Differences and Commonalities of Psychological Safety in Individuals and Groups: Insights from a Human Development Perspective

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Abstract

People are accustomed to engaging in preventive behaviors against potential dangers and harms, taking precautions to obtain psychological safety. Psychological safety is the perceived anticipation of potential physical or psychological threats or risks, representing a psychological state manifested through cognitive, emotional, behavioral, and physiological dimensions. In recent years, research on psychological safety has gradually become a prominent topic in psychology, particularly achieving significant progress in domains such as public health events, organizational management, and social relationships. However, in the field of human development, researchers have yet to pay adequate attention to psychological safety, with insufficient research on its understanding throughout human evolutionary history and on corresponding intervention methods. Therefore, this article, through literature review and critical reflection, adopts a human development perspective to explore and deepen the understanding of psychological safety by focusing on its differences and commonalities at both individual and group levels. Specifically, differences in genetic traits shaped by early survival environments of ethnic groups and individual developmental experiences lead to variations in stress susceptibility and coping styles when facing events, thereby generating individual differences in psychological safety. At the group level, the interplay among environment, culture, and genes triggers divergences in thinking patterns and behavioral expression modes, resulting in group differences in psychological safety. Furthermore, the interaction between individuals and groups plays a crucial role in the formation of psychological safety. On one hand, collective memory and cultural symbols endow members with shared frameworks and meanings for understanding the environment and generating cognitive-level psychological safety; on the other hand, emotional bonds such as sense of belonging, cohesion, and cultural attachment formed through positive group interactions bring emotional-level psychological safety. In summary, this article examines psychological safety from a human development

perspective and applies this understanding to various contexts including intimate relationships, family education, organizational leadership, and emergency preparedness, aiming to achieve psychological goals of maintaining psychological safety, improving quality of life, enhancing public well-being, and promoting diversity and inclusion.

Full Text

The Difference and Commonality of Psychological Security in Individuals and Groups: Insights from the Human Development Perspective

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Abstract

People habitually engage in preventive behaviors against danger to achieve psychological security. Psychological security represents the perceived anticipation of potential physical or psychological threats—a mental state manifested through cognition, emotion, behavior, and physiological responses. While research on psychological security has become increasingly prominent in psychology, particularly in public health events, organizational management, and social relations, its role in human development remains underexplored. This paper examines the literature from a human development perspective, focusing on differences and commonalities in psychological security across individuals and groups. Specifically, genetic factors shaped by ancestral environments and divergent personal developmental experiences create individual differences in stress susceptibility and coping styles, thereby generating variability in psychological security. At the group level, interactions among environment, culture, and genes produce divergent thinking patterns and behavioral expressions, leading to group-level differences in psychological security. Moreover, individual-group interactions play a crucial role in forming psychological security. On one hand, collective memories and cultural symbols provide shared frameworks and meaning for members to understand their environment, generating cognitive-level psychological security. On the other hand, positive group interactions foster emotional bonds such as belonging, cohesion, and cultural attachment, creating emotional-level psychological security. This paper explores psychological security from a human development perspective and applies these insights to intimate relationships, family education, organizational leadership, and emergency preparedness, aiming to maintain psychological security, enhance quality of life, improve public welfare, and promote diversity and inclusion.

Keywords: Psychological Security; Human Development; Individual Differences; Group Differences; Diversity and Inclusion

"Prudence secures a thousand autumns; caution sails a ship for ten thousand years." Since ancient times, humans have maintained high vigilance, constantly monitoring their surroundings to ensure safety and comfort. In daily life, people choose to reside in neighborhoods with low crime rates and harmonious neighborly relations, installing security doors and windows to guard against potential threats. Similarly, in social and professional environments, individuals remain cautious about their behavior and speech to avoid unnecessary trouble. In today's information society, information security and privacy protection during internet and smartphone usage have garnered widespread attention [**?**, **?**]. Additionally, artificial intelligence-induced uncertainties in the workplace create stress for many. Across other life domains, we engage in physical exercise, maintain healthy diets, wear seatbelts, and actively participate in vaccination programs—all reflecting humanity's profound need for psychological security [**?**, **?**].

Security refers to a state where individuals feel free from fear and anxiety, experiencing safety and liberation [**?**, **?**]. Over recent decades, this field has attracted increasing scholarly and public attention, yielding important findings in political science, organizational management, social psychology, and public health. In political and military domains, social unrest, terrorist attacks, and wars severely impact psychological security [**?**, **?**, **?**]. In organizational contexts, safe work environments and team climates enable employees to express opinions confidently [**?**, **?**, **?**, **?**] and demonstrate greater work passion [**?**, **?**]. In social domains, positive interpersonal relationships constitute crucial factors for maintaining psychological security [**?**, **?**], with relationship quality directly affecting partners' sense of security [**?**, **?**, **?**]. Social distance also serves as an important indicator of psychological security. Humans regulate personal space, establishing protective boundaries between themselves and others, feeling safer when their space is respected [**?**, **?**]. During the COVID-19 pandemic, the importance of social distance became particularly salient [**?**, **?**, **?**]. Today, psychological security has evolved into a complex system integrating modern cognitive understanding—a dynamic process requiring responses to different challenges at various stages to create new security experiences [**?**, **?**]. Despite widespread attention in organizational leadership, work environments, and social psychology, psychological security remains insufficiently emphasized from the United Nations' advocated perspective of Human Development.

2.1 Conceptual Connotation of Psychological Security

Psychological security is closely related to several concepts including "safety," "sense of safety," "perceived safety," and "psychological safety." Initially, safety meant escaping dangerous situations; successfully avoiding threats constituted safety, involving physical, psychological, and social protection—an objective condition. Later, safety was defined as the perception of survival possibilities in the present or future [**?**, **?**], with its subjective component being the sense of safety.

Edmondson [?, ?] applied psychological safety to organizational research, defining it as a mental state where individuals feel accepted, supported, and free to express opinions at work, particularly emphasizing employees' emotional security and trust. Maslow considered security a fundamental psychological need—a feeling of confidence, safety, and freedom from fear and anxiety, especially the feeling that one's current (and future) needs will be met [?, ?]. As an internal psychological resource, security helps individuals process information, regulate stimulus responses, mobilize social support, and enhance well-being [?, ?]. Conversely, insecurity involves perceptions and cognitions of the external environment, encompassing environmental assessment and coping evaluation [?, ?]—the perception of unsafe information in the environment.

In fact, "perceived safety" and "psychological security" are distinct concepts. Perceived safety focuses on individuals' perception, judgment, and evaluation of environmental safety or threats—a psychological process or mechanism. Psychological security emphasizes individuals' feelings about their own state, representing a subjective belief and the outcome/valence of environmental perception. While the psychological process of perceived safety is universal, involving perceptual actions and information evaluation [?, ?, ?], the degree of psychological security varies across individuals [?, ?]. Notably, Chinese researchers have proposed a more localized definition: psychological security is the anticipation of potential physical or psychological threats or risks, involving feelings of certainty and controllability when handling events \cite{安莉娟，丛中，2003}. Interpersonal security and control/certainty constitute two sub-dimensions of Chinese psychological security: the former reflects individuals' safe experiences in interpersonal processes, while the latter reflects predictability, certainty, and control over life \cite{丛中，安莉娟，2004}.

In this paper, we define psychological security as the psychological state following environmental and risk perception—a subjective experience manifested through cognition, emotion, behavior, and physiology. Based on the revised Maslow Security-Insecurity Questionnaire [?, ?], we can demonstrate psychological security's dimensions and manifestations across three aspects: self-security, emotional security, and interpersonal security [Figure 1: see original paper].

Figure 1. Internal Structure and External Manifestations of Psychological Security
Note: Blue sections represent the three internal structures of psychological security; pink sections represent corresponding manifestations.

2.2 Theoretical Research Related to Psychological Security

Throughout psychology's history, descriptions of security appear across numerous theoretical schools. Psychoanalytic theory suggests insecurity stems from unmet personal needs and desires; humanism views security as a deficiency need, considering it in terms of human nature and well-being; cognitive psychology treats psychological security as a mental state that changes over time and space.

Beyond psychological schools, scholars have proposed diverse perspectives and theories to understand security. We have reviewed relevant existing theories and examined each from three aspects: purpose, content, and application .

Table 1. Existing Theories Related to Psychological Security

Theory	Purpose	Content	Application
Protective Motivation Theory [?, ?, ?]	To analyze psychological processes and coping behaviors when facing fear information, explaining how fear information influences attitude change	Information recipients evaluate information from environmental or internal sources through cognitive mediation processes (threat assessment and coping assessment), forming protective motivation	Primarily used for predicting and intervening in health and safety-related behaviors across healthcare, environmental science, information security, and tourism management
Social Information Processing Theory [?, ?, ?, ?]	To understand the psychological processes underlying social responses, from encoding social cues through interpretation, goal clarification, response search, decision-making, and behavioral enactment	Individuals' cognitive structures, early experiences, and information processing steps are interrelated, jointly shaping social cognition and behavior	Applied to aggression and social interaction behaviors

Theory	Purpose	Content	Application
Safety Decision Model [?, ?, ?]	To understand from a decision neuroscience framework how the brain computes safety and makes safety decisions	Safety decisions depend on interactions between threat-oriented assessments (threat value, urgency, predictability) and self-oriented assessments (personal experience, coping strategies, situational control)	Used for safety learning, fear inhibition, and risk assessment
Schema Therapy Theory [?, ?, ?]	An integrative therapy model combining traditional CBT with attachment theory to treat personality disorders	Memory systems store cognitive responses from past experiences, affecting information processing. Childhood trauma or overprotection forms early maladaptive schemas that activate when facing similar situations	Primarily used in psychotherapy for personality disorders, mood disorders, anxiety, depression; also for attachment security priming

Theory	Purpose	Content	Application
Tripartite Model of Psychological Security [?, ?, ?]	To provide an integrated security system theory explaining how people maintain psychological security	Attachment, self-esteem, and worldviews provide psychological comfort when facing threats. Self-esteem represents self-concept security; attachment represents interpersonal security; worldviews represent value-based security. Threats to one component activate compensatory defenses in others	No specific applications mentioned; can be used to measure psychological security levels

Theory	Purpose	Content	Application
Biopsychosocial Model [?, ?, ?, ?]	To provide a theoretical framework explaining and testing relationships between physiological arousal and behavior	Incorporates emotions, focusing on challenge/threat appraisals. When resources are deemed sufficient, challenge states emerge; when insufficient, threat states emerge, reflected in distinct neuroendocrine and cardiovascular patterns	Primarily used for performance and decision-making under stress (threat-challenge), individual differences in skill performance (e.g., sports, police work, social facilitation)
Social Self-Preservation Theory [?, ?, ?]	To explain relationships between emotion, psychology, and physical health, showing how social self-related threats induce psychosocial stress	Individuals have specific biological systems to protect the social self, monitor threats to social esteem/status, and coordinate psychological, physiological, and behavioral responses	Used for reactions and strategies during social threat evaluation, such as female body image threats

Theory	Purpose	Content	Application
Social Safety Theory [?, ?, ?]	To explain how brain and immune systems evolved adaptively to avoid social threats and maintain friendly social bonds	Psychosocial stressors increase cortisol and other physiological parameters. Brain and immune systems evolved to monitor environments, detect threats, and generate anticipatory behavioral responses	Primarily used for health disparities caused by social negative factors (interpersonal conflict, life stress, social threats, isolation)

As evident from this review, current security theories primarily adopt cognitive perspectives. Protective motivation theory, social information processing theory, safety decision models, and schema therapy focus on perception, judgment, and evaluation of environmental information—the psychological mechanism of "threat/safety perception." Additionally, biopsychosocial models, social self-preservation theory, and social safety theory incorporate evolutionary biological factors alongside cognitive assessments, considering physiological responses under threat or safety conditions. The tripartite model emphasizes the importance of maintaining psychological security. These theories provide valuable insights for understanding the distinct concepts of "perceived safety" and "psychological security."

However, psychological security is a complex concept with substantial variation across individuals and groups. For individuals, social backgrounds and characteristics influence psychological security. For instance, women report more insecurity than men [?, ?]; low-income individuals report more insecurity than high-income individuals [?, ?]; demographic variables (gender, age, birth order, number of siblings), socioeconomic characteristics, and personal experiences may affect psychological security [?, ?]. Research shows children's psychological security can be predicted by their different perceptions and evaluations of school, family, and neighborhood [?, ?]. At the group level, a study across 13 countries examining psychological distress and mental health during COVID-19 found Vietnamese populations reported the highest odds of psychological distress, followed by Egypt, while Nepal reported the lowest [?, ?]. This variation may relate to misinformation spread during the pandemic's early stages, exacerbating psychological insecurity in Vietnam. Additionally, different social

classes exhibit varying psychological security [?, ?]. Compared to middle-class work, working-class jobs face greater threats with more constrained work and life conditions, higher risks of debt, unemployment, and poverty. Similarly, group psychological security changes with social transformation; Chinese students' interpersonal security, trust, and sense of certainty have declined annually [?, ?]. With accelerating urbanization, new concepts like "urban residents' psychological security" have emerged [?, ?].

As a psychological phenomenon, psychological security has undergone extensive evolutionary development, forming adaptive psychological and behavioral mechanisms under survival and reproductive pressures. Individuals' attention suppresses threat-irrelevant behaviors, prioritizing threatening stimuli (angry faces, snakes, spiders) [?, ?]. When facing threats without safety signals, defense systems activate [?, ?]. In uncertain environments, individuals actively avoid or confront threats [?, ?], employing camouflage and protective coloration [?, ?]. Cooperation establishes social bonds to jointly resist external threats [?, ?]. The attachment system drives individuals to seek caregivers' protection, with attachment patterns extending throughout life into broader relationship networks in adulthood [?, ?]. These signal patterns embedded in our genetic information remind us not to neglect psychological security's evolutionary history.

In summary, research still lacks sufficient understanding of psychological security's evolutionary history and methods for identifying, maintaining, and enhancing it for specific individuals or groups. Tinbergen [?, ?] argued that understanding behavior requires integrating mechanistic and functional research, examining both proximate causes (causal relationships and development) and ultimate causes (adaptive value and evolutionary inheritance). The ultimate level emphasizes individual-environment adaptation coordination, explaining how behaviors were evolutionarily selected to encode specific genetic information, while the proximate level describes biological tendencies and psychological mechanisms, explaining how behaviors operate [?, ?]. Hofmann et al. [?, ?] provided a comprehensive framework for evolutionary analysis of social behavior, encompassing external attributes like ecology and social environment, and internal attributes like neuro-molecular mechanisms and life history traits. Through literature review and reflection, this paper aims to explore and deepen understanding of psychological security from a human development perspective, focusing on individual and group differences and commonalities, integrating ecological geography, biological genetics, cultural adaptation, and individual experience.

3 Intragroup Differences in Psychological Security: Gene-Experience Interactions

Psychological security constitutes an important dimension of human development, involving interactions between individuals and their contexts. As ecological systems theory posits [?, ?], individual development is nested within interrelated environmental systems that influence psychological development

and behavioral expression. Environmental experiences can restructure brain networks, enabling neural plasticity [?, ?, ?]. Genetic, environmental, developmental, and epigenetic processes intertwine to produce behavioral phenotypes \cite{O'Connell & Hofmann, 2011}. Therefore, within the same group, genetic factors and personal developmental experiences create individual differences in psychological security [Figure 2: see original paper]. We examine the mechanisms underlying these intragroup differences through empirical evidence.

Figure 2. Intragroup Differences in Psychological Security and Their Mechanisms

Note: Psychological security emerges from the joint action of ultimate evolutionary-biological mechanisms and proximate environmental factors. Ultimate causes involve brain structures specialized for environmental monitoring and threat perception that evolved to meet survival and reproductive challenges, with specific receptor-editing genes providing biological responses to these threats. Proximate causes primarily include early environmental experiences and developmental conditions that affect brain microstructure, shaping differential responses in psychological security. Variation in genes selected by ancestral environments and personal developmental experiences influences physiological activation and coping strategies when facing specific events, producing different levels of psychological security and demonstrating intragroup diversity.

3.1 Neural Basis of Psychological Security: Adaptive Brain Structures

Human social cognition has strong phylogenetic origins [?, ?]. Throughout evolution, the brain has shouldered responsibility for environmental adaptation, establishing social cognition-related neural circuits concentrated in the orbitofrontal cortex, prefrontal cortex, superior temporal gyrus, and amygdala complex to perceive and process social cues [?, ?]—the "social brain." The social brain hypothesis suggests that social complexity correlates with species' cortical volume [?, ?], with species living in larger social groups possessing greater neocortical proportions than those in smaller groups [?, ?]. Additionally, behavioral innovation, social learning, and tool-use capacity promoted brain size increases [?, ?].

To survive in dangerous environments while promoting social interaction in safe contexts, mammalian nervous systems evolved to adapt to fight-flight and social engagement behaviors [?, ?]. The neuroanatomical basis of potential danger assessment circuits comprises several interconnected limbic regions crucial for processing motivational stimuli: hippocampus, amygdala, bed nucleus of stria terminalis, and medial orbitofrontal cortex [?, ?]—key waystations for defensive motivation and emotional activation. The amygdala serves as a monitor for fear-related stimuli [?, ?], an integrated hub for identifying imminent threats and activating defensive responses, rapidly triggering threat-related mental states. Increased amygdala activity occurs when facing stress and lacking security [?, ?]. Recent perspectives suggest threats can be processed simultaneously via subcortical and cortical circuits [?, ?]. When threatened, the amygdala-centered

subcortical defense survival circuit activates defensive behaviors, while cortical (primarily prefrontal) cognitive circuits underlying working memory generate conscious fear experiences. Thus, conscious fear feelings during threat represent integration results in working memory, including sensory information, various memory representations, survival circuit activity, and bodily feedback. Additionally, neural pathways related to threat and safety perception include the sympathetic nervous system, hypothalamic-pituitary-adrenal (HPA) axis, vagus nerve, and meningeal lymphatic vessels [**?**, **?**]. The vagus nerve, 80% afferent, transmits sensory signals from visceral organs to the central nervous system, helping regulate stress levels and promote psychological security [**?**, **?**, **?**].

3.2 Genetic Basis of Psychological Security: Susceptibility Receptor Genes

Individuals exhibit different sensitivities to environments. Particularly, individuals carrying more plasticity alleles show greater environmental sensitivity [**?**, **?**]. Specific alleles such as glucocorticoid receptor gene, serotonin transporter gene (5HTTLPR), oxytocin receptor gene, and $ $2B adrenergic receptor gene (ADRA2B) render carriers more environmentally sensitive and thus more vulnerable to psychological insecurity. Taking attachment security as an example, glucocorticoid receptor gene NR3C1 methylation represents a susceptibility factor. Research shows children with high NR3C1 methylation exposed to stress show increased attachment anxiety [**?**, **?**]. Specific oxytocin receptor gene loci (e.g., OXTR rs2254298) associate with infant attachment behavior, particularly in non-white infants, where carriers of the A allele show more pronounced attachment security [**?**, **?**]. Additionally, individuals carrying OXTR rs53576 alleles (GG/AG) show high sensitivity to social environmental inputs, especially cultural norms for emotional support seeking [**?**, **?**]. Furthermore, 5HTTLPR short allele carriers are more sensitive to environments and personal experiences, showing stronger emotional reactions [**?**, **?**].

The $ $2B adrenergic receptor gene is also a stress susceptibility gene. Under stress, ADRA2B deletion mutation carriers show significantly higher amygdala activation when viewing emotional faces compared to non-carriers, with no difference under control conditions [**?**, **?**]. Excessive amygdala activation may weaken emotional control, making risk allele carriers prone to psychological or behavioral problems in negative environments. One study tested brain electrical activity during gambling tasks across different genotypes [**?**, **?**], finding DRD4-7R/2R carriers showed significantly greater Reward-Positivity and frontal-P3 event-related potential changes during reward and loss compared to non-carriers. This indicates DRD4-7R/2R carriers more sensitively perceive and respond to rewards, better concentrating attention when rewarded, possibly explaining their greater environmental susceptibility and cultural norm acceptance. In summary, complex associations exist among biology, environment, and psychology, with certain innate biological factors potentially placing individuals at higher or lower levels of psychological security in specific cultural

contexts.

3.3 Proximal Factors: Gene-Experience Interactions

Early environmental experiences and social contexts constitute proximal factors for psychological security. Individuals dynamically interact with environments [?, ?], with environments providing feedback loops to determine situational safety [?, ?]. During early development, family and school represent the most important microsystems for children's activities and interactions, where attachment styles, family atmosphere, and childhood trauma strongly influence psychological security. In family contexts, insecure attachment histories increase sensitivity to psychological security cues and negative emotion perception, while securely attached individuals tend toward cooperation even after rejection [?, ?]. Positive family relationships and harmonious parent-child bonds represent intimacy and acceptance, with love and warmth promoting psychological security, whereas excessive parental control creates insecurity and increases conflict [?, ?]. Childhood trauma histories correlate with adult anxiety and depression [?, ?], negatively impacting physical and mental health [?, ?]. These early experiences modify brain microstructure development, integrating numerous environmental factors from physical (nutrition) to psychosocial (family stability, socioeconomic status, stress, social norms) [?, ?]. During the first two years of life, as the brain develops overall, cortical gyrification increases [?, ?]. By age 2, the brain's basic structural and functional architecture appears largely established, with subsequent development characterized by reorganization, fine-tuning, and remodeling of established circuits and networks.

Human genome social sensitivity ultimately stems from social conditions' ability to influence central nervous system perception of safety and threat [?, ?]. Social environmental processes activate central nervous system processes, affecting peripheral hormones and neurotransmitter activity, regulating gene expression and influencing genetic sensitivity to social environments [?, ?]. Epigenesis refers to continuous gene-environment interactions that alter gene expression in mind, brain, and behavior, with environmental inputs affecting gene expression and causing neural and behavioral changes. Research shows childhood adversity may disrupt normal HPA axis gene function, leading to blunted cortisol responses and weakened stress coping [?, ?]. These early environmental factors interact with biological factors, ultimately shaping susceptibility traits like impulsivity and pessimism. Additionally, ongoing social environments throughout development continuously modify the brain. For example, socioeconomic status (income, occupation, education, neighborhood) affects brain development [?, ?, ?, ?]. Children from lower socioeconomic status families experience less linguistic, social, and cognitive stimulation, with differences in language stimulation quantity and quality correlating with developmental differences in left-hemisphere language-supporting cortical regions. Lower socioeconomic status individuals experience more stress, negatively impacting hippocampus, amygdala, and prefrontal cortex. These socioeconomic differences affect brain development, manifesting as

individual differences in language, information processing, memory, and cognitive structure [?, ?].

Thus, within the same group, differences in genes selected by ancestral environments and personal developmental experiences lead to varied physiological activation and coping styles when facing life events in specific cultural contexts, generating intragroup differences in psychological security.

4 Intergroup Differences in Psychological Security: Environment-Culture-Gene Interactions

Psychological security is not only individual but also collective experience [?, ?]. Since adopting sedentary lifestyles, humans have organized groups according to social behavior patterns constrained by survival forms. Living environments, genes, and behavior patterns continuously interact, manifesting regional differences in personality and psychological phenomena. Intergroup differences in psychological security similarly result from these three-way interactions [Figure 3: see original paper]. We examine these mechanisms through empirical evidence.

Figure 3. Intergroup Differences in Psychological Security and Their Mechanisms
Note: At the intergroup level, group-evolved natural and social environments, cultural adaptation, and group members' genes intertwine and mutually influence each other. These three dimensions of difference drive divergent thinking patterns and behavioral expressions among group members, revealing group-level diversity in psychological security. These elements serve as both ultimate causes formed through human group evolution and proximate causes affecting group members' adaptation to new environments.

4.1 Environment-Gene Interactions

Natural geographical features (terrain, climate) and social environmental characteristics (values, culture) influence thoughts, emotions, and behaviors, contributing to spatial clustering of personality traits and psychological phenomena [?, ?, ?]. This environment-gene interaction also creates geographical differences in psychological security. For example, Wei et al. investigated climate-personality relationships across Chinese and American regions, finding individuals in milder climates showed higher extraversion, agreeableness, and openness, and lower neuroticism compared to those in harsh climates [?, ?]. As warm-blooded animals, humans seek psychologically and physiologically comfortable environments. Mild climates provide psychological security, offering more outdoor exploration and social opportunities that influence personality development; when temperatures are too extreme, people are less likely to venture outside. This aligns with attachment theory: when individuals feel psychologically secure, they are more likely to explore their environment [?, ?]. Similarly, Camperio Ciani et al. investigated personality traits among Italian island resi-

dents, finding islanders showed lower extraversion and openness but higher emotional stability and conscientiousness compared to mainlanders, while emigrants from islands showed higher extraversion and openness [?, ?, ?, ?]. Combining ecological niche and gene flow theory explains this phenomenon: low extraversion/openness and high emotional stability/conscientiousness adapt well to isolated island niches, while maladapted individuals leave, causing allele loss for extraversion/openness in island gene pools. With continued isolation, island residents' personality traits shift toward optimal adaptation to isolated environments. Gene flow and genetic processes adapting to specific social niches create personality differences between island and mainland residents [?, ?]. Regarding national and international differences in aggression and violence, the Climate, Aggression, and Self-control model suggests local adaptations reflected in life history strategies, time orientation, and self-control differences produce violence and aggression variations [?, ?]. Specifically, lower temperatures and greater climatic seasonality require slower life history strategies, greater future focus, and stronger self-control, thereby inhibiting aggression and violence, with correspondingly higher psychological security among populations in such environments [?, ?].

4.2 Gene-Culture Interactions

Recent scholarship has proposed multiple theories explaining gene-culture interactions. Cultural neuroscience integrates cultural psychology, neuroscience, and genetics to investigate cultural differences in psychological, neural, and genetic processes and their bidirectional relationships [?, ?, ?]. Niche construction theory emphasizes organisms' capacity to alter natural selection, thereby directing evolutionary processes for themselves and other species. Human niche formation is determined by a unique, powerful, cumulative cultural knowledge base [?, ?]. The Neuro-Culture Interaction Model suggests repeated participation in cultural practices and long-term cultural immersion helps form new neural pathways or brain activity patterns under cultural modes, enabling seamless execution of culture-related behaviors [?, ?], creating psychological and behavioral differences between populations. According to culture-gene coevolution theory [?, ?, ?], culture drives brain and body evolution along specific directions, shaping human genes. Brain and mental activities result from culture-gene coevolution. When cultural traits are adaptive, gene selection may improve cognitive and neural structures responsible for storing and transmitting these cultural capacities, generating psychological and neurobiological adaptations.

Culture-gene interaction cycles create distribution differences in susceptibility genes across cultures, thereby producing intergroup differences in psychological security. Research reveals substantial allele differences between cultural groups, particularly for the serotonin transporter gene (5-HTTLPR), which shows marked frequency differences along the collectivism-individualism cultural dimension. Collectivist cultures (East Asian samples) are more likely to contain individuals carrying 5-HTTLPR short (S) alleles compared to individualist cul-

tures (European samples) [?, ?]. These genetic differences produce behavioral expression variations: individuals carrying more short (S) alleles show attentional bias toward negative words and images, while those with more long (L) alleles show positive cognitive bias (Note: (S) = 14-repeat short allele; (L) = 16-repeat long allele).

Similarly, culture has changed genes during human evolution. The dopamine D4 receptor DRD4-7R gene relates to novelty-seeking and hyperactive personality; DRD4-7R carriers generally show greater risk-taking [?, ?]. Research indicates DRD4-7R distribution globally aligns with ancestral migration routes: the farther populations migrated from African origins, the higher the DRD4-7R carrier rate. European and Middle Eastern populations show approximately 10-25% carrier rates, while indigenous populations in South America's Amazon basin show approximately 70% [?, ?, ?]. High DRD4-7R rates record our ancestors' great migration history. Moreover, collectivist cultures show lower DRD4-7R proportions, as collectivism demands uniformity while DRD4-7R carriers' restless traits conflict with collectivist culture, leading to gene elimination under collectivist cultural pressure. Additionally, Asians show greater cultural interdependence while Westerners show independence, with DRD4-7R or 2R moderating these cultural orientations. Carriers show greater plasticity to environmental/sociocultural influences, more likely supporting their culture's values [?, ?]. Compared to European Americans, East Asians show stronger interpersonal tendencies and perspective-taking. Research examining gray matter volume (GM) in the temporoparietal junction (TPJ)—a brain region related to social interaction and mental reasoning—found East Asians had larger right TPJ GM volume than European Americans, with this cultural difference more pronounced among DRD4-7R/2R carriers [?, ?].

Beyond collectivism-individualism and interdependence-independence differences, East-West cultural differences appear in thinking habits and values. For example, debate is widely accepted in the West as natural expression, while in Eastern cultures like China, debate is uncommon. Western North Americans receive education and training in exposition and argumentation from kindergarten, focusing on objects themselves as independent entities, tending to express diverse opinions in communication and decision-making. In contrast, Eastern cultures emphasize interdependence between self and others, viewing individual self as part of a whole whose value and meaning must be defined through groups and social roles. Under this view, intense discussion forms like debate may threaten interpersonal harmony, leading Eastern cultures to prefer conflict reduction and consensus-building through seeking common ground [?, ?]. Additionally, East Asians process visual information more holistically, attending to both periphery and central objects, while Westerners process more analytically, focusing on central objects over peripheral context [?, ?].

4.3 Environment-Culture Interactions

Yamagishi and Hashimoto [?, ?] propose that humans are social niche constructors who adapt to and change social environments through creative behaviors and decisions, with institutional development at the core of social niche construction. Institutions incentivize or inhibit specific behaviors, which people follow to maximize social environmental adaptation. To the extent that specific social behaviors (and their underlying psychological mechanisms) serve defensive functions, they become more likely to evolve into prevalent cultural features adapted to the environment [?, ?]. Cultural factors 主要包括价值观、社会规范、社会支持等多个方面，文化的构建、传承和演变也是为了适应特定的环境，保护自身安全。以文化价值观为例，研究认为，面对严酷的经济和自然环境，巨大的心理威胁更可能导致人们倾向于采纳集体主义或优先保护群体的价值观。实证研究结果证实了这一观点。与环境不那么恶劣的地方相比，在气候条件苛刻、自然资源有限的地方，人们表现出更多集体主义价值观 [?, ?]; similarly, regions with higher natural disaster risk show more collectivism than lower-risk regions [?, ?]; regional pathogen prevalence strongly positively correlates with collectivism and negatively with individualism [?, ?]. Facing severe environmental challenges, people need risk-avoidance strategies prioritizing safety, which collective control and isolation effectively provide. Additionally, a study covering 85 countries and 15 Chinese provinces examined three climato-economic habitats and their corresponding social-psychological patterns, revealing: among heat-threatened impoverished populations, freedom is lowest due to constrained choices and actions from harsh environments and scarce resources; among mild-climate populations, freedom is moderate; among heat-threatened wealthy populations, freedom is highest because sufficient economic resources enable exploration, creativity, and quality-of-life maintenance despite harsh conditions, with greater behavioral freedom [?, ?]. This shows environmental and economic differences provide varying psychological security levels while shaping culture adapted to those environments. Collectivist culture, in turn, defends against harsh environments and coordinates limited resources.

Environment and culture intertwine, with social norms largely reflecting intergroup differences in psychological security. The strength of social norms and sanctions for deviance can be described as "cultural tightness-looseness" [?, ?]. Tight cultures have strict normative constraints and low tolerance for deviance, while loose cultures have more flexible norms and higher tolerance [?, ?]. Cultural tightness-looseness similarly adapts to local ecology. Surveys across 33 nations and 50 US states show that compared to low-threat regions, high-threat regions (natural disasters, resource scarcity, infectious disease, conflict, high population density) exhibit stronger cultural tightness, with citizens showing greater caution, impulse control, and self-monitoring. Facing threats, strong norms and low deviance tolerance help coordinate survival actions. Conversely, low-threat regions have more flexible norms tolerating greater behavioral freedom [?, ?]. Tight cultures show higher social stability, lower crime rates, lower drug and alcohol use, lower homelessness, and less social disorder [?, ?, ?], symbolizing higher psychological security. A COVID-19 survey through October

2020 showed countries with strict norms (tight cultures: Japan, China, Singapore) achieved greater success limiting cases and deaths than those with lax norms (loose cultures: USA, Brazil, Italy). Loose cultures had an estimated 4.99 times more cases and 8.71 times more deaths than tight cultures [**?**, **?**]. Strict norm compliance enables large-group coordination to collectively address threats and enhance psychological security.

In summary, within groups, natural and social environments, cultural adaptation, and individual genes interact and mutually influence each other. These three dimensions of difference trigger divergent thinking patterns and behavioral expressions among group members, producing intergroup differences in psychological security. Notably, these represent both ultimate causes affecting group psychological security across human evolutionary time and proximate causes influencing adaptation to new environments, with selective migration causing geographic variation in personality and psychological phenomena [**?**, **?**].

5 Commonalities in Psychological Security: Cognitive and Emotional Dimensions

Despite individual and group differences in psychological security, similarities exist across all individuals and groups. Psychological security activates affective, cognitive, and motivational systems that jointly promote individual growth, well-being, and prosocial tendencies [**?**, **?**]. Cognition and emotion are universal human psychological characteristics enabling similar perceptions and understandings. We synthesize research to understand these common mechanisms [Figure 4: see original paper].

Figure 4. Common Mechanisms of Individual and Group Psychological Security
Note: Different colored circles represent different individuals coalescing into groups. Within groups, members' shared experiences form collective memories that become narrative schemas transmitted across generations. Collective memories preserved in historical records evolve into diverse cultural symbols, providing shared frameworks and meaning for understanding environments and generating cognitive-level psychological security. Simultaneously, positive group communication and interaction strengthen emotional bonds like belonging, cohesion, and cultural attachment, producing emotional-level psychological security.

Group security refers to members' feelings of safety and protection within collectives. Shared negative experiences and emotions constitute primary sources of relationship maintenance and cornerstones of group cohesion and identity [**?**, **?**]. In early human history, people gathered in groups of various sizes, sharing experiences (resisting natural disasters, defending against predators, cooperative hunting) that were widely shared through communication, dynamically constructed, and transmitted across generations via oral traditions, storytelling, and historical records—forming collective memory or narrative schemas. Collective memory can transform individual cognition and evoke group consciousness

[?, ?].

In group living, to reduce uncertainty in physical and social environments and more effectively ensure individual and collective survival [?, ?], people must find shared meaning systems. Collective memories preserved in historical records evolve into diverse cultural symbols, social rules, customs, and laws—different forms of culture (cultural elements or representations) representing shared and learned thought and behavior patterns among group members [?, ?] that provide frameworks for understanding environments. Culture not only promotes social harmony but also provides group members with cognitive security (Sense of Epistemic Security). On one hand, culture, society, and individuals intertwine, with culture providing meaning that promotes social coordination and integration [?, ?]. Culture constrains socially destructive behaviors through norms and institutions, maintaining common interests, social order, and coordination. On the other hand, culture's shared nature provides cognitive security. Individuals acquire and internalize cultural values and norms, enabling social adaptation and functioning [?, ?, ?]. When institutional norms are trusted by citizens, psychological security increases, promoting interpersonal trust with strangers [?, ?].

Culture provides security not only cognitively but also emotionally [?, ?]. Culture has affective value, transmitted across generations to become a secure base for emotional attachment, providing emotional support and protection. Cultural attachment—emotional connections between individuals and cultural groups—brings security [?, ?, ?]. For example, overseas soldiers carry national flags under their uniforms, symbolizing affective cultural attachment. Finally, members within the same society share similar cultural representations, with this shared knowledge helping connect individuals to society [?, ?].

Positive individual-group interactions strengthen emotional connections. Through interaction, feeling others' support, understanding, and recognition while sharing goals, values, and culture enhances group cohesion and belonging. Group interaction provides channels for social identity, making individuals feel they are group members with stronger psychological security. Baumeister and Leary [?, ?] propose humans have a universal motivation to form and maintain lasting, positive, significant interpersonal relationships. This motivation is rooted in ancestral genetic backgrounds, permeating thoughts, emotions, and behaviors. Belonging and identity are core elements of this motivation, with the drive to establish social connections being indispensable to human nature and centrally shaping social interactions and experiences. Additionally, group-provided collective resources and collaborative mechanisms offer security sources. Individual-group interaction also enhances security by establishing trusting and safe social atmospheres. All these promote emotional-level psychological security.

Therefore, collective memories and cultural symbols provide shared frameworks and meaning for understanding environments, generating cognitive-level psychological security, while positive group interactions foster emotional bonds like

belonging, cohesion, and cultural attachment, creating emotional-level psychological security. These cultural and emotional bonds enable different individuals and groups to obtain psychological security through similar mechanisms.

6.1 The Role of Psychological Security in Physical and Mental Health

Over recent decades, numerous benefits of maintaining higher psychological security have been demonstrated. Psychological security importantly and positively impacts physical and mental health [**?**, **?**]. Physiologically, higher psychological security alleviates stress, maintains bodily homeostasis, stabilizes respiration and heart rate, and strengthens immunity. Psychologically, psychological security forms the foundation of mental health [**?**, **?**], promoting positive emotions, enhancing emotional regulation and problem-solving abilities, and fostering emotional stability and psychological well-being. Individuals with higher psychological security more likely experience positive emotions like happiness, satisfaction, and optimism [**?**, **?**]. The broaden-and-build theory of positive emotions suggests positive emotions expand perspectives, build resources, and promote physical and mental health with lasting benefits [**?**, **?**, **?**].

Psychological security also provides resources promoting self and interpersonal health. In personal development, psychological security relates to health, self-esteem, interpersonal trust, and creativity. In team work, psychological security functions as an ecological asset [**?**, **?**], promoting open communication and enhancing cooperation and participation. Research shows psychologically secure individuals can express themselves, voice opinions, and create, integrating self-concept into work. Psychological security improves team efficiency and outcomes by creating safe, comfortable environments [**?**, **?**]. Perceived safety makes people more willing to experiment without fear of mistakes or blame, thereby promoting learning and innovation. Positive psychological security may optimize important daily life situations.

Conversely, lower psychological security causes mental health problems. Lack of control increases illusory pattern perception, even causing individuals to see nonexistent intentions (visual/auditory hallucinations) and perceive conspiracies [**?**, **?**]. When individuals feel psychologically secure after lacking control, they are less prone to illusory patterns. This beneficial security effect is commonly used in psychotherapy, giving clients a sense of control over their lives to reduce over-interpretation of others' harmless behaviors. Additionally, lower psychological security leads to adolescent internet addiction, with individuals immersing in virtual worlds to compensate for lacking real-life security [**?**, **?**, **?**]. Those whose psychological needs are met in reality show lower internet addiction rates [**?**, **?**], suggesting enhanced psychological security may help overcome addiction.

6.2 Strategies for Identifying, Maintaining, and Enhancing Psychological Security

Individual psychological characteristics change over time, making psychological security a dynamic process [**?**, **?**]. Several studies show Chinese college students' psychological security levels declining over time [**?**, **?**, **?**]. Cross-cultural research also reveals COVID-19's global impact on psychological distress and insecurity [**?**, **?**]. Current realities remind us not to neglect psychological security's importance and to address its declining trend. To take necessary measures, we must first accurately identify different individuals' and groups' psychological security levels in specific contexts, where the human development perspective theoretical framework plays a crucial role:

1. **Precise identification of target psychological security levels.** As discussed, individual and group psychological security is influenced by interactions between individual and group development. Counselors or mental health workers can assess clients' psychological security levels in specific problem contexts based on their ethnic/family cultural backgrounds and individual developmental experiences. For example, important life events, developmental environments, and relationships with primary attachment figures may affect psychological security. Additionally, each developmental stage (childhood, adolescence, adulthood) has unique tasks and challenges affecting psychological security differently. Therefore, assessments must comprehensively consider these factors to ensure results are both universal and targeted, providing effective intervention bases.

2. **Group integration to maintain psychological security.** Social identity and experiencing connection to social groups positively impact health and well-being [**?**, **?**, **?**]. According to social identity theory, groups' psychological shaping depends on individuals' incorporation of group characteristics into self-systems [**?**, **?**]—group identity. As a prerequisite for social connection, group identity provides psychological resources for coping with setbacks, changes, and challenges, enhancing feelings of trust, belonging, security, and support, thereby affecting mental health and well-being [**?**, **?**]. Group members help individuals construct self-cognition by transmitting information and providing support. Identity with the group makes people see themselves as collective parts, feeling connected and integrated into larger social networks, cultivating "ontological security" [**?**, **?**]. Perceived similarity with group members predicts shared motivation and security—important group experiences [**?**, **?**]. In families, schools, and workplaces, group identity and belonging help individuals establish solid psychological foundations crucial for cultivating and enhancing psychological security. The "GROUPS 4 HEALTH (G4H)" intervention program, a manualized 5-module protocol providing knowledge and skills for building and maintaining social group relationships, has shown preliminary value in improving mental health problems caused by social isolation or disconnection [**?**, **?**].

3. **Building supportive social relationships to enhance micro-environment psychological security.** Social networks consist of interpersonal relationships; establishing social connections is a fundamental human motivation [**?**, **?**]. Social relationships expose individuals to broad, diverse resources and information, while intimate social support provides experiences of being loved, cared for, respected, and valued [**?**, **?**]. Frequent, close interactions build strong relationship networks that expand into interconnected groups, where individuals feel connected to others. Specifically, establishing intimate relationships [**?**, **?**], harmonious neighborly relations, positive leader-member relationships [**?**, **?**], and good teacher-student relationships [**?**, **?**] through positive social interactions builds trust, cooperation, and mutual assistance to manage, utilize, and enhance psychological security.

4. **Improving social security systems and welfare to enhance overall psychological security when facing economic, health, and social risks.** Building social recreational facilities alleviates anxiety and depression. Reducing social inequality and wealth gaps constructs stable social environments. Establishing sound social service psychological systems is essential. From a human development perspective, each developmental stage has specific needs and challenges. For example, older adults may focus more on health and retirement security, while adolescents may focus more on education and employment opportunities. Therefore, social security and welfare systems should be designed and adjusted for different groups' characteristics to truly meet people's needs and enhance psychological security. Considering social diversification and globalization trends, we should strengthen cross-cultural and cross-group communication and cooperation, promoting resource sharing and circulation to provide richer, more diverse support and opportunities.

6.3 Application of the Psychological Security Framework in Building Diversity and Inclusion Culture

Diversity and Inclusion (D&I) refers to acknowledging, respecting, and appreciating individual differences while creating environments where every member can fully participate and contribute unique value [**?**, **?**, **?**]. These differences may be based on race, gender, sexual orientation, age, physical ability, religion, cultural background, and other factors. Effective D&I strategies go beyond increasing representation to ensure all members feel welcomed, valued, and influential in inclusive environments [**?**, **?**]. As China's socioeconomic development and international prominence grow, strategic demands for internationalization are rapidly increasing across economic, cultural, educational, technological, and diplomatic domains. Meanwhile, domestic regional and social class cultural differences are becoming more pronounced, reflecting individual and group differences in thinking and behavior patterns [**?**, **?**, **?**, **?**, **?**, **?**, **?**]. In this context, the human development perspective psychological security framework holds special

significance for creating diverse and inclusive organizational and work contexts. Understanding subtle differences in psychological security structures and functions across individuals and groups can guide creation of more inclusive environments that meet unique needs and perspectives, thereby improving adaptability, resilience, and innovation:

1. **Workplace inclusion initiatives:** Organizations should recognize individual and group cultural differences in psychological security through inclusive policies ensuring all employees feel valued, heard, and safe. Companies can provide training on cultural competence, implicit bias, and microaggressions for employees and managers, ensuring everyone feels psychologically secure.

2. **Inclusive changes in educational policy:** Schools and universities should cultivate inclusive learning environments respecting and adapting to students' diverse backgrounds. Curricula should include diverse perspectives, educators should receive culturally responsive pedagogy training, and schools should provide programs and resources supporting students' unique needs, such as mentorship programs, support groups, or resource centers for specific populations.

3. **Healthcare service enhancement:** Healthcare can use this framework to provide culturally empathetic services. Health professionals should understand that different cultural and developmental backgrounds may affect patients' psychological security, thereby influencing health status and even treatment outcomes. Health promotion programs can be developed for different cultural groups to enhance their psychological security.

4. **Precision implementation of public policy:** Government departments can implement policies supporting diverse needs of different cultural groups based on this framework, involving efforts to combat discrimination and systemic bias, create equal opportunities, and ensure equitable resource and service access.

5. **Continuous research and evaluation:** Researchers should conduct ongoing studies and evaluations based on this framework to understand diversity experiences and needs related to psychological security across different cultural and personal development backgrounds, guiding intervention, policy, and program development and refinement.

By integrating these recommendations into diversity and inclusion efforts, researchers and practitioners can better predict and meet unique needs of various individual and cultural groups, creating more inclusive and psychologically secure environments for Chinese society and organizations, maximizing high-quality human development.

7 Summary and Outlook

As an important issue in contemporary society and organizations, psychological security's impact on human behavior and mental health receives increasing attention. This paper deeply explores psychological security's differences and commonalities across individuals and groups from a human development perspective, proposing corresponding identification, maintenance, and enhancement strategies, and important applications in building diverse and inclusive cultural atmospheres. These findings have significant theoretical implications for understanding human behavior and mental health, and provide positive references for management practices in families, organizations, and society.

However, future research faces a series of challenges and new directions. For example, with accelerating globalization and deepening social diversification, how to ensure cross-cultural and cross-boundary construction and maintenance of psychological security, and further create diverse and inclusive social and organizational cultural contexts to attract and retain global talent and modern development resources, is an urgent national strategic issue. Additionally, how new technologies and media forms influence and transform our psychological security represents an emerging research area. Future research must also consider more complex social backgrounds, such as social inequality, political turmoil, and environmental change, which may profoundly impact psychological security. To address these challenges, researchers need interdisciplinary approaches combining sociology, management, psychology, and other fields to comprehensively explore psychological security's complexity.

In conclusion, the path of psychological security research remains long and challenging. However, with social progress and technological development, we have reason to believe that through collective effort and exploration, we can more deeply understand psychological security and provide more effective strategies and recommendations for its practical application.

References (as provided in original)

Note: Figure translations are in progress. See original paper for figures.