed no relation to the development (slope) of worries. Therefore, participants might have "tried" using problem-focused coping to cope with worries, but this approach was not successful. Problem-focused coping is mostly effective for threatening situations that can possibly be controlled by the individual (Folkman & Lazarus, 1980; Folkman et al., 1986). Being able to control the situation, though, was not really possible for the participants in our study, because they were not directly involved in the military conflict.

Notably, all associations between worry and coping were independent of age and gender, although both age and gender were associated with initial levels of worry. Older participants were on average more worried than younger participants. This finding is in contrast to previous findings, in which older people reported better overall well-being (Stone et al., 2010) and

experienced less anxiety during the COVID-19 pandemic (Pieh et al., 2020). A possible explanation for our findings might be that older generations have experienced more military conflicts during their lifetime than the younger generations who might not be able to imagine the scope of the situation and therefore underestimate it. In addition, in our sample, women were more worried than men. Previous research describes women to be more likely to experience higher levels of worry (Stavosky & Borkovec, 2014), which is in line with our findings. Women also used more social and avoidance coping, whereas men tended to use more meaning-focused coping, which was associated with lower initial levels of worry. This might explain the gender differences in worry in our study.

Limitations

This research demonstrates how people feel and react to a new threatening global crisis like the Russo–Ukrainian War and extends the knowledge about how people successfully or unsuccessfully cope with threatening global events, but the study also has certain limitations. First, our data consist of only three measurement points within a short time range; thus, the long-term effects of the four different coping domains could not be investigated. In addition, we did not investigate the possible effects of the simultaneous use of multiple coping strategies, although previous research has found higher levels of worry to be related to a higher degree of polyregulation (Lischetzke et al., 2022). Also, other forms of coping strategies that we did not assess may be able to reduce worrying. For example, a study during the Ebola outbreak in 2014 showed that third-person self-talk was associated with a reduction in worrying (Kross et al., 2017). Further, we had too few data points to control whether participants' worry reaches a plateau. We also were not able to investigate causal relationships or make predictions for future outcomes because not all possible confounding factors could be controlled. Nevertheless, in the future, a broader set of control variables could be implemented, for example, personality factors, health status, job security, or other variables that may influence people's worries. We also did not have enough data to investigate whether individuals with close personal contacts in Ukraine were more burdened. Another possible limitation was that our study sample consisted exclusively of German participants, many with a higher level of education; this limits generalizations to the German population as well as to populations of other European countries. In addition, worries of people could well differ in countries that are located closer to Russia or Ukraine or are in other ways more involved in this military conflict. Participants' responses may have been influenced by the repeated administration of the questionnaire within a relatively short time frame. Due to the repetition, for instance, participants may have responded at subsequent measurement points with reduced thoroughness or reduced effort. Finally, our data relied solely on self-reports. Participants' responses may have also been influenced by their momentary cognitive and emotional states. In future studies, it would be advantageous to confirm some of our results with alternative methods.

Conclusions and outlook

In summary, our study revealed a significant reduction in four coping strategies (meaning-focused, problem-focused, social, and avoidance coping) and in global worries about the Ukraine conflict over the course of the study. The decline in two coping strategies, social and

avoidance coping, was also significantly related to a decline in worries. In addition, higher use of avoidance coping at the beginning of the study was associated with a decline in worry over time. Based on these findings, future research could do a more fine-grained investigation of specific worries in the population. Especially the differentiation between objects and domains of worry about the Ukraine conflict, how these relate to indicators of mental health, and whether these are influenced by the choice of different coping strategies could be investigated in future research. Possible positive effects of worries should be considered as well because nonclinical worrying can also foster adaptive behavior, information-seeking, and motivation to act, as studies investigating worries about climate change have shown (Ojala et al., 2021).

Only a few weeks after the Russian invasion of Ukraine began, people's worries and general coping efforts strongly decreased, indicating a possible habituation process to this new threatening crisis. The decrease in worry was predicted by a high degree of initial avoidance coping and associated with the decrease in social and avoidance coping. The present study examined the processes and interactions between general coping tendencies and worry about a social crisis and showed possible protective effects of avoidance coping. This coping strategy has often been found to be dysfunctional in previous research, but here, it was protective in the short-term regulation of worry. The average frequency of use, however, was rather low. Together with the cross-sectional results showing that meaning-focused coping is correlated with less worry, this study shows how people regulate their emotions over time in a global crisis situation. To what extent a low level of worry is appropriate or may be an underestimation of risk remains an open question.

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CONFLICT OF INTEREST STATEMENT

The authors report that there are no competing interests to declare.

DATA AVAILABILITY STATEMENT

The data supporting the findings of this study are available from the corresponding author Saalwirth, C. on request. Raw data were generated at the University of the Bundeswehr Munich.

ETHICS STATEMENT

The study was approved by the institutional Ethics Committee of the University of the Bundeswehr Munich.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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5.1 Summary of Contribution 3

This final contribution was conducted shortly after the beginning of the Russo-Ukrainian war and investigated how levels of stress appraisal (war-related worries) and coping, as well as their association, changed over time. Therefore, this chapter provides additional insights into the dynamics of these variables in the face of global crises. The statistical model that was conducted revealed a decline in worries over two months, particularly in the initial weeks post-invasion. Similarly, coping (problem-focused, meaning-focused, social, and avoidance coping) also declined throughout the study. These interindividual differences indicate that as individuals experienced fewer worries, the need for coping strategies diminished, in line with the transactional model of stress (Lazarus & Folkman, 1984). Furthermore, the model disclosed that participants with higher initial worry levels tended to employ problem-focused, social, and avoidance coping more frequently than those with lower initial worry levels. Conversely, meaning-focused coping was negatively associated with initial worry levels, suggesting that finding meaning in the novel situation may have facilitated the down-regulation of initial worries. Alternatively, meaning-focused coping might only become relevant in later stages of the stress process when attributing meaning to an adverse situation becomes increasingly significant. Notably, the findings also demonstrated that avoidance coping, often viewed as a disadvantageous strategy, was linked to a more pronounced decline in worry. This suggests the adaptive potential of avoidance coping and underscores the importance of investigating coping strategies separately within different contexts. Finally, meaning-focused and problem-focused coping were employed more frequently than social and avoidance coping, respectively.

The subsequent final chapter will now encapsulate the overarching findings drawn from the three described contributions, relate them to the existing literature, indicate possible further research approaches, and explore additional results.

Chapter 6

Discussion and Outlook

6. Discussion and Outlook

Global crises are occurrences with widespread adverse effects on numerous individuals, posing a significant risk to the mental health of individuals. Despite their shared attributes, though, each global crisis presents a unique challenge and stressor. Consequently, it is essential to examine individuals' stress appraisals to different global crises. Therefore, this dissertation focused on two distinct global crises - the COVID-19 pandemic and the Russo-Ukrainian War - with three separate contributions. These contributions address two research aims related to individuals' stress appraisal, well-being, and coping efforts, which will be elaborated on in the subsequent section.

6.1 Central Findings

6.1.1 Stress Appraisal and Well-being During Global Crises

Examining global and specific stress appraisal and its interconnection with diverse aspects of well-being constituted the initial research aim of this dissertation. This aim was pursued in the first and second contributions (Chapters 3 and 4). The first contribution involved analyzing bivariate correlations between a global measure of COVID-19-related stress appraisal (COVID-19-related worries) and individuals' well-being, measured by positive and negative affect and sleep quality. The findings uncovered connections between COVID-19 worry and all three facets of well-being. Specifically, heightened levels of worry were linked to diminished positive affect, increased negative affect, poorer sleep quality, and shorter sleep duration. Therefore, stress appraisal regarding COVID-19 was associated with both emotional and cognitive measures of well-being. These results support previous research findings linking worries with decreased general well-being (e.g., Ganster & Rosen, 2013; McLaughlin et al., 2007) and poorer sleep characteristics (e.g., Dregan et al., 2013; Marques et al., 2016) replicating these relationships in a different context, specifically amidst a global crisis. Interestingly, the strongest association of COVID-19 worries was with negative affect, including emotions such as being afraid, irritable, nervous, or scared (Watson et al., 1988). Given that worrying inherently involves feelings of fear and anxiety (Mathews, 1990), it is plausible that this shared emotional underpinning contributes

to the heightened association between negative affect and worrying, as opposed to the relationship with positive affect. In addition, while many studies focused on direct associations between coping strategies and well-being during the COVID-19 pandemic (see, for example, Götmann & Bechtoldt, 2021; Zacher & Rudolph, 2021), here a regression analysis was employed to investigate the moderating role of coping on the association between worrying and well-being. Four different coping strategies were examined (problem-focused, meaning-focused, social, and avoidance coping). The findings indicated that problem-focused and meaning-focused coping alleviated the connection between worries and well-being, while social coping amplified this relationship, which offers new perspectives on the dynamic interplay among these variables during a global crisis. Hence, coping strategies centered around addressing the problem or finding meaning in adversity appeared to be adaptive in dealing with COVID-19-related worries, which is in line with previous research findings undertaken in different contexts (e.g., Duangdao & Roesch, 2008; Wang et al., 2019). Conversely, social coping seemed to be a maladaptive strategy. At the same time, avoidance coping showed no effect on the relationship between worries and well-being despite being frequently characterized as a maladaptive approach (Littleton et al., 2007).

The second contribution delved into investigating different facets of COVID-19-related stress appraisal. Unlike the initial contribution, which employed a broad measure of COVID-19 stress appraisal, this study uniquely differentiated three specific facets of stress appraisal associated with the pandemic. To the best of my knowledge, as of the data collection date, these aspects had not yet been explored in combination. These facets were social isolation, fear of COVID-19, and financial worries, which were investigated because they were among the most prominent stressors during the earlier stages of the pandemic (American Psychiatric Association, 2020; Park et al., 2020; Statista, 2020). However, the study sample did not report these three facets as equally stressful. In fact, across all participants, social isolation was described as more stressful than fear of COVID-19 and financial worries, respectively. These outcomes underscore the importance of discerning between various contents of stress appraisal. Using a broad measuring instrument, as in Contribution 1, would obscure these differences. Additionally, in Contribution 2, different well-being measures compared to those in Contribution 1 were examined. Positive and negative affect were replaced by emotional well-being as an emotional-oriented measure, and life satisfaction was included alongside sleep quality as a cognitive-oriented measure. Finding similar results using

alternative instruments of stress appraisal and well-being strengthens the interpretability of the association between these constructs. Notably, Contribution 2 largely found results comparable to those established in Contribution 1. All three facets of COVID-19-related stress appraisal were associated with at least one well-being measure, indicating that heightened stress appraisal was consistently correlated with diminished overall well-being. While financial worries were correlated with all three measures of well-being (emotional well-being, life satisfaction, and sleep quality), fear of COVID-19 and social isolation were only correlated with emotional well-being and sleep quality. Thus, it appears that the comprehensive assessment of an individual's life remained largely unaffected by the potential risks of infection or the implementation of quarantine measures. Instead, it was more strongly influenced by personal financial challenges. Financial problems can pose an existential threat that might lead to worries about the security of one's future. Consequently, such a constant menace to one's security of living might result in dissatisfaction. Moreover, the structural equation model further revealed that these associations (except for the association between fear of COVID-19 and sleep quality) remained significant while controlling for the influence of age, gender, household income, and whether one was living alone. This further underscores the negative relationship between stress appraisal and overall well-being. The model also revealed that these associations differed in strength. In fact, standardized regression coefficients varied between small to medium effect sizes (Cohen, 1988). Interestingly, despite being perceived as less stressful than the other two facets of COVID-19-related stress appraisal across the entire study sample, financial worries emerged as the most potent predictor of reduced well-being. A reason for this might be that financial problems pose a direct threat to people's existence. Getting sick or feeling alone might not have been perceived as equally harmful since most people got well again after an infection, and social quarantines were potentially perceived as only temporary. Taken together, these results emphasize that an average mean of reported stress appraisal does not necessarily equate to a substantial relation to individuals' well-being. This further enriches the knowledge about stress appraisal during the pandemic that was gained in Contribution 1 and extends on previous research on individual stress-related reactions during pandemics in general.

Overall, the results of the first research aim align with appraisal theories of stress and emotion (Lazarus & Folkman, 1984; Smith & Lazarus, 1990), which state that the

appraisal of a situation as potentially threatening can lead to diminished well-being. This association between stress appraisal and well-being was found in Contributions 1 and 2. The model further posits that coping efforts might influence this relationship. This was also shown in Contribution 1, where problem-focused, meaning-focused, and social-focused coping moderated the relationship between stress appraisal and well-being. Furthermore, the model makes no general assumptions about whether specific coping strategies are adaptive or maladaptive. Again, this can be supported by the results as specific coping strategies mitigated (problem-focused and meaning-focused) and enhanced (social coping) the relationship between stress appraisal and well-being. In addition, worrying is interpreted here as a specific form of anticipatory stress appraisal of potentially threatening situations, which represents a rather novel approach to investigating worrying. However, given that the results do not contradict appraisal theories, specifically the Transactional Model of Stress and Coping (Lazarus & Folkman, 1984), but support assumptions drawn from the model, underscores this interpretation.

6.1.2 Stress Appraisal and Coping during Global Crises

The second research objective of this dissertation was to highlight the association between stress appraisal (specifically worries) and coping, which was explored in Contribution 3. Employing a latent growth model, this contribution utilized panel data gathered shortly after the commencement of the Russo-Ukrainian War. The model revealed a decline in worries over time, particularly in the initial weeks post-invasion, indicating intraindividual differences in stress appraisal. These results are in line with findings from Bendau et al. (2021) and Hetkamp et al. (2020) during the COVID-19 pandemic, who reported a decrease in fear of COVID-19, depression, and anxiety over time. Taken together, these findings suggest a gradual adaptation of individuals to global crises, irrespective of their nature—whether it be a societal or health crisis as the COVID-19 pandemic or a geopolitical or man-made crisis as the Russo-Ukrainian War. Future research should investigate whether well-being develops in a similar manner, which would further strengthen the assumption of a general adaption process to persistent global crises. Consequently, the knowledge about potential adaption processes in the face of global crises could help in creating possible prevention approaches by identifying individuals with disrupted or hindered adaptation processes or by identifying individuals who are especially resilient to such events (Noeker & Petermann, 2008). Potential factors that make people especially resilient might be

strengthened in prevention programs which could prevent the development of mental diseases such as depression or pathological anxiety, which increased, for example, during the COVID-19 pandemic (Lakhan et al., 2020) and ensure healthy psychological functioning (Noeker & Petermann, 2008). In addition, a constant decline in coping efforts across the three measurement points was also demonstrated. These results indicate an association between increased utilization of coping mechanisms and higher levels of stress appraisal. This is also supported by the cross-sectional relations with more worries being associated with more problem-focused, social, and avoidance coping. However, meaning-focused coping was negatively correlated with worries in the cross-sectional data. These findings might indicate that the mechanisms through which meaning-focused coping operates might be fundamentally different from the other three coping strategies. In fact, meaning-focused coping could mitigate the initial stress response as it aims at changing how individuals perceive and appraise a stressor in the first place, leading to cognitive reevaluation and reorganization (see, for example, Thompson, 1985).

Furthermore, the results revealed a noteworthy association wherein initial avoidance coping, conventionally considered a maladaptive strategy, predicted a stronger reduction of worries over time. This highlights the need for more nuanced and separate examinations of coping strategies within diverse contexts of global crises to comprehend their distinct impacts on potential outcomes. The insights of this dissertation, therefore, partly challenge conventional negative findings on avoidance coping (see, for example, Holahan et al., 2005), supporting Lazarus (1983), who already suggested four decades ago that avoidance coping can have its benefits in specific situations. Therefore, these findings emphasize the intricate dynamics surrounding the effectiveness of avoidance coping in specific situations, acknowledging their potential benefits for specific contexts, although they are traditionally deemed disadvantageous. However, whether this approach is also beneficial over a prolonged time period remains an open question for future research, as studies have already indicated that avoidance coping can be positive in the short term but not necessarily in the long run (Suls & Fletcher, 1985). Interestingly, although cross-sectionally associated with worries, none of the other three coping strategies could predict temporal changes of worry during the initial weeks of the Russo-Ukrainian War. Why these coping mechanisms did not predict worry development has to be examined in future studies. Overall, the results underscore the significance of

examining diverse coping strategies within a specific global crisis, as not all strategies appear equally effective. In the initial phase of the Russo-Ukrainian War, only avoidance coping seems to be an effective coping strategy in the short run.

Again, these results align with the Transactional Model of Stress and Coping (Lazarus & Folkman), as coping can be seen as continuous adjustments in cognitive and behavioral efforts directed toward managing specific situations that are appraised as stressful and exceed the individual's current resources. Therefore, positive correlations between stress appraisal (here worrying) and coping efforts can be derived from the model. Such an association was indeed found in Contribution 1. More importantly, though, this association was not only found cross-sectionally; coping efforts also decreased over time when stress appraisal declined. Intriguingly, this was the case for all four coping strategies, although only one of them, namely avoidance coping, was able to predict a decline in stress appraisal. Nevertheless, since the model refrains from assuming the efficacy of coping efforts, this aligns with the model's principles.

6.2 Further Insights

Although the following findings did not constitute the primary focus of this dissertation, they nevertheless offer intriguing insights into potential factors that could influence the central constructs of this study and should be considered in future research on global crises. Therefore, I wish to highlight results regarding a comparison between the correlation coefficients between stress appraisal and coping in Contributions 1 and 3, the frequency of use of the investigated coping strategies in Contributions 1 and 3, the mean averages of well-being in Contributions 1 and 2, as well as relationships of the relevant variables with age and gender.

6.2.1 Stress Appraisal and Coping in Contributions 1 and 3

In Contribution 1, correlation coefficients between stress appraisal regarding COVID-19 (worries) and coping were also reported. The data revealed positive associations with problem-focused, social, and avoidance coping and negative associations with meaning-focused coping. Interestingly, Contribution 3 successfully reproduced these correlations for stress appraisal and the four coping strategies. This is especially noteworthy since stress appraisal was investigated in a different context (the COVID-19 pandemic and the Russo-Ukrainian War) and with a different measurement instrument. Further, the correlations were comparable not only in direction but also in

size. A study by Fluharty et al. (2021) also found comparable results during the COVID-19 pandemic. This observation underscores the relationship between stress appraisal and coping across varying contexts (global crises) and measurement approaches.

6.2.2 Frequency of Use of the Coping Strategies

In both Contributions 1 and 3, the frequency of use of the four investigated coping strategies was additionally investigated. In both studies, meaning-focused and problem-focused coping emerged as the strategies, being employed more frequently than social and avoidance coping, respectively. These results indicate a consistency of coping patterns across different contexts (global crises). To explain these findings, one could argue that individuals potentially tend to lean towards adaptive coping strategies, as both meaning-focused and problem-focused coping mitigated the negative relationship between stress appraisal and well-being in Contribution 1. However, as avoidance coping turned out to be a potentially adaptive mechanism in the second contribution, this explanation seems insufficient. The pattern appears to reflect a stable tendency in the population. However, these findings might also be a result of social desirability, because especially avoidance coping includes negatively connoted behaviors, such as, for example, substance use. Nevertheless, these findings contribute to a nuanced understanding of coping dynamics, emphasizing the recurring prominence of certain strategies in the face of global crises.

6.2.3 Well-being

As described in section 2.3, Diener and Diener (1996) claim that individuals tend to gravitate towards an individual set point of well-being, which typically resides in the positive spectrum. This phenomenon is also referred to as the paradox of subjective well-being (Staudinger, 2000). In fact, the descriptive statistics of Contributions 1 and 2 also support this assumption in the context of a global crisis. The average mean (calculated midpoint between the minimum and the maximum of the respective scales) of positive affect and sleep quality in Contribution 1, as well as the average mean of emotional well-being, life satisfaction, and sleep quality in Contribution 2, were all above the scale mean. However, it is important to note that although the empirical mean resides in a moderately positive range, this does not inherently indicate that everyone is happy. Interindividual differences still exist that should be considered. In fact, the individual means (for each participant) of most of the well-being measures in Contributions 1 and 2 resided across the entire spectrum of the respective scales,

meaning that some participants were very unhappy while others reported being extremely happy. This can also be seen in the standard deviations of the well-being scales in Contributions 1 and 2. Hence, while individuals generally seem capable of sustaining a satisfactory level of well-being amid a global crisis, researchers and policymakers should bear in mind that an overall mean above a neutral point does not negate the potential requirement for prevention and support programs for certain subgroups of the population, such as, for example, younger adults and women (see the following section).

6.2.4 Age and Gender

Age and gender were integrated as control variables in all three contributions of this dissertation, guaranteeing that the reported findings remain independent of these personal characteristics. Given that a majority of the findings exhibited significant results after adjusting for these variables, the reported associations appeared to be pervasive and influencing individuals across diverse demographic backgrounds. However, it was further observed that some variables were also correlated with age and gender, indicating variations in worries, well-being, and the utilization of coping strategies based on these personal characteristics.

Overall, older age was associated with more positive and less negative affect in Contribution 1 and with better emotional well-being in Contribution 2 (both study samples included mainly adults of working age). This supports previous findings that indicate more pronounced happiness among older compared to younger adults (see, for example (Horley & Lavery, 1995) which can be explained by the positivity effect (Carstensen & DeLiema, 2018). The positivity effect states that older adults attend to and remember more positive than negative information compared to younger adults. However, whether this relationship is indeed a linear one or rather u-shaped is still the subject of debate (see López Ulloa et al., 2013). Intriguingly, age solely exhibited correlations with affective and not with cognitive measures of well-being. These findings suggest a compelling conclusion: older individuals may be more adept at preserving their affective well-being in the face of adversity compared to younger adults. This resilience could be attributed to their wealth of life experiences and memories of successfully navigating challenges in their past. Perhaps, drawing upon a rich tapestry of personal history, older individuals find themselves better equipped to navigate and endure difficult circumstances, leveraging their accumulated wisdom.

Interestingly, the associations of age with stress appraisal remain inconclusive. In Contribution 1, age and worry were not correlated. However, in Contribution 2, one facet of stress and worries, namely social isolation, was negatively related to age, while in Contribution 3, age was positively correlated with worries about the Russo-Ukrainian war. Future research is needed to further investigate this association and potential moderators that might explain these inconsistent findings. Lastly, older age was further correlated with less meaning-focused coping in Contributions 1 and 3 and less social and avoidance coping in Contribution 1. Taken together, these results imply that older people, in general, report fewer coping efforts than younger people. This phenomenon could be elucidated by the concurrent observation that older individuals also report higher well-being scores, indicating a diminished need for coping mechanisms.

Moreover, in all three contributions, females reported more worries and stress than men (except for the association between gender and financial worries, where men reported higher worries). This corresponds to previous findings that women are more susceptible to stress and worries (e.g., Davis et al., 1999; Robichaud et al., 2003). Furthermore, women exhibited lower well-being in comparison to men. In Contribution 1, being female was linked to reduced positive affect, heightened negative affect, and poorer sleep quality. Similarly, in Contribution 2, being female was associated with diminished sleep quality. While previous research findings confirm that women, in general, report lower sleep quality than men (e.g., Tang et al., 2017), the association between gender and well-being, in general, is inconclusive, and a meta-analysis by Batz-Barbarich et al. (2018) even reported no significant differences for women and men. Interestingly, women also reported using more problem-focused (Contribution 1), less meaning-focused (Contributions 1 and 3), and more social coping (Contributions 1 and 3) than men. The difference in coping efforts might potentially be explained by the differences between men and women in experienced stress appraisal and well-being. Lower well-being and higher stress appraisal would increase the need for coping efforts. Future research should investigate whether women tend to use coping strategies that are less adaptive than men.

6.3 Limitations and Future Research

While the present dissertation contributes valuable insights into the intricate relationships between stress appraisal, subjective well-being, and coping during global

crises, several limitations warrant consideration, and avenues for future research should be addressed.

First and foremost, I want to note that the time-critical nature of the survey administration of the three contributions imposed considerable constraints on the planning process. Global crises are inherently unforeseeable and uncontrollable events, rendering them challenging research topics. Fast reactions are essential to investigate their impact on the population during their early stages or in relation to specific pivotal events. For instance, the first contribution was conducted amidst the initial wave of COVID-19 infections in Germany, coinciding with the enforcement of lockdown measures, and the second contribution occurred during the third infection wave (World Health Organization, 2023). By the time of the third data collection, the COVID-19 pandemic was in recession, and the military conflict in Ukraine just began. In consequence, exploring individuals' stress appraisal regarding the war appeared more salient. Therefore, a shift in the research topic into a new context (a different global crisis) was necessary. Here, the study relied on data measured only a few weeks after the onset of the Russo-Ukrainian War and no published questionnaires were available to measure stress and worries about COVID-19 or the Russo-Ukrainian War. In conclusion, self-invented or adapted questionnaires had to be used. However, face validity was high, and reliability was good. Therefore, no methodological problems should be expected in these areas. Furthermore, global crises inherently present challenges in obtaining experimental data, prompting a call for other methodologies or alternative data collection strategies. The data of this dissertation relies on cross-sectional and panel data, which do not allow for causal interpretations.

Secondly, the exploration of global crises in this dissertation is constrained to just two specific instances. Although these events span diverse categories of global crises—encompassing both societal/health crises and geopolitical/man-made crises—it raises questions about their representativeness as prototypes for their respective domains. Additionally, the transferability of the reported findings to other types of global crises, unexplored within the confines of this dissertation, remains uncertain. This underscores the need for future research to delve into a broader spectrum of global crises, examining whether the observed results of the current dissertation persist across various contexts and crisis types. Addressing this gap will contribute to a more comprehensive understanding of the nuanced dynamics and impacts associated with different global crises.

Third, this dissertation only delved into short-term effects and relationships of the investigated variables, leaving a gap in the understanding of long-term psychological implications. A crucial avenue for future research, therefore, lies in the incorporation of longitudinal designs. These designs allow for a more comprehensive understanding of the trajectory and lasting impacts of the investigated variables to provide a more nuanced and complete picture. In addition, all three contributions relied solely on self-reported data, which introduces potential biases in the results, such as the influence of the current cognitive and emotional state or common method variance, urging future research to consider incorporating objective measures and multiple data sources for a more comprehensive assessment of the psychological variables.

Fourth, the inclusion of only German samples limits the generalizability of this dissertation's results. Whether and to what extent the results reported here can be adapted to other countries remains an open question. One could expect similar results for countries in the European Union that are in close distance to Germany since they share similar values, cultures, and political with Germany. However, future studies concerning global crises should strive for diverse international samples to enhance the external validity of findings, examine potential differences, and better capture the global nature of crises. In addition, all three study samples of the three contributions consisted of a higher percentage of highly educated participants, as one would expect in a representative study sample for Germany, and Contribution 3 encountered limitations in participant numbers (N = 175) because of its high drop-out rate. Participants and drop-outs, however, did not differ in terms of the relevant variables. Furthermore, although we included several control variables, we do not claim that these are exhaustive. Identifying additional confounding factors remains an opportunity for future studies.

Fifth, future research should also delve into even more specific contexts and domains of worries, exploring the nuanced factors that contribute to individuals' concerns during times of crisis. This deeper exploration will provide valuable insights into the intricacies of psychological responses to various stressors. This assessment of worries could also extend beyond a binary examination to measure both the frequency and intensity of experienced worries since the results of Contribution 2 indicated that frequency does not necessarily reflect the strength of possible relationships. Lastly, although we investigated four different coping strategies, we do not claim to address the entirety of the coping strategies that exist. Moreover, this study did not consider

coping flexibility, which represents an important area for future research. Coping flexibility describes intraindividual variations in utilizing various coping strategies and how this ability promotes well-being. A meta-analysis by Cheng et al. (2014) indicated a positive link between coping flexibility and psychological adjustment. Regarding the findings of this study, it would be interesting to explore how the associations between the different coping strategies, stress appraisal, and well-being evolve during global crises and whether individuals capable of adapting their coping mechanisms more effectively also experience enhanced well-being over time. For instance, as already indicated, the positive outcomes for avoidance coping in Contribution 3 might only be a short-term occurrence, and in later phases of the crises, other coping strategies could be a better choice. Therefore, understanding the role of coping flexibility in mitigating the psychological impact of global crises might provide further valuable insights for intervention strategies and mental health support initiatives.

6.4 Conclusion

In this dissertation, a comprehensive examination of individuals' stress appraisal regarding two distinct global crises, the COVID-19 pandemic and the Russo-Ukrainian War, revealed novel insights. The central findings focused on two key research aims: first, understanding stress appraisal and its association with well-being, including the moderating role of coping strategies. Second, the direct relationship between stress appraisal and coping efforts.

Regarding stress appraisal and well-being, the analyses revealed a consistent connection between higher stress appraisal and diminished well-being during the COVID-19 pandemic. Notably, a detailed exploration of specific facets of stress appraisal uncovered variations in perceived stress levels and relations to measures of well-being. Interestingly, the results highlighted that a higher average mean of stress appraisal does not necessarily imply a stronger relationship to well-being. In fact, the COVID-19 stressors with the lowest stress appraisal over all participants (financial worries) showed the strongest association with well-being. These findings demonstrate the importance of exploring general stress appraisal and its relation to well-being separately. The findings further revealed that coping efforts moderate the association between stress appraisal and well-being. Problem-focused and meaning-focused coping mitigated, while social coping amplified the relationship.

Furthermore, the temporal change of worries during the initial phase of the Russo-Ukrainian War indicated a decline over time, aligning with findings from earlier

studies during the COVID-19 pandemic (Bendau et al., 2021; Hetkamp et al., 2020). These findings provide novel insights into a potential adaptation process during global crises. Taken together, these findings indicate that, in general, people are able to downregulate their stress appraisal (fears and worries) within only a few weeks after the beginning of a global crisis. Understanding this adaptation process could inform prevention approaches by identifying individuals at risk of disrupted adaptation, potentially preventing the development of mental health issues. However, it is also important to note that each problem presents an opportunity for growth and learning when effectively coped with. By facing such issues head-on and seeking solutions, individuals can build resilience, develop problem-solving skills, and ultimately lead more fulfilling lives (Gloria & Steinhardt, 2016). However, this implies the use of adaptive coping efforts. In this regard, the data revealed that coping efforts declined in line with decreasing worries during the Russo-Ukrainian War, inclining that coping efforts might be directly linked to stress appraisal. This was supported by the significant associations between stress appraisal (worries) and coping in the data. Problem-focused, social, and avoidance coping were positively associated with worries, while meaning-focused coping was negatively associated with worries. Interestingly, worries associated with the Russo-Ukrainian War exhibited a more pronounced decline when individuals engaged in greater use of avoidance coping. These findings underscore the importance of nuanced examinations of coping strategies within diverse contexts of global crises. In addition, this dissertation provides new insights into a possible, stable tendency of the use in coping efforts during global crises. Both during the COVID-19 pandemic and the Russo-Ukrainian War, problem-focused and meaning-focused coping were used more frequently than social and avoidance coping, respectively.

In summary, this dissertation contributes valuable insights into the dynamics and relationships of individuals' stress appraisal during global crises. Overall, the findings support assumptions drawn from the Transactional Model of Stress and Coping (Lazarus & Folkman, 1984) about the relationships between stress appraisal, well-being, and coping in the context of global crises, which can provide a foundation for understanding and addressing mental health challenges during widespread crises for health professionals and policymakers. Especially policymakers, who often make decisions that impact many people simultaneously should consider not only the social, economic, and political consequences of important decisions but also the potential psychological effects on the individual. They should consider individual stress

appraisals and worries, along with their unique connections to people's well-being, and meticulously balance the risks and benefits of their actions. Furthermore, if adverse effects are anticipated, they could proactively implement support services for those in need, rather than waiting until after the negative consequences manifest.

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