Research Article

Variability in Psychological Security Among Individuals and Groups: An Evolutionary and Developmental Perspective

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Rooted in our evolutionary past, psychological security, encompassing cognition, emotion, behavior, and physiology, plays a critical role in shaping human interactions and individual well-being. This manuscript delves into the intricate tapestry of individual and group variations in psychological security, underscoring the influences of genetic makeup, evolutionary trajectories of groups, unique developmental experiences, and prevailing environmental cues. Of particular note is the paper's exploration of how these determinants engender distinct stress responses and adaptive coping strategies across populations. Delving deeper into the symbiotic relationships between environmental contexts, cultural norms, and genetic predispositions, we elucidate the multifarious determinants of disparities in psychological security across groups and individuals. Moving beyond the theoretical, we also shed light on the overarching societal ramifications of these findings, advocating for informed approaches in spheres ranging from intimate partnerships and familial upbringing to organizational leadership and crisis management. Collectively, these insights not only enrich our comprehension of psychological security from an evolutionary standpoint but also empower stakeholders to enhance holistic well-being, elevate life quality, and champion a more inclusive societal fabric.

1. Introduction

"Prudence endures forever; caution lasts a thousand years." Throughout human history, this intrinsic sense of vigilance has been evident. From the primitive choices of ancestral habitats marked by

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minimal predator risks to modern decisions like settling in neighborhoods known for low crime rates and close-knit communities, the evolutionary drive for security is clear. Even in contemporary contexts, people demonstrate caution by assessing the implications of their words and actions in professional settings, or by securing their digital footprints in an era characterized by online threats and emerging technologies like artificial intelligence (Kraus et al., 2017). At its core, this timeless behavior underscores humanity's enduring quest for security—a hallmark of evolutionary survival.

Security, conceptualized as a state devoid of fear and anxiety (Maslow, 1942), has garnered interdisciplinary attention across epochs, spanning domains like tribal dynamics, politics, organizational behavior, social psychology, and public health. Sociopolitical events—be it tribal conflicts of ancient societies or modern-day challenges like terrorism and wars—emphasize the tenuous nature of psychological security in larger societal fabrics (Jacobson & Bar-Tal, 1995; Cammett et al., 2022). Within structured organizations, the evolutionary benefits of fostering psychological safety manifest as increased work passion, elevated innovation and enhanced group cohesion (Chen et al., 2022; Edmondson, 1999; Edmondson & Lei, 2014; Yagil & Luria, 2010). The evolutionary dynamics of interpersonal relationships also shape this sense of security. Both broader social alliances (Yang et al., 2022) and close-knit kinship ties or intimate partnerships (Feeney & Fitzgerald, 2019) contribute to survival and, by extension, psychological security. The significance of personal space, an intrinsic aspect of psychological security, has been further accentuated during critical events like pandemics, with evolutionary roots in disease avoidance behaviors (Oosterhoff et al., 2020; Pedersen & Favero, 2020).

While the theme of psychological security has been dissected across myriad contexts, its exploration through an evolutionary lens is ripe for deepened investigation. This perspective, rooted in evolutionary psychology, seeks to understand how the adaptive behaviors of our ancestors have shaped contemporary psychological constructs. As human populations diversify and globalize, understanding the evolutionary underpinnings that contribute to variations in psychological security becomes crucial. For modern organizations, recognizing and integrating these evolutionary insights is instrumental in crafting truly adaptive and inclusive environments, lest they inadvertently cater solely to dominant groups, sidelining others in the process.

In light of this evolutionary backdrop, our paper delves into the intricate dynamics of psychological security. We aim to enrich the academic discourse with evolutionary insights, while also providing actionable strategies that draw from our species' rich ancestral heritage. Through this endeavor, we

aspire to deepen the theoretical foundations of psychological security and offer pragmatic frameworks for fostering adaptive, inclusive, and secure organizational ecosystems in alignment with our evolutionary past.

2. Psychological security and its theoretical explanations

2.1. Conceptualization of psychological security

The term "psychological security" significantly overlaps with related phrases such as "safety", "sense of safety", "perceived safety", and "psychological safety". Initially, the term "safety" was associated with an objective escape from hazardous conditions. It later evolved to represent a subjective "sense of safety", reflecting an individual's perception of survival possibilities (Tashjian et al., 2021). Maslow (1942) postulated that a sense of safety is a fundamental psychological need, encapsulating feelings of confidence and freedom from fear and anxiety, particularly concerning the fulfillment of various personal needs. As an intrinsic psychological resource, this sense of safety assists individuals in processing information, regulating stimulus responses, mobilizing social support, and increasing well-being (Melanie, 2011). In contrast, insecurity often arises from external environmental perceptions and cognitions, involving evaluations of the environment and coping strategies (Lazarus & Folkman, 1987). Edmondson (1999) expanded the concept of "psychological safety" into organizational behavior, framing it as a condition where individuals feel accepted, supported, and free to voice their opinions at work, which at times, is also referred to as "psychological security". However, we argue that "sense of safety" and "psychological security" are distinct yet related constructs; the former centers on how individuals assess and evaluate the safety or threats in their environment, while the latter emphasizes the subjective emotional state stemming from this environmental perception. Both involve common psychological processes, such as perception, action, and information evaluation (Rogers, 1975; Tashjian et al., 2021). However, the degree to which individuals experience psychological security can vary significantly (Jacobson & Bar-Tal, 1995).

In this paper, we define psychological security as a state experienced by individuals or groups post-environmental perception, manifesting across various dimensions, including cognition, emotion, behavior, and physiology. This concept is further illuminated by examining personality traits. For instance, individuals prone to psychological insecurity often exhibit negative personality traits like

attachment anxiety, attachment avoidance, heightened sensitivity, and vigilance, all indicative of their underlying insecurity (Young et al., 2021). Moreover, personality traits modulate the degree of psychological security one may need or experience. Within the framework of the Big Five personality traits, individuals with high levels of neuroticism tend to experience elevated levels of anxiety, unease, fear, sadness, and psychological insecurity, while those with high agreeableness often possess strong communication skills and the capacity to form positive interpersonal relationships, generally resulting in a greater sense of psychological security (Montag et al., 2020).

2.2. Theoretical studies related to psychological security

In the annals of psychological research, various theoretical schools have explored the concept of security. Psychoanalytic theory posits that feelings of insecurity manifest when an individual's fundamental needs and desires are overlooked or unmet. Within the framework of humanism, security is conceptualized as a deficiency need, integral to the broader matrix of human well-being and natural necessities. Cognitive psychology, on the other hand, portrays psychological security as a fluid mental state subject to change. Beyond these, an array of additional perspectives and theories also contribute to our understanding of what constitutes a sense of security. **Table 1** below provides a succinct overview of diverse theories and models related to psychological security.

Authors	Theoretical models	Main purpose	Main content	Applications
Rogers (1975); Maddux & Rogers (1983)	Protective Motivation Theory	Analyzing the psychological processes and coping behaviors of people when facing fearful information, and explaining how fearful information affects attitude changes.	The formation of protective motivation depends on the evaluation of information (cognitive mediation process), including threat evaluation (assessing if an event, condition, or situation poses a threat) and coping assessment (focuses on available defenses, beliefs about handling danger).	Predicting and intervening for health and safety-related behavior, such as healthcare, environmental science, information security, health protection behavior in tourism management.
Mobbs et al. (2020); Tashjian et al. (2021)	The Safety Decision Model	Understanding how the human brain computes safety and makes safety decisions from a decision neuroscience framework.	Safety decisions rely on the interplay between threat-oriented evaluation (the value, urgency, and predictability of the threat) and self-oriented evaluation (personal experience, coping strategies, and control over the situation). These components intertwine and are weighted to result in a safety decision.	Safety learning, fear inhibition, fear regulation.
Young (1999); Young et al. (2003)	Schema Therapy Theory	An integrated treatment model combining traditional cognitive-behavioral therapy with attachment theory,	Individual memory systems store cognitive responses to inherent experiences of a past event, affecting	Intervening the maladaptive schemas in psychological treatment

Authors	Theoretical models	Main purpose	Main content	Applications
		aimed at treating personality disorders using schema therapy.	information processing. Harmful experiences in growing up lead to maladaptive schemas that persist throughout life. Facing situations similar to initial trauma may activate insecure schemas, generating strong negative emotions.	(personality disorders, mood disorders, anxiety, depression). Priming attachment security.
Hart et al. (2005); Hart (2014)	The Model of A Tripartite Security System	Providing an integrated security system theory regarding defense, explaining how individuals maintain a sense of psychological security.	Attachment, self-esteem, and worldview offer psychological comfort in the face of psychological threats, serving defensive functions. Self-esteem represents psychological security at the self-concept level; attachment at the interpersonal level; worldview at the value level. The three dimensions form a dynamic interconnected security system.	Applicable for measuring levels of psychological security, though not explicitly mentioned.
Blascovich & Tomaka (1996); Blascovich & Mendes (2000); Blascovich	The Biopsychosocial Model of Challenge and Theory	Providing a theoretical framework to explain and test the relationship between physiological arousal and behavior.	Incorporating emotions, focusing on assessments of challenges and threats. A challenge state is expected when people have sufficient resources to meet task demands, a threat state emerges	Understanding the performance and decision-making under stress (threat-challenge), individual differences in skill performance (sports

Authors	Theoretical models	Main purpose	Main content	Applications
et al. (2004)			when resources are perceived as insufficient. The state is objectively reflected through different neuroendocrine and cardiovascular response patterns.	competitions, police duty, social facilitation effects).
Dickerson et al. (2004); Dickerson & Kemeny (2004)	Social Self-Preservation Theory	Elucidating the relationships among emotions, psychology, and physiological health, specifically how threats related to the social self induce psychophysiological responses.	Individuals have specific biological systems to maintain and protect the social self in social environments, monitoring threats to social respect or status and coordinating psychological, physiological, and behavioral responses.	Understanding reactions and strategies during social threat evaluations, such as threats to women's body image.
Slavich (2020); Slavich (2022)	Social Safety Theory	Explaining how the brain and immune system achieve evolutionary adaptiveness to avoid social threats, develop, and maintain friendly social relationship bonds.	The human brain and immune system are primarily designed to ensure the safety of the organism. To achieve this goal, they have evolved to monitor the environment, detect threats, and generate expected behavioral responses.	Understanding health disparities caused by negative social factors.

Table 1. Theories and models related to psychological security.

The theories enumerated in Table 1 predominantly adopt a cognitive lens, with frameworks such as the Protective Motivation Theory, Safety Decision Model, and Schema Therapy largely focusing on cognitive processes, exploring how individuals perceive, judge, and evaluate their environment, collectively contributing to what is termed as "threat/security perception." Meanwhile, other theories like the Biopsychosocial Model, Social Self-Preservation Theory, and Social Safety Theory incorporate biological evolutionary factors into these cognitive evaluations, thereby extending the dialogue to physiological reactions. The Tripartite Security System model underscores the necessity of maintaining a sense of psychological security.

Psychological security, as we perceive it, is a multifaceted construct marked by significant inter-individual and inter-group variations. On an individual level, factors such as social background and personal characteristics significantly influence psychological security. For instance, women often report higher levels of insecurity compared to men (Marzo et al., 2021), and individuals with lower incomes tend to feel more insecure than those with higher incomes (Bar-Tal & Jacobson, 1998). Demographic variables like gender, age, birth order, and number of siblings, along with socio-economic indicators, further affect this sense of security (Wang et al., 2009). On a group level, people from different countries displayed varied levels of psychological distress and mental health amid the global COVID-19 pandemic (Marzo et al., 2021). Moreover, class stratifications reveal distinct manifestations of psychological security (Harrington, 2017). For instance, the working class faces greater financial insecurity due to challenges like debt, unemployment, and poverty compared to their middle-class counterparts. With societal shifts, the concept of group psychological security also evolves, as evidenced by emerging discussions around the "Psychological Security of Urban Residents" (Wang et al., 2019).

Over time, psychological security has undergone a complex evolution. Survival and reproductive pressures have shaped associated psychological and behavioral mechanisms. For instance, individuals instinctively focus on stimuli deemed threatening (Neuberg & Schaller, 2004), activate defense systems in response to threats (Gilbert, 1993), and employ defensive strategies like avoidance or confrontation in ambiguous situations (Sangha et al., 2020), as well as camouflage and protective coloration (Stevens & Merilaita, 2009). Social bonds, enhanced through cooperative behaviors, provide a buffer against external threats (Baumeister & Leary, 1995). The attachment system motivates individuals to seek care and protection, a drive that extends to broader relationship

networks in adulthood (Mikulincer & Shaver, 2017). These patterns, rooted in our genetic makeup, reflect the evolutionary development of psychological security.

In conclusion, while strides have been made in understanding psychological security, gaps remain, particularly within the evolutionary context and in addressing the needs of specific individuals or groups. Mayr (1961) and Tinbergen (1963) posited that behavior should be studied from both proximate causes—concerning immediate causality and development—and ultimate causes, which focus on evolutionary heritage and adaptive value. Hofmann et al. (2014) once provided an integrated framework for the evolutionary analysis of social behavior, encompassing external attributes such as ecological and social environment, as well as internal attributes like neural, molecular, and life-history traits. Accordingly, this paper aims to enrich our understanding of psychological security through the lens of human development, spotlighting both the differences and commonalities across individuals and groups.

3. Individual differences in psychological security: The interaction of genes and experiences

Psychological security plays a pivotal role in human development, encapsulating the reciprocal interaction between an individual and their immediate context. As delineated by the Ecological Systems Theory (Bronfenbrenner, 1992), an individual's development is entangled within a network of interconnected environmental systems, which significantly mold psychological growth and behavioral expressions. Environmental experiences possess the potential to restructure brain networks (Chen & Baram, 2016; Maya-Vetencourt & Origlia, 2012). The interweaving of multiple processes - genetics, environmental factors, development, and epigenetics, collectively orchestrate an individual's behavioral manifestations and phenotypic traits (O'Connell & Hofmann, 2011). The mechanisms underlying individual variations in psychological security are analyzed alongside empirical research evidence (**Figure 1**).

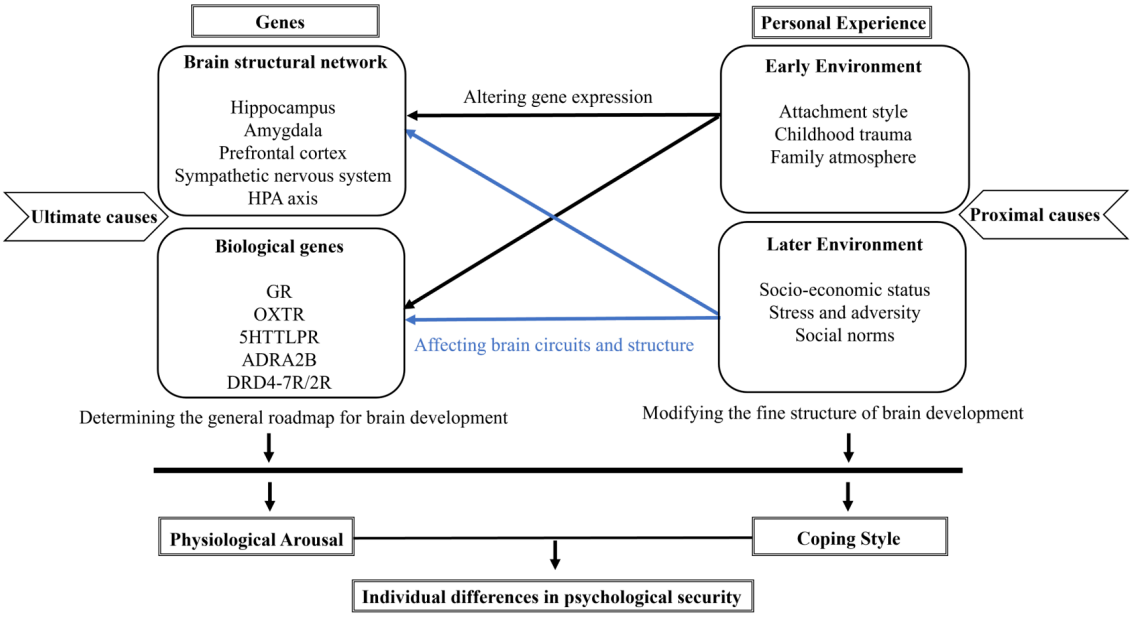

Figure 1. Individual differences in psychological security and the mechanism of its formation.

Note: The inception of psychological security emanates from the amalgam of distal evolutionary biological mechanisms and proximal environmental factors. Within the distal causes, to confront the challenges of survival and reproduction, the human brain has evolved specialized structures responsible for monitoring the environment and perceiving threats, while specific receptor-editing genes facilitate the biological response to these threats. Proximal causes primarily encompass an individual's early environmental experiences and developmental conditions, which influence the micro-structure of brain development and further shape the differentiated responses of psychological security. Variations in genes selected through early survival environments and individual developmental experiences influence physiological activation levels and coping strategies when facing specific events, leading to different levels of psychological security. This variability illustrates the diversity of psychological security within a population.

3.1. Neural basis of psychological security

The cognition of human society is deeply rooted in phylogenetic development (Sallet, 2022). As the course of evolutionary progression unfolded, the brain adapted to environmental exigencies and societal living by establishing neural pathways pertinent to social cognition, notably within regions such as the orbitofrontal cortex, prefrontal cortex, superior temporal gyrus, and amygdala complex.

These regions specialize in perceiving and processing information relating to social cues (Fernández et al., 2018), an architecture colloquially termed the "social brain".

In order to survive in perilous environments and promote social interaction and bonding in safe conditions, mammalian neural systems have evolved towards adaptive fight-or-flight and social engagement behaviors (Porges & Furman, 2011). The neural anatomical foundations of potential danger evaluation circuits consist of several interconnected limbic areas essential for processing motivational stimuli, such as the hippocampus, amygdala, bed nucleus of the stria terminalis, and medial orbitofrontal cortex (Szechtman & Woody, 2004), key relay stations for defensive motivation and emotional activation. The amygdala serves as a monitor for salient stimuli in the environment (Sander et al., 2003), functioning as a hub for identifying imminent threats and triggering defensive responses. This can quickly evoke psychological states associated with threats and danger, resulting in a sense of insecurity (Mikulincer & Shaver, 2019). Recent theories posit that threats can be processed simultaneously through subcortical and cortical circuits (LeDoux, 2017). When facing threats, the subcortical defensive survival circuits centered around the amygdala activate defensive behaviors, while cortical cognitive circuits within the prefrontal cortex generate conscious experiences of fear. Additionally, neural pathways associated with threat and safety perception include the sympathetic nervous system, hypothalamic-pituitary-adrenal (HPA) axis, vagus nerve, and meningeal lymphatic vessels (Slavich, 2020). Among these, the vagus nerve, consisting of 80% afferent fibers, mainly functions to convey sensory signals from visceral organs to the central nervous system, thereby assisting in regulating stress levels and possibly fostering a sense of security (Porges, 2007; Porges & Furman, 2011). These neural bases related to psychological security have been preserved through a prolonged evolutionary course.

3.2. Susceptibility gene receptor

Individual susceptibility to different environmental contexts varies significantly. Particularly, individuals harboring a higher number of plasticity alleles exhibit heightened sensitivity to environmental influences (Belsky & Pluess, 2009). Certain alleles, such as Glucocorticoid Receptor Genes (GR), 5-HTT linked Polymorphic Region (5HTTLPR), Oxytocin Receptor Genes, α2B Adrenergic Receptor Genes (ADRA2B), and The 7R/2R Allele of the Dopamine 4 Receptor Gene (DRD4-7R/2R), render carriers more responsive to their surroundings (**Table 2**). This suggests that there is a complex

interconnection between biology, environment and psychology, and that certain innate biological genes may cause individuals to have lower levels of psychological security in certain situations.

Susceptibility gene receptor	Description	Literature support
Glucocorticoid Receptor Genes (GR)	Children with high levels of Glucocorticoid Receptor Gene NR3C1 Methylation are more likely to exhibit attachment anxiety when exposed to stressful situations.	Bosmans et al. (2018)
Oxytocin Receptor Genes (OXTR)	The A allele of OXTR rs2254298 was associated with attachment security in the non-Caucasian infants. Individuals carrying specific alleles of the OXTR rs53576 locus exhibit heightened sensitivity to social environmental input, particularly concerning cultural norms for emotional support seeking.	Chen et al. (2011); Kim et al. (2010)
5-HTT linked Polymorphic Region (5HTTLPR)	Individuals with short alleles of 5HTTLPR are more likely to be sensitive to environmental and personal experiences, displaying strong emotional reactions.	Starr et al. (2013)
α2B Adrenergic Receptor Gene (ADRA2B)	Carriers of a deletion mutation in the ADRA2B show significantly higher amygdala activation when viewing emotional faces under stress conditions compared to non-deletion mutation carriers.	Li et al. (2015)
The 7R/2R allele of the Dopamine 4 Receptor Gene (DRD4-7R/2R)	Individuals carrying the DRD4-7R/2R gene perceive and respond more sensitively to rewards during a gambling task, they are more easily influenced by their environment and more readily accept and align with the norms and values of their culture.	Glazer et al. (2020)

Table 2. Susceptibility gene receptors prone to feelings of psychological insecurity.

3.3. Interaction between individual experience and biological genes

The proximal determinants of psychological security are sculpted by an individual's early environmental experiences and social surroundings. Through a dynamic interplay between the individual and the environment, a feedback loop is established, enabling the individual to gauge the safety of a situation (Wanless, 2016). During early childhood, the family and school environments emerge as the most conspicuous and impactful microsystems, wherein attachment styles, family ambiance, and childhood traumas significantly influence the sense of psychological security. Within the family environment, a history of insecure attachment leads to an increased sensitivity to cues of psychological security and a frequent negative perception of others' emotions. In contrast, individuals with secure attachments tend to cooperate even after rejection (Fang et al., 2014). Positive family relationships and harmonious parent-child connections, representing intimacy, acceptance, love, and warmth, foster psychological security. However, excessive parental control can create psychological insecurity in a child, leading to increased conflict (Selçuk et al., 2020). A history of childhood trauma has been linked to anxiety and depression in adulthood and negatively affects physical and mental health (Oral et al., 2016; Hovens et al., 2009). These early experiences modify the fine structure of brain development. From physical factors, such as nutrition, to psychosocial factors, like family stability, socioeconomic status, stress adversity, and social norms, various environmental aspects integrate within the brain (Farah, 2017). During the first two years of life, as the brain matures, the number of sulci within the cortical region also increases (Gilmore et al., 2018). By the age of two, the fundamental structure and functional architecture of the brain appear to be primarily formed, and subsequent brain development mainly characterizes the reorganization, fine-tuning, and reshaping of existing neural circuits and networks.

Social conditions influence the central nervous system's ability to perceive safety and threats (Dickerson & Kemeny, 2004). The process of the social environment, by activating central nervous system processes and affecting peripheral hormone and neurotransmitter activity, regulates human gene expression, thus altering genetic sensitivity to social environmental reactions (Cole, 2009). Research indicates that adverse childhood experiences may disrupt the normal function of HPA axis genes, leading to a blunted cortisol response and reduced stress-coping ability (Brodsky, 2016). These early environmental factors interact with biological aspects, ultimately shaping psychological characteristics such as impulsivity and pessimism. Furthermore, the social environment continues to modify and influence the brain throughout development. For example, socioeconomic status,

including income, occupation, education, and neighborhood relationships, affects brain development (Brito & Noble, 2014; Farah, 2017; Rakesh & Whittle, 2021). Compared to children from families with higher socioeconomic status, children from lower socioeconomic status often experience fewer linguistic, social, and cognitive stimuli from caregivers and family environments. Moreover, lower socioeconomic status represents more stress, which negatively affects brain regions like the hippocampus, amygdala, and prefrontal cortex. These factors may result in differences in language, information processing, memory and cognitive structures among children from families with different socioeconomic status (Brito & Noble, 2014). Therefore, the interaction between genes and environmental inputs shapes an individual's social sensitivity and psychological security.

In conclusion, within a single group, variations in genetically inherited traits, selected through early communal living environments, coupled with personal developmental experiences, may lead to individual differences in physiological activation and coping strategies when confronting specific cultural scenarios and life events. These differences, in turn, may culminate in individual variations in the sense of psychological security.

4. Group differences in psychological security: The interplay of environment, culture and genes

Psychological security transcends individual experience, extending into a collective phenomenon (Jacobson & Bar-Tal, 1995). The inception of settled living saw humans organizing groups based on distinct social behavioral patterns, dictated by their mode of existence. The ongoing interplay among the living environment, genes, and behavioral patterns culminates in regional variations in personality and psychological phenomena, with group differences in psychological security being a product of these interactions (see **Figure 2**). The mechanisms underpinning group variations in psychological security are dissected alongside empirical research evidence.

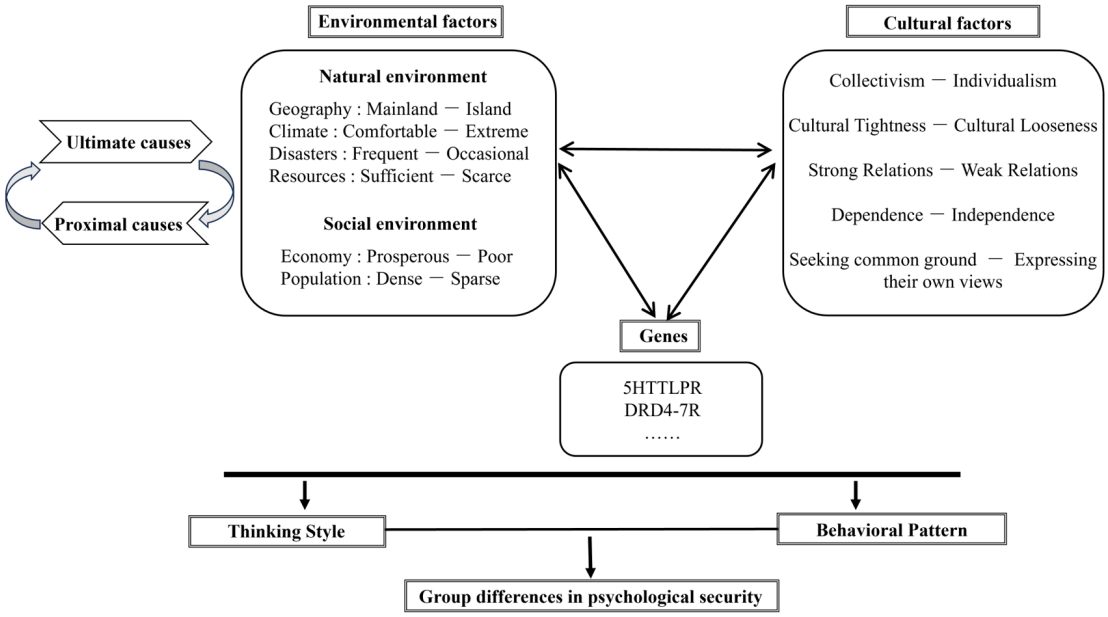

Figure 2. Group differences in psychological security and their underlying mechanisms.

Note: Within groups, the natural and social environment of group evolution, cultural adaptability, and the genes of group members are intertwined, mutually influencing one another. The distinctions among these three factors drive differences in thought patterns and behavioral modes among members of different groups, thereby revealing a multifaceted diversity at the group level of psychological security. These elements serve as both distal causes, formed through the process of human group evolution, and proximal causes, influencing the degree to which group members adapt to new environments.

4.1. Interaction between environment and genes

The peculiarities of both the natural geographical environment (e.g., terrain and climate) and the social environment (e.g., values and culture) significantly mold people's thoughts, emotions, and behaviors, leading to spatial clustering of personality traits and psychological phenomena (Rentfrow, 2014; Rentfrow, 2020). The complexity of the socioecological environment shapes specific cognitive and behavioral patterns, reflecting the diversity of behaviors and the multifaceted nature of personality (Lukaszewski et al., 2017; Smaldino et al., 2019). This interaction between the environment and genes also leads to geographical differences in the sense of psychological security. For example, Wei et al. (2017) investigated the relationship between climate and personality across

various regions in China and the United States. Their results revealed that, compared to individuals living in harsh climatic areas, those living in more temperate regions exhibited higher levels of extraversion, agreeableness, and openness, as well as lower levels of neuroticism. As warm-blooded animals, humans pursue environments that are most comfortable both psychologically and physiologically. A mild climate offers a sense of psychological security, providing more opportunities for outdoor exploration and social interaction; in contrast, people are less likely to venture outdoors when the environmental temperature is unfavorable. This aligns with attachment theory, which posits that individuals are more likely to explore their surroundings when they feel psychologically secure (Bowlby, 1969, 1982). Similarly, Camperio Ciani and colleagues conducted a series of studies on the personality traits of residents on Italian islands (Camperio Ciani, 2017; Camperio Ciani et al., 2007; Camperio Ciani & Capiluppi, 2011). They found that, compared to mainlanders, islanders living in Italian islands had lower levels of extraversion and openness but higher levels of emotional stability and responsibility, whereas immigrants leaving the islands exhibited higher levels of extraversion and openness. Traits of low extraversion and openness, along with high emotional stability and responsibility, were well-adapted to the social-ecological niche of isolated islands, with individuals not suited to these conditions gradually leaving the population. Moreover, according to the human climate, aggression, and self-control model (Van Lange et al., 2017), the adaptations to local environments are reflected in variations in life history strategies, time orientation, and self-control, leading to differences in violence and aggression. Specifically, lower temperatures, especially significant climatic seasonal changes, require individuals and groups to adopt slower life history strategies, focus more on the future, and pay greater attention to self-control, thereby inhibiting aggressive and violent behavior. Correspondingly, people living in such environments tend to have relatively higher levels of psychological security.

4.2. Interaction between genes and culture

Recent scholarly endeavors have unveiled various theories elucidating the dynamic relationship between culture and genes, such as the Cultural Neuroscience Theory (Chiao, 2018; Kim & Sasaki, 2014), Niche Construction Theory (Laland et al., 2010), Neuro-Culture Interaction Model (Kitayama & Uskul, 2011), and the Coevolution Theory of Culture and Genes (Boyd & Richerson, 1988; Laland et al., 2010). The interactive loop between culture and genes has resulted in the distribution differences of susceptible genes under different cultures, leading to group differences in psychological security. Research has revealed substantial differences in alleles between different cultural groups, especially

the 5-HTTLPR receptor gene, which shows significant frequency differences under the "collectivism-individualism" cultural dimension. Compared to individualistic cultures (European samples), collectivist cultures (East Asian samples) are more likely to include individuals carrying the short (S) allele of 5-HTTLPR (Chiao & Blizinsky, 2010). This genetic difference leads to behavioral expression differences: individuals carrying more short (S) alleles may exhibit more attention preference for negative words and images, whereas individuals with more long (L) alleles tend to have positive cognitive preference.

Similarly, in human evolution, culture has also changed genes. The dopamine D4 receptor DRD4-7R gene is related to novelty-seeking and hyperactivity personality. Individuals carrying the 7-Repeat Variation of Dopamine Receptor D4 (DRD4-7R) are generally more adventurous (Chen et al., 1999). Research shows that the overall trend of DRD4-7R gene distribution worldwide coincides with human ancestors' migration experiences: starting from the human origin in Africa, the farther the human migration distance, the higher the ratio of individuals carrying DRD4-7R in that population. In European and Middle Eastern populations, the rate of carrying the DRD4-7R gene is approximately 10% to 25%; in indigenous populations migrating from Africa to the Amazon basin in South America, it is about 70%. A high DRD4-7R gene-carrying rate records the great migration history of human ancestors (Chen et al., 1999; Ding et al., 2002). Under collectivist culture, the proportion of people carrying the DRD4-7R gene is lower since collectivist culture demands individual conformity, and the restlessness of individuals carrying DRD4-7R does not fit into such culture, which may eventually lead to its extinction. In addition, DRD4-7R or 2R regulates independence or interdependence. Compared to non-carriers, DRD4-7R or 2R carriers exhibit a culture-dominant social orientation, are more susceptible to environmental or cultural influences, and are more likely to support their culture and values (Kitayama et al., 2014). Moreover, compared to European Americans, East Asians exhibit a stronger tendency in interpersonal communication and are more willing to think from others' perspectives. Research has found that East Asians have a larger right temporoparietal junction (TPJ) gray matter volume (related to interpersonal interaction and mental reasoning) than European Americans. This cultural difference is more pronounced among individuals carrying DRD4-7R/2R. Those who carry DRD4-7R/2R, both East Asians and European Americans, show more marked cultural differences in TPJ gray matter volume (Kitayama et al., 2020). This suggests that repeated participation in cultural practices or long-term exposure to a particular culture helps form new neural pathways, allowing the brain to spontaneously and seamlessly perform behaviors related to that

culture (Kitayama & Uskul, 2011), leading to psychological and behavioral differences between different populations.

Apart from the aforementioned collectivism-individualism and interdependence-independence differences, East-West cultural differences are also reflected in thinking habits, values, and other aspects. Take debating as an example. Western North Americans are exposed to articulation and argumentation education and training from kindergarten, focusing on the essence of things and considering them as independent entities, leaning towards expressing individual opinions in communication and decision-making. In contrast, Eastern culture emphasizes the interdependent relationship between self and others. Individual self is seen as part of the whole, with personal value and meaning defined through group and social roles. Under this concept, vigorous discussions like debates might threaten interpersonal harmony, and therefore people in Eastern cultures tend to reduce conflicts and seek common ground to achieve consensus (Nisbett, 2003). Furthermore, East Asians tend to process information in a more comprehensive way, focusing on the visual periphery and central objects, whereas Westerners tend to process visual information analytically, focusing more on the central object rather than peripheral objects (Nisbett & Miyamoto, 2005). Therefore, in collectivist cultures emphasizing social relationships, people's psychological security is more stressed on interpersonal security and control certainty (Strand, 2020).

4.3. Interaction between environment and culture

Yamagishi and Hashimoto's (2016) study posits that humans are the architects of social-ecological niches, adapting to and reshaping the social environment through innovative actions and decisions. The crux of social-ecological niche construction lies in institution-building, which either incentivizes or restrains individuals from acting in certain ways, with people maximizing adaptation to the social environment by complying with these institutions. To some extent, specific forms of social behavior (and the underlying psychological mechanisms) have a defensive function, making these behaviors (and latent mechanisms) more likely to become more widespread cultural characteristics in adapting to the environment (Fincher et al., 2008). Cultural factors mainly include values, social norms, social support, etc. The construction, inheritance, and evolution of culture are also for adapting to specific environments and protecting one's safety. For example, people are more likely to adopt collectivist values or prioritize protecting group values when facing a significant psychological threat. Empirical studies have confirmed this view. Compared to less harsh environments, in places with stringent

climatic conditions and limited natural resources, people show more collectivist values (Van De Vliert, 2013); similarly, places with higher risks of natural disasters are more collectivist than those with lower risks (Oishi & Komiya, 2017), regional prevalence of pathogens has a strong positive correlation with collectivist cultural indicators and a strong negative correlation with individualism (Fincher et al., 2008). Facing severe environmental challenges, people need to avoid risk, prioritizing safety, and collective control and isolation can protect themselves well. In addition, different Climato-Economic Habitats produce corresponding social and psychological patterns. The study shows that among the population threatened by high temperatures, the level of freedom is lowest, as the harsh environment and lack of economy restrict their choices and actions. In the population affected by a mild climate, the freedom level is intermediate, and in the affluent population threatened by high temperatures, the freedom level is highest because they have enough economic resources to cope with harsh environmental conditions (Van De Vliert et al., 2013). This indicates that differences in environment and economy bring varying degrees of psychological security to people and enable them to build cultures that adapt to the environment.

The environment and culture are intertwined, and social norms largely reflect group differences in psychological security. The intensity of social norms and the degree of sanction for deviant behavior can be described as "Cultural Tightness-Looseness" (Gelfand et al., 2006). Culturally tight countries have strict social norm constraints and lower tolerance for deviant behavior, while culturally loose countries have more relaxed social norms and higher tolerance (Gelfand et al., 2011). Cultural tightness or looseness is also an adaptation to the local ecological environment. A survey showed that, in places facing high threats (such as natural disasters, resource scarcity, infectious diseases, threatening conflicts, high population density), there is stronger cultural tightness, and citizens exhibit greater caution, impulse control, and self-monitoring ability. Facing threats, strong norms, and a low tolerance for deviance help coordinate social actions for survival. Comparatively, areas with lower threats have more flexible norms, tolerating more unrestricted behavior (Harrington & Gelfand, 2014). Areas with cultural tightness have higher social stability, lower crime rates, less drug and alcohol use, lower homelessness rates, and less social chaos, symbolizing a higher level of psychological security. A survey showed that, during the COVID-19 pandemic, the culturally loose countries had a higher number of cases and deaths than the culturally tight countries (Gelfand et al., 2021). Strict adherence to social norms allows people to coordinate and respond to collective threats on a large scale, enhancing psychological security.

In summary, within groups, the intricacies of natural and social environments, cultural adaptability, and the genetic makeup of individuals interact and influence one another. These differences across the three aspects spawn variations in thought patterns and behavioral expressions among different group members, culminating in divergences in psychological security across groups. It is worth noting that this is not only a distant cause affecting group psychological security on the human timeline but can also act as a proximate cause, affecting people's adaptability in new environments, and selective migration is the reason for the geographical variations in personality or psychological phenomena (Rentfrow & Jokela, 2016).

5. Unifying threads of psychological security: cognitive and affective facets

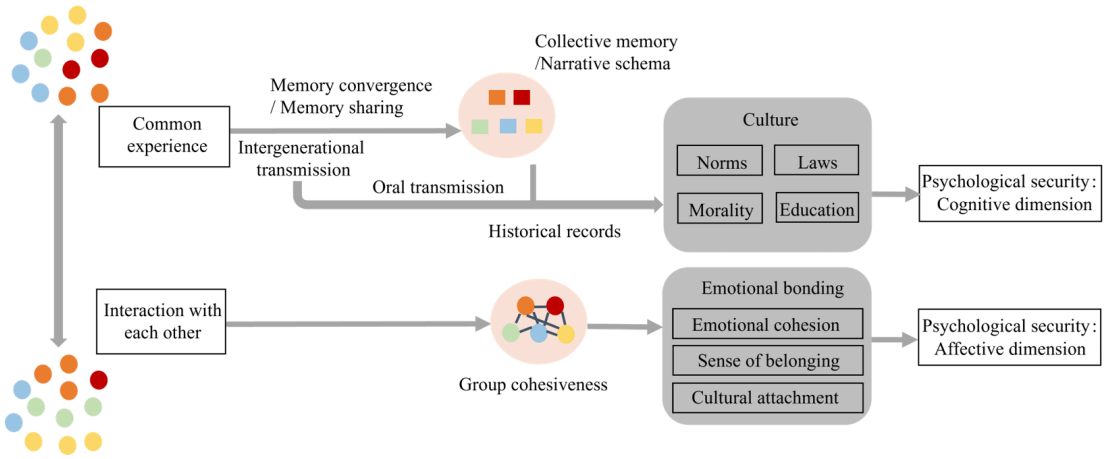

Figure 3. Unveiling the common mechanism of psychological security at individual and group levels.

Note: Circles of different colors represent different individuals gathered to form a group. Within the group, members' shared experiences form shared memories, gradually becoming collective memories or narrative schemas as they are passed down through generations. Preserved in historical records, collective memories evolve into a wide variety of cultural symbols over generations, providing group members with a shared framework and meaning for understanding the environment and generating psychological security at the cognitive level. Simultaneously, positive group communication and interaction closely connect group members, fostering emotional bonds such as belonging, cohesion, and cultural attachment, thereby creating psychological security at the emotional level. The roles of

culture and emotional bonds enable different individuals and groups to attain psychological security through similar mechanisms.

Despite the diversities in psychological security across individuals and groups, a core similarity lies in the realms of cognition and emotion, common psychological facets in humans. These facets potentially orchestrate similar perceptions and understandings. The commonality of psychological security mechanisms is dissected in tandem with research evidence (**Figure 3**).

Shared adversities and emotions are pivotal in sustaining relationships and lay the foundation for group cohesion and identity (Spoor & Kelly, 2004). Early human history saw people congregating into groups of varying sizes. Within these groups, shared experiences (e.g., battling natural disasters, warding off wild animal attacks, cooperative hunting) became widely recounted, dynamically constructed through communication, and bequeathed through generations via oral traditions, storytelling, historical records, and other means. These narratives metamorphosed into a memory system—collective memories or narrative schemas—that were communally owned and shared by group or societal members, influencing individual cognition and evoking a sense of group consciousness (Reese & Fivush, 2008).

To mitigate uncertainty in both material and social realms, and to bolster individual and collective survival, people sought a shared meaning system (Christopoulos & Tobler, 2016). Collective memories, preserved in historical records and evolved into a rich tapestry of cultural symbols, social rules, customs, laws, etc., over generations, morphed into diverse forms of culture. These cultural elements, shared and imbibed by members within specific societies or groups, furnished a shared framework for deciphering the environment, promoting social harmony, and rendering a sense of cognitive security (Sense of Epistemic Security) (McNeeley & Lazrus, 2014). Culture, intertwining with society and individuals, nurtures a sense of purpose and fosters internal coordination within society, while restraining destructive behaviors to maintain social order (Chao et al., 2015). Furthermore, the shared ethos of culture bequeaths individuals with cognitive security as they internalize cultural values and norms, aiding their adaptation to society (Chao et al., 2015; Fu et al., 2007). When institutional norms are trusted by citizens, they enhance psychological security and foster interpersonal trust with strangers (Spadaro et al., 2020). Psychological security provided by culture extends not only cognitively but also to the emotional realm (Chao et al., 2015). The affective facet of culture, passed down through generations among group members, becomes a solid foundation for emotional attachment, offering emotional sustenance and protection. Cultural attachment fosters a

sense of security; for example, soldiers stationed overseas carry their national flag close to their bodies under their uniforms, symbolizing an emotional cultural attachment (Hong et al., 2013; Yap et al., 2019). Lastly, members within the same society possessing similar cultural representations help link individuals with society (Rohner, 1984).

Positive engagements between individuals and groups intensify emotional bonds among group members, nurturing a sense of belonging to the group. These interactions offer a conduit for social identification, enabling individuals to feel part of the group and experience heightened psychological security. Baumeister and Leary (1995) posited that humans harbor a universal motive to forge and sustain meaningful interpersonal relationships, a motive ingrained in our ancestral genetic fabric and permeating our cognitive and affective landscapes. The quest for social connections and a sense of belonging is an intrinsic human trait, molding individual social interactions and experiences. Furthermore, collective resources and collaborative mechanisms provided by the group also source security for individuals. Interactions within the group can enhance a sense of security by building trust and a safe social atmosphere, promoting psychological security on the emotional level.

In summation, collective memories and cultural symbols furnish members with a shared interpretive framework, generating psychological security at the cognitive level. Concurrently, the sense of belonging, cohesion, cultural attachment, and other emotional bonds cultivated through positive group interactions engender psychological security at the emotional level.

6. Translating the evolutionary framework of psychological security into practice

6.1. Implications of psychological security on physical and mental wellness

Psychological security acts as a linchpin in sculpting both physical and mental well-being. On the physical spectrum, an augmented sense of psychological security has been associated with stress alleviation, harmonized bodily functions, stabilized respiratory and cardiac rhythms, and fortified immunity. In the mental arena, it undergirds an individual's psychological well-being (Zotova & Karapetyan, 2018), nurturing superior emotional regulation, problem-solving prowess, and engendering emotional stability and contentment. This secure mental landscape can foster transparent communication, invigorating team synergy and active participation, thereby amplifying team efficiency and outcomes (Schulte et al., 2012).

On the flip side, a dwindling psychological security could trigger mental health quandaries, such as heightened susceptibility to delusional illusions or even hallucinatory experiences, and an intensified propensity towards perceiving conspiracies (Whitson & Galinsky, 2008). Augmenting psychological security after a perceived loss of control has been tethered to a diminution in such delusional tendencies. Adolescents exhibiting lower psychological security levels might veer towards internet addiction, seeking refuge in the virtual sphere to counterbalance real-world security deficits (Young et al., 2011). Addressing these psychological imperatives could curtail levels of internet addiction (Arpaci et al., 2018).

6.2. Blueprint for recognition, sustenance, and augmentation of psychological security

Psychological security, a fluid entity, morphs over time, reshaped by the fluctuating landscapes of societal milieus (Chopik, 2023). The formidable challenges borne by events like the global COVID-19 pandemic accentuate the quintessential role of psychological security (Marzo et al., 2021). To stem its receding trend, several stratagems can be employed:

1. **Accurate appraisal of individual psychological security levels.** This involves a comprehensive assessment integrating an individual's cultural, familial, and developmental history. Such a thorough evaluation will ensure tailor-made and universally relevant results, laying the groundwork for effective interventions.
2. **Fostering group integration.** By nurturing a sense of belonging and identity within groups – be it familial, academic, or professional, individuals can harness the positive mental health dividends of social connectivity (Haslam et al., 2022; Steffens et al., 2017). The psychological intervention program named "GROUPS 4 HEALTH (G4H)" can be learned to foster and maintain social group relationships and address mental health issues caused by social isolation or disengagement (Haslam et al., 2016).
3. **Cultivating supportive social interpersonal relationships in the microenvironment.** Building social connections is a fundamental human motivation (Baumeister & Leary, 1995). Social relationships expose people to diverse resources and information, while intimate social support lets individuals feel loved, cared for, respected, and valued (Taylor et al., 2004). Specifically, developing intimate relationships (Arriaga et al., 2018), harmonious neighborhood relations, cultivating positive leader and team member relationships (London et al., 2023), and creating

good teacher-student relationships (Jia et al., 2017) helps enhance psychological security through positive social interactions.

4. **Bolstering social safety nets.** This entails a comprehensive social psychological support system, attuned to the unique needs and challenges characteristic of each developmental stage. Social security systems and welfare should be designed and adjusted according to the characteristics of different groups to truly meet people's needs, thus enhancing people's psychological security.

6.3. Cultivating a culture of diversity and inclusion through psychological security

Diversity and Inclusion (D&I), a model heralding the celebration of individual distinctiveness within an organizational canvas, necessitates an inclusive milieu where every member feels cherished and empowered to contribute (Pless & Maak, 2004; Roberson, 2006). These differences can be based on race, gender, sexual orientation, age, physical ability, religion, cultural background, and other factors. An effective D&I strategy is not just about increasing racial, gender, or cultural representation, but also about ensuring that all organizational members feel welcome, valued, and influential in an inclusive environment (Shore et al., 2011). This framework of psychological security, when viewed through an evolutionary lens, could shepherd us in crafting a more inclusive ambiance to amplify adaptability and spark innovation. The specific applications are delineated below (**Table 3**).

Application Field	Application Goal	Initiatives
Organization Management	Recognizing cultural nuances in psychological security.	Formulating inclusive policies to ensure that all employees feel valued, heard, and safe. Training employees in cultural competence and microaggressions to ensure their psychological security.
Educational Policy	Cultivating an inclusive learning environment that respects and accommodates students' diverse backgrounds.	Developing curriculum with diverse perspectives. Training educators in culturally responsive teaching methods. Providing programs and resources to support students' unique needs, such as mentoring programs, support groups, or resource centers.
Healthcare and Public Health	Delivering culturally attuned healthcare services.	Providing training for health professionals to understand that different cultures and developmental backgrounds may affect patients' psychological security, health status and medical outcomes. Developing health promotion programs tailored for different cultural groups.
Public Policy	Fashioning policies to cater to a culturally diverse populace.	Combating discrimination and systemic bias. Creating equal opportunities for people to access resources and services.

Table 3. Harnessing psychological security for a culture embellished with diversity and inclusion.

7. Conclusion and prospective directions

Psychological security, pivotal in both modern societal and organizational milieu, has elicited escalating attention owing to its salient impact on human behavior and mental well-being. This manuscript embarked on a meticulous expedition to unravel the intricacies of psychological security

among individuals and groups, all through the prism of evolutionary insights. The insights and stratagems delineated herein harbor substantial theoretical ramifications, shedding light on pathways to comprehend human behavior and mental health, thereby proving to be invaluable assets for families, organizations, and society at large.

Nonetheless, the domain of psychological security research is laden with intricacies and uncharted territories. Paramount challenges encompass the fabrication and preservation of psychological security across a mosaic of cultural landscapes and borders; the sway of burgeoning technologies and media modalities on the dynamics of psychological security; and the decoding of the myriad social contexts that influence psychological security. Traversing these avenues necessitates a deeper scholarly foray.

As we venture forth, it is our fervent hope that subsequent research endeavors will continue to demystify the enigma of psychological security. By doing so, we yearn to furnish a richer understanding and devise pragmatic strategies and recommendations to augment psychological security in a plethora of contexts.

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