

# A dual pathway for understanding the relation between wellbeing and resilience

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# A dual pathway for understanding the relation between wellbeing and resilience

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This study investigates the intricate connections between relational wellbeing and individual resilience, through family and community protective factors. As such, we aim to bridge an existing gap in resilience literature by examining the elements that contribute to individual resilience from a relational perspective through a random sample of slum dwellers in Indonesia. To address this research gap, we adopted White's conceptualisation of relational wellbeing and integrated Benard's perspective on individual resilience and applied them using established measures to assess the general population living in slum areas across three Indonesian cities: Bima, Manado and Pontianak. Rigorous confirmatory factor analysis were conducted to establish the validity and reliability of all employed measures. The results of the mediated-path analysis underscore the significance of family protective factors in most relationships between dimensions of relational wellbeing and individual resilience. Notably, the two mediators exhibited distinct effects: the former positively mediated the relation, while the latter demonstrated an inverted mediation effect. These findings significantly enhance our understanding of the nuanced interplay between wellbeing and resilience, particularly regarding the impact of familial and community support on individuals' ability to cope with daily life challenges, especially in disaster-prone areas.

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## Introduction

Resilience has emerged as a key concept for understanding how individuals navigate and adapt to adversity (Miller-Graff, 2022). Broadly defined, resilience encapsulates the capacity to manoeuvre through challenges and exhibit adaptability in the face of adversity (Mguni et al., 2012; Southwick et al., 2014). This concept operates at multiple levels, encompassing community resilience (Kimhi, 2016), family or household resilience (Nguyen and James, 2013; Setiawan et al., 2022), and individual resilience (Benard, 1999). Furthermore, resilience extends beyond the individual or social context to encompass the ability of systems to successfully adapt to emerging challenges (Masten, 2021; Southwick et al., 2014). This versatility has led to the application of resilience across diverse disciplines, ranging from engineering to the social sciences and ecology.

In our swiftly evolving world, the manner in which resilience is embraced plays a pivotal role in shaping the quality of people's life. Individuals across diverse backgrounds encounter daily uncertainties, spanning social changes, unemployment, and poverty, to the far-reaching impacts of climatic changes, like flooding and landslides (Armitage et al., 2012).

Indonesia offers an ideal backdrop for exploring the concept of resilience. The country has undergone significant urbanisation, driven by a substantial migration from rural to urban areas. This phenomenon has compelled individuals at the lower end of the economic spectrum to inhabit densely populated areas with limited public amenities, especially in marginalised locales often referred to as left-behind places or slums. Many of these settlements are situated along riverbanks, exacerbating challenges related to inadequate access to clean water and heightened vulnerability to frequent floods (Rentschler et al., 2021; World Bank Group and Global Water Security and Sanitation Partnership, 2021). Further complicating the situation, these individuals are susceptible to economic and health repercussions, exemplified by the challenges posed by events such as the COVID-19 pandemic (SMERU et al., 2021). Consequently, evaluating resilience becomes an even more pertinent framework for elucidating how residents in slum areas can either adapt or grapple with behaviour adjustments in response to environmental changes.

According to a World Bank report on flood risk management in Indonesia, rapid urbanisation has heightened flood risks in at least three cities: Bima, Manado and Pontianak (World Bank Group, 2018). Each city exhibits a distinct flood risk typology, with Bima susceptible to fluvial and coastal hazards, Manado more prone to pluvial hazards, and Pontianak facing risks from pluvial, fluvial, and coastal flooding. While varying degrees of flood risk exist within each city, it is universally acknowledged that communities with low socio-economic profiles are the most vulnerable (Rentschler et al., 2021). These communities often inhabit or are forced into settlements characterised by subpar infrastructure, including, inadequate drainage networks, poor building quality, and insufficient water installations. Moreover, these settlements tend to have a high population density. Consequently, residents not only grapple with the intensified impact of floods or inundations but also contend with a lack of clean water on a daily basis. Frequently classified as slums (*kawasan kumuh* in Indonesian legal terms) by United Nations (UN) standards (UN-Habitat, 2003), these communities find themselves compelled to reside in such areas to secure housing that aligns with their limited earning opportunities. However, the projected increase in flood risks poses a severe threat to the socio-economic progress of these cities, disproportionately affecting those residing in slum settlements.

Hence, the primary objective of this study is to examine the resilience of individuals residing in Indonesian slums, with a specific focus on scrutinizing their wellbeing. The research is

centred on elucidating individual resilience in slum settlements in Bima, Manado and Pontianak, where inhabitants face daily challenges related to meeting clean water needs and grappling with flood/inundation impacts. Through this investigation, we anticipate that the findings can be utilized to further explore the role of individual resilience in predicting pro-environmental behaviours among individuals managing aquatic challenges.

Moreover, wellbeing emerges as a pivotal element in resilience discussions, with both concepts converging in how individuals generate positive self-evaluations (Hascher et al., 2021). Individual wellbeing is intricately connected to resilience, as higher positive evaluations of one's life have been correlated with stress reduction and an enhanced ability to cope with adversity (Fredrickson and Joiner, 2002). This association is especially pertinent for those residing in slum areas facing daily aquatic challenges. Therefore, delving into individual's wellbeing and its correlation with resilience is a crucial step in comprehending behavioural patterns stemming from their life evaluations and understanding how these patterns relate to their ability to sustain life in settlements prone to aquatic disasters.

Wellbeing encompasses a broad spectrum, extending from personal or psychological wellbeing (Diener et al., 1999) to a more socially and structurally dependent form known as relational wellbeing (White, 2015). In the specific context of our research, many slum dwellers share close connections as relatives or long-time neighbours (Chaudhuri, 2015). Consequently, the theory of relational wellbeing emerges as a fitting framework for our study. According to the theory of relational wellbeing, individuals should be viewed as relational subjects actively participating in their own lives rather than mere objects of others' attention (White and Jha, 2023). This perspective acknowledges that people are influenced by their relationships with others and the material and social contexts surrounding them. These relationships not only shape individuals but also serve as the means through which people address a diverse range of needs. To delve deeper, White (2010) proposed a three-dimensional model of wellbeing, comprising material, relational, and subjective dimensions. Each dimension possesses distinct properties, with the material dimension encompassing assets, the relational dimension consisting of social relations, and the subjective dimension containing individual values and beliefs. These dimensions are interconnected, emphasising that no single dimension can exist in isolation. In essence, relational wellbeing is central to understanding that social relationships are not just social determinants of wellbeing but also a medium that allows wellbeing to thrive and flourish (White, 2015).

This is consistent with Benard's (1999) theoretical claims for individual resilience's dependence on protective factors, such as family and community. With relationality central to individuals' evaluation of their current situations, the expression of their relational wellbeing will emerge from their perceived relationships with their family, community, nature and even public facilities in their living space. As White (2010, p.164) proclaims, "... people become who and what they are in and through their relatedness to others." This, in turn, is expected to affect their individual resilience.

Previous research has identified a range of factors that contribute to individual resilience. This includes social support, organizational engagement and healthy climate (Hascher et al., 2021; Koay and Dillon, 2020; Lester et al., 2020). However, there is very limited research on the factors that contribute to individual resilience among slum dwellers in Indonesia; let alone from the relational wellbeing perspective. This study addresses this gap by investigating the relationship among slum dwellers in Indonesia between wellbeing and individual resilience mediated by

family and community protective factors. We do this by relying on the Resilient Indonesian Slums Envisioned (RISE) project dataset. This is comprised of random samples of slum dwellers living in the cities of Bima, Manado and Pontianak. Together, these cities represent most of the social and water challenges Indonesian cities face nowadays.

The results contribute to the extant literature on resilience, but also offer practical implications for policymakers and practitioners in the field of urban community development. They identify pathways for contributing to resilience among slum dwellers to develop interventions and policies to build resilient community members and improve the wellbeing of people living in prone-to-disaster areas.

In so doing, we constructed the following research question: *To what extent can the relation between relational wellbeing dimensions and individual resilience be explained by family and community protective factors among slum dwellers in Indonesia?*

To explore this relationship for our case study cities in Indonesia, we theorise first on the concepts of individual resilience and relational wellbeing and the intermediary role of family and community and, subsequently, on the applied methodology and analysis.

## Theoretical framework

**Individual resilience.** In the past three decades, resilience has been studied in various settings, from disaster-risk situations (González-Riancho et al., 2015) to individuals with psychological problems, e.g., juvenile substance abuse (Benard, 1999; Paton and Johnston, 2001; Twigg, 2009). Although different settings, these studies all agree that how resilience is expressed is an essential response to dealing with adversity. In the context of disasters, research on resilience has burgeoned, contributing to the development of diverse perspectives on subject. A notable evolution in this discourse is the transition from a focus on individuals' capacity to bounce back to an emphasis on dynamic systems' ability to adeptly respond to emerging challenges (Masten, 2021). The term "system" encompasses a broad spectrum, spanning from regional and community entities to individual homes and even ecological systems (Chapin et al., 2009). While various theories may offer nuanced definitions, a consensus emerges that resilience extends beyond an individual's possession of positive traits or resources. It also encompasses the crucial aspects of whether these positive attributes and resources manifest during the adaptive processes of individuals (Miller-Graff, 2022).

We prioritise the examination of individual resilience due to its pivotal role in shaping an individual's decision-making process when confronting adversity. Research has demonstrated that individual resilience has the capacity to foster a sense of optimism and hope (Benard, 1999), and help individuals in overcoming distress (Ferreira et al., 2020). By adopting a system perspective on resilience, we posit that other forms of resilience, including household and community resilience, arise within and are intricately woven into networked systems of individuals (Masten, 2021). Individual resilience, in this context, signifies the degree to which individuals can collaborate with others, employ problem-solving skills, exercise autonomy to work independently towards common goals, and effectively plan and execute tasks (Benard, 1997). Consequently, when disruptions occur at one level of the system, such as within a family grappling with daily hardships in areas prone to aquatic disasters, the role of individual resilience becomes paramount. Therefore, individuals with high levels of resilience are assumed to form positive social relationships with others, learn new strategies to mitigate risks, and adapt to adverse circumstances by finding innovative ways to meet their daily needs while navigating the risks. In the following section, we

delve into the antecedents of individual resilience, examining them through the lens of protective factors and wellbeing, as elucidated by scholar such as Benard (1991) and Hascher et al. (2021).

**Individual resilience and its protective factors.** Individual resilience delineates the capacity of individuals to bounce back from adverse life events and sustain their functioning at an acceptable level in the aftermath of challenges (Eachus, 2014). According to Benard (2004), resilience is a built-in trait of every individual, constituting an inherent trait that can be moulded and influenced by their social environment. Thus, resilient individuals have distinct characteristics, such as heightened responsiveness, proactivity, and empathy. They often demonstrate prosocial behaviours, showcasing social competence. Additionally, resilience is associated with the ability to think abstractly and a flexibility that allows for the generation of alternative solutions through effective problem-solving skills. Individuals with high resilience further manifest their ability to act independently, establishing a sense of control over their environment, a quality referred to as autonomy. They exhibit hope, a positive orientation towards success, a clear sense of purpose, and an active engagement with the future.

According to Benard (2004), resilience can develop positively over time and result in adaptive behaviours if the environment provides protective factors. The term environment pertains to individuals' closest social systems, specifically their family and community, to which they feel a sense of identification (Bronfenbrenner, 1986). In contrast, protective factors denote the resources that individuals possess, serving as a buffer against the adverse impacts of adversity. Therefore, these protective factors play a vital role in fostering positive adaptation, particularly in the face of elevated levels of risk or difficulty. Benard (2004) claims that family and community provide three things to increase one's resilience, namely: caring relationships, high expectations message, and opportunities to participate and contribute.

Precisely, a family can be defined as a cohesive unit whose membership is typically established through kinship, marriage, and descent. Members of a family commonly inhabit the same dwelling unit, where economic and psychological functions are shared and intertwined (Treuthart, 1991). Family can be a protective factor if individuals can receive good resources from their family. These resources might include: a warm relationship and absence of severe criticism (caring relationships), positive expectations and beliefs from adults (high expectations), and an opportunity to express opinions and have responsibility (opportunities to participate and contribute). In practical terms, caring relationships reflect the degree to which family members embrace and bolster individuals' aspirations. Conversely, high expectations denote the family's confidence in the capabilities of its members. Meanwhile, opportunities to participate and contribute encompass the level of shared quality time and responsibilities between an individual and their family, serving as a means for personal development. If the family provides these conditions, the individual will feel fulfilled in their primary and psychological needs, including: affection, the need for belonging, security, independence, a sense of competence, amongst others. These resources can increase the resilience of the individual. In line with Juang et al. (2018), secure attachment relationships provide a stable sense of security when individuals are stressed and provide resources to bounce back. Individuals with a secure relationship, family closeness and support are more resilient than others because the attachment can help repair mood and regulate emotions. Familial capital also grows resilience because

individuals can learn from their parents how to resolve difficulties (Kovács et al., 2022). Thus, the quality of attachment to family is a significant factor in enhancing individual resilience (Darling Rasmussen et al., 2019).

Regarding the significance of social relations in understanding a community, we adopt the perspective that defines a community as a place where one lives and cultivates meaningful social connections. In Benard's (2004) view, a community can also serve as a protective factor when it cultivates a warm atmosphere and interconnectedness among its members (caring relationship), by establishing expectations and offering guidance in behaviour (reflecting high expectations) and by creating conditions that enhance competencies, foster a sense of belonging, cultivate leadership skills, and promote appreciation for problem-solving and decision-making abilities (opportunities to participate and contribute). People who receive social support, high expectations and opportunities to participate will feel supported and accepted. It enables individuals to be more capable of solving a problem, acquiring insight and to face life's difficulties and crises (Benard, 2004).

People who develop active social participation have been shown to have positive attitudes, such as emotional maturity, self-confidence and persistence that encourage them to exhibit positive environmental behaviour and contribute to their psycho-social wellbeing (Marenco-Escuderos et al., 2020). In other words, having more positive peer relationships (such as greater trust, more communication and less isolation) are likely to be associated with lower anxiety and less depression, increased resilience and better adjustment (Juang et al., 2018). In effect, social capital creates room for resilience development (Kovács et al., 2022).

**Relational wellbeing.** Apart from family and community factors, according to Chaigneau et al. (2022), the level of individuals' wellbeing positively affects the ability to adapt to stress and shocks. We, therefore, argue that relational wellbeing is also a significant resource for resilience, given it is aligned with individuals' relationships with their family and community.

One of the well-known theories of wellbeing is subjective wellbeing (SWB), which complements economic indicators by measuring how individuals perceive their lives in specific circumstances (Diener et al., 1999; OECD, 2011). Despite its popularity, SWB poses challenges, as factors influencing life satisfaction may raise ethical concerns in certain cultures, yet they are crucial for adapting to situations. Another noteworthy theory is psychological wellbeing (PWB), which transcends mere happiness. Rooted in an eudaemonic approach, PWB emphasizes positive relations with others (Ryff, 1995), associating such relationships with warmth, satisfaction, and trustworthiness. Built on the capability approach, PWB suggests that individuals need specific capabilities, including fostering positive relationships, to achieve a good level of wellbeing (Ryff, 1995; White, 2015). On the other hand, relational wellbeing is individuals' evaluation towards their life attainment and is a multidimensional construct that consists of material, relational and subjective dimensions (White, 2015). The material dimension includes resources, such as food, assets, and income, while the relational dimension consists of social and human components. Social aspects encompass how individuals relate to others and their satisfaction with public facilities, while human aspects include abilities, physical health, and personal relationships (White, 2010). The subjective dimension includes the individual's perception of their position in material, social and relationship domains, as well as their cultural values, ideologies, and beliefs.

The most prominent distinction between relational wellbeing and other theories of wellbeing, such as SWB of Diener et al. (1999) and PWB of Ryff (2013), lies in the relationality among the three dimensions. No single dimension can exist without the others (White, 2015). Further, individuals' relationships become central in explaining how they evaluate their lives. These relationships serve as means to meet ends (i.e., material and subjective dimensions) as well as integral parts of the entire life experience, determining their wellbeing (White, 2017). In short, individuals' relationships play a key role in the interconnectedness between the experience of wellbeing and the three underlying dimensions within individuals and their contexts, dimensions that can either foster or undermine wellbeing.

In a similar vein, McCubbin et al. (2013) have conceptualised relational wellbeing as an individual's evaluation of the degree to which they fulfil their own needs and contribute to community needs. This is characterized by a sense of contentment and wellbeing stemming from the belief and competence to overcome adversity, as well as to show respect and harmony with nature and ancestors through cultural practices. Additionally, it involves effective management of financial resources, commitment to family, and access to quality health care. While McCubbin's emphasis on relationships seems to align with White's relational wellbeing, there is a fundamental difference in their approach. White's relational wellbeing is grounded in the ontological approach, which "regards relationality not as an external 'social determinant' or 'social support' (or constraint) to individual subjects, but as fundamentally constitutive of subjectivity" (2017, p.129). In this particular study, we adhere to White's framework as the primary reference. White's conceptualisation provides more detailed insights into how social relationships play a central role in elucidating individuals' wellbeing.

According to White (2010), wellbeing should be considered a process, rather than a state. It involves three interdependent, mutually supportive dimensions that can also be in conflict with one another. To illustrate this, White (2015) draws the process of wellbeing as an interdependence of personal, societal and environmental processes. For psychologists, this can be simply understood by referring to the framework of the ecology of human development proposed by Bronfenbrenner (1986), which includes the chronosystem (personal), mesosystem (family and community), and ecosystem (broader context). For sociologists, anthropologists and other social science disciplines, this can be considered as different structures that underpin individuals' lives (Mische, 2015; White, 2017), including the individual, collective or communities and institutions.

To operationalise this, we adhere to the proposed indicators of dimensions outlined by White (2010), maintaining environmental quality as a consistent construct representing the place of residence. We contend that this choice is highly relevant given our research focus on slum settlements, where living conditions are characterised by limited living space, and the natural and living environment converge into a single space. Although White (2015) did not encourage to operationalise the three dimensions into a strict list of indicators, she proposed a list of properties or indicators as to how these dimensions can be translated in research (see Table 1). For instance, the material can be recorded as the level of income an individual receives and the extent to which they are satisfied with their income (White, 2010). The social can be seen as their social and cultural identities, sense of security in their place of residence and access to public services. Whereas, the personal or subjective dimension can be covered by an individuals' self-concept and personal beliefs, such as religiosity, which, within this context, explores the influence of individuals' religious beliefs on their daily experiences. For instance, it examines the extent to which individuals perceive



**Table 1 Relational wellbeing dimensions as suggested by White (2010).**

Dimension	Subjective aspects (but not limited to)
1. Material	Evaluation of one's income Evaluation of one's standard of living in comparison to others Evaluation of one's current standard of living in comparison to their past Evaluations towards safety and respect in their place of residence Satisfaction with access to services Evaluation towards treatment received
2. Relational or social	
3. Subjective or human	Self-concept Sense of competence Religiosity

their religious beliefs as affecting their methods of coping with adversity in daily life.

Expanding upon the theory proposed by White's (2010), we have formulated a definition of relational wellbeing as individuals' ongoing evaluation of their achievements, encompassing material (e.g., satisfaction with their current income), subjective (e.g., their religious beliefs and personal development), and relational dimensions (e.g., their family and community involvement, and security and competition). At a glance, several properties of the dimensions within relational wellbeing may seem self-centred, as exemplified by satisfaction with the current income. However, taking into account the theoretical assumptions of White and Jha's (2023) that individuals are equipped with personal aspirations and possess a natural inclination to integrate these aspirations into their social relationships, these seemingly self-centred properties are indeed socially oriented. White (2015) illustrates, for instance, that achieving economic success contributed to greater harmony within the families she studied in India. Therefore, within the realm of relational wellbeing, evaluating one's life cannot simply be extracted from how they are doing in their career or in their community performance, but it must also consider how individual achievements impact their familial relationships.

**Community resilience.** We acknowledge that dealing with daily hardships in flood-prone slum areas requires more than just individual resilience. The ability of a community to withstand, recover from, and adapt to these challenges, often referred to as community resilience (Eachus, 2014; Nguyen and Akerkar, 2020), is essential for ensuring that individuals receive adequate support from their community. At the same time, the resilience of a community is also directly linked to the resilience of its individual members. If a substantial portion of individuals within a community lack resilience, it is highly unlikely that the community as a whole will be resilient. After all, the function of a community is not defined merely by its physical structures or location, but rather by the individuals who reside there. Since individuals do not live in isolation but are part of dynamic interactions within their community (Berkes and Ross, 2013), it is imperative to also consider community resilience to better understand its relationship with individual resilience in the face of daily hardships.

Recent research suggests that community resilience should be approached from a multi-dimensional perspective, encompassing interactions with local government and non-governmental organizations (NGOs), the natural environment, social, economic, and physical infrastructure. Using the Climate Disaster Resilience Index (CDRI) framework, we define community resilience as the community's capacity to absorb daily challenges

and mitigate them to sustain life (Joerin et al., 2014). This is assessed through five dimensions: physical (e.g., access to electricity, clean water), social (e.g., poverty rate, educational level), economic (e.g., income and saving), institutional (e.g., interaction with local figures), and natural (e.g., severity of natural hazards). These dimensions are selected because our study context not only pertains to urban slum living but also to urban slums with heightened flood risks (as evidenced in the report by Rentschler et al., 2021). We anticipate a positive relationship between the dimensions of community resilience and individual resilience.

**The relations between relational wellbeing dimensions and individual resilience via individual's relationship with family and community.** Based on the aforementioned theoretical claims, we can safely conclude that individual resilience relies on multiple layers of society in which people live. By considering the different dimensions of relational wellbeing, we can further explain individuals' resilience. Specifically, we learn that individuals living in slum areas who have material assets, social connections and the capacity to act collectively with others, are more likely to have higher resilience (see Chaigneau et al., 2022; Gillam and Charles, 2018). In addition, Schwalm et al. (2022) suggested that religious belief is one crucial factor related to resilience. People are more likely to be resilient in facing difficulties in life if they receive support from religious organizations. The opportunity to access public facilities is also essential to practice their beliefs and to support them when dealing with difficult times. These help individuals to develop a positive self-concept, which has been shown to improve general psychological attributes, such as resilience (Katsumata and Mohanan, 2020). Therefore, we hypothesized that *the relational wellbeing dimensions operationalized by participation in family and community, security and competition between groups, material satisfaction, social access and facilities, religiosity and self-concept are positively related to individual resilience (H1).*

The extant literature has shown that family and community factors provide protective resources for individuals in times of adversity. When individuals feel that their social relationships provide positive interaction and respond positively to their needs, they will show empathy, be more responsive and freely communicate their needs (Miller-Graff, 2022). Furthermore, when individuals feel that their communities provide alternative solutions to solve their problems (e.g., employment choices), people are given a chance to think independently about choosing the right decision to deal with their problems (Southwick et al., 2014). While all these resources may be taken for granted in mundane life, scholars agree that these are essential factors helping people develop their resilience and that will come evident in times of adversity, including in overcoming daily hardships (Benard, 1991; Miller-Graff, 2022). In particular, within a slum or disaster-prone community, people who cultivate social competence, problem solving skills, a sense of purpose and future, and autonomy are expected to exhibit swifter recovery following a flood disaster and are more likely to develop pro-environmental behaviours aimed at mitigating flood risks (Chaigneau et al., 2022; Kimhi, 2016).

In the meantime, individuals' evaluation towards their life achievement so far is expected to relate to the individuals' evaluation towards their relationships with family and community. Those who perceive themselves as capable of achieving their aspirations independently, without excessive reliance on others' assistance, while also recognising the significance of their social relationships – such as consulting with family members on important life decisions – are likely to evaluate their relationships

with family and community positively. Consequently, individuals are likely to perceive that they receive the necessary conditions, e.g., warm and caring relationships, to allow them to develop a desired level of individual resilience. This all implies a mediational role of protective factors in the direct relationship between relational wellbeing dimensions and individual resilience. Therefore, we hypothesize that family (H2) and community relationship (H3) positively mediate the relationship between relational wellbeing dimensions and individual resilience.

## Methods

The current study uses a dataset from the RISE project focused on the relations between water management, wellbeing, and resilience. The project investigates the complex interactions between water management and adaptability among people living in slum areas. This interdisciplinary initiative addresses a range of critical issues, encompassing relational wellbeing, individuals' interactions with local stakeholders, resilience, and individual livelihoods. The dataset and its documentation are publicly available through a data repository platform (Setiawan et al., 2022). We provide only a brief explanation of research locations, participants and measures employed to answer the research question.

**Purposive selection of research locations.** The study investigates the relationship between relational wellbeing dimensions and individual resilience considering the resilience protective factors among individuals living in vulnerable and disaster-prone areas in Indonesia. The country has many water-related threats that often remain unaddressed (World Bank Group and Global Water Security and Sanitation Partnership, 2021). One approach to addressing these issues is to concentrate on slum areas, which are frequently considered as disaster-prone communities. These are mostly situated along riverbanks or sea shorelines that characteristically have poor disaster mitigation systems. We selected three Indonesian cities (Bima, Manado and Pontianak) facing increasing risks of water-related disasters, according to the latest World Bank report (Rentschler et al., 2021). These are medium-sized cities that represent diverse stages of development and unique challenges, encompassing most of the social and water-related issues encountered by urban populations in Indonesia. After purposely choosing the cities, we selected districts according to the Mayor's identification of slum settlements in each city (Dinas PUPR Kota Bima, 2019; Provinsi Kalimantan Barat, 2020; Provinsi Sulawesi Utara, 2021). To offer a comprehensive insight into the locations, we will provide a description of the three cities based on their geographical locations and past experiences with flood disasters.

Bima, situated downstream from an upstream river outlet, has an elevation of 2–20 metres above sea level (Putra, 2016). The selected research area was located in the Rasanee Barat district, specifically the Rontu watershed which consists of two sub-watersheds: Padolo and Melayu, each with one primary river, Sori Pedolo, and Sori Melayu, respectively (Rohmat et al., 2022). From the Rasanee Barat district, we purposely selected Paruga and Sarae sub-districts which fall within Padolo sub-watershed. During our research along the riverbanks, we observed a high population density and noticeable garbage accumulation, particularly in the downstream area. Additionally, we were informed by the locals that there has been no clean water available in one neighbourhood community in Paruga for the past seven years. The residents primarily depend on shallow wells for their water supply, typically reaching depths of around six metres. Deeper wells are often impractical as they tend to yield brackish water. Groundwater remains a primary water source, accessed through drilled wells in houses, although some households use refillable

containers for drinking and cooking. In 2016, Bima faced significant floods, reaching three metres in height, causing road closures, and disrupting electricity and communication infrastructure (Nurlatifah et al., 2018). More recently, in 2021, flash floods occurred and affected 1930 households in Bima (Syarifudin, 2021).

In the case of Manado, the city is characterized by a sloping plain that encompasses approximately 78.51% of its area. The elevation of this plain varies from sea level to 240 metres (Badan Pusat Statistik Kota Manado, 2022). The city has three primary watersheds, namely Paniki, Sario and Tondano, that discharge into the city's coastal areas (Rohmat et al., 2022). For the study, we purposely selected Wawonasa and Titiwungen Utara sub-districts within Tondano and Sario watersheds. Unlike Bima, Manado has a more developed water infrastructure which is managed by the government's state water company (*Perusahaan Air Minum* [PAM]). However, despite the extensive network, water availability often falls short, and water quality remains below standards. PAM services are also found to be frequently inaccessible in the more elevated areas. In 2022, a report noted cloudy and odorous water from PAM (Rohmat et al., 2022). Therefore, residents in high-elevated areas tend to rely on well water for domestic needs. In 2014 and 2022, Manado faced national attention due to flash floods, causing substantial damages to infrastructure and housing (Sabu, 2022).

Subsequently, Pontianak is situated at 0.1–1.5 metres above sea level. The city is well known for its network of ditches and susceptibility to flooding during high tide events (Badan Pusat Statistik Kota Pontianak, 2022; Rokib, 2021). The city is traversed by the Kapuas River. We selected Tambelan Sampit and Sungai Jawi Luar sub-districts, where a significant residential portion is along the Kapuas riverbanks. During the dry season, the Kapuas River maintains a normal discharge, but during the rainy season, flooding frequently occurs, with existing ditches helping water recede within an hour. However, a study by Purnomo et al. (2019) highlighted that flooding could reach up to the height of one-story houses, particularly on riverbanks. In Tambelan Sampit, a waterfront was constructed in 2016 to mitigate flood risks (Jawapos, 2017). Residents rely on rainwater and river water, despite poor quality characterized by its dark and murky appearance (Rohmat et al., 2022).

In short, all three locations face geographical challenges worsened by inadequate water facility and flood mitigation infrastructures, particularly in the slum settlements. This has also been documented in the World Bank report that highlights the cities' integrated flood risk management and practices (for full details, see World Bank Group, 2018).

**Random selection of participants.** Data collection took place between November 2021 and February 2022. We initially aimed to conduct random sampling based on the population registry. However, due to incomplete and outdated registry, we used a 'random walk' method to select a sample of adults aged 18 years and above from the general population of each city to be interviewed. Other criteria used for the sampling was a minimum residency of at least five years in the area. This requirement was implemented to garner a more profound understanding of individual's flood experiences and the challenges they face in meeting their need for clean water. The procedures were as follows: First, the research team selected areas in each city that were considered slums, based on the respective mayoral decrees on slum settlements (Dinas PUPR Kota Bima, 2019; Provinsi Kalimantan Barat, 2020; Provinsi Sulawesi Utara, 2021). Then, they purposely selected sub-districts with higher exposure to water-related problems, such as pollution and frequent floods.

**Table 2** Descriptive statistics of participants on all measures.

Predictors	Range	Bima		Pontianak		Manado		F test
		M	SD	M	SD	M	SD	
Individual resilience	1-6	3.83	0.43	4.38	0.28	3.65	0.33	$F(2,697) = 304.10$
Family & community participation	1-6	4.72	0.57	5.09	0.21	5.05	0.71	$F(2,697) = 35.47$
Security & competition	1-6	2.86	1.05	2.47	0.40	2.70	1.73	$F(2,697) = 7.83$
Subjective material wellbeing	1-6	4.08	0.73	3.49	0.62	4.32	0.84	$F(2,697) = 87.26$
Social & facility satisfaction	1-6	4.40	0.67	4.70	0.55	4.86	0.79	$F(2,697) = 24.96$
Religiosity	1-6	4.46	0.72	4.89	0.47	4.94	0.80	$F(2,697) = 32.90$
Self-concept	1-6	4.05	0.60	4.18	0.56	4.76	0.74	$F(2,697) = 74.92$
Family protective factor	1-6	4.54	0.71	4.59	0.48	4.90	0.72	$F(2,697) = 19.34$
Community protective factor	1-6	4.09	0.74	3.94	0.46	4.72	0.77	$F(2,697) = 91.02$
Individual characteristics								
Age	18-76	45.54	12.71	40.92	10.63	43.60	11.99	$F(2,697) = 9.80$
Gender (female as reference)	0/1	0.23	0.42	0.50	0.50	0.33	0.47	-
Physical	1-3.5	1.78	0.55	2.47	0.53	2.74	0.49	$F(2,697) = 176.73$
Social	1-5.5	2.46	0.94	2.34	0.89	2.26	0.69	$F(2,697) = 2.73$
Economic	-	1.49	0.47	2.02	0.46	1.87	0.45	$F(2,697) = 78.17$
Institution	1-6	2.10	0.50	2.24	0.84	2.74	1.20	$F(2,697) = 29.82$
Natural	0-1	0.60	0.23	0.29	0.22	0.19	0.30	$F(2,697) = 137.60$

Bold indicates significance at  $p < 0.05$ .

Second, the team obtained research permits and performed the 'random walks' by selecting a starting point near the local government office (e.g., sub-district office). Subsequently, we used a dice roll to determine the house to approach from the starting point, for example, selecting the second house. This number also served as an interval for moving to subsequent households until we reached our target sample size. If multiple eligible participants were present within a household, we selected the participant with the nearest birthdate to the survey date. Each selected participant was provided with brief information about the study and was asked for their active informed consent. The survey successfully reached out to 920 individuals but only 700 were able to participate: 300 from Pontianak and 200 each from Bima and Manado (see Table 2). Overall, the response rate is 76.42%.

**Measures.** This section elucidates the measures for individual resilience and relational wellbeing dimensions, as well as the two protective factors of individual resilience, namely family and community factors. To validate these measures, we conducted confirmatory factor analysis (CFA) procedures utilising the following criteria: (1) we employed maximum likelihood (ML) estimation to confirm the relationships between factors and the configuration of measured indicators or items (Schmitt, 2011); (2) we utilised a combination of fit indices, specifically the Comparative Fit Index (CFI) and the Standardized Root Mean Squared Residual (SRMR), to assess the goodness of fit of the model. According to Hooper et al. (2008), a CFI exceeding 0.90 and a SRMR less than 0.08 indicate a valid model; (3) we adhered to Peterson's (2000) recommendation for factor loading coefficients and set our threshold at a minimum of 0.40. We employed the 'lavaan' package in R to run the CFA (Rosseel, 2018); (4) Finally, we provide a description of the questions utilised to capture community resilience and individual characteristics.

**Individual resilience.** We employed a measure of individual resilience based on Benard's (1991, 1999) conceptualisation, which encompasses four attributes: social competence, problem-solving skills, autonomy, and a sense of purpose and future. Since individual resilience is considered a trait by Benard (2004), the scale measures such dimensions in a general context but is

applicable in various contexts. In detail, social competence dimension is concerned with the extent to which participants show appropriate social behaviours with items, such as "I am able to work with someone whose opinions differ from mine" and "I am able to defend my rights without offending others". Next, the problem-solving skills dimension is focused on items that ask to what extent participants are able to think abstractly and be flexible in solving problems, such as "I can change the plan, if the plan fails" and "I try to solve a problem by discussing it with others". Furthermore, the autonomy dimension refers to the extent participants are able to act independently and have a sense of control of their surroundings, with items such as "I can complete the task assigned to me" and "I take the initiative to solve problems that arise". Finally, sense of purpose and future focuses on the extent to which participants show hope and engage in their future planning, with items such as "I have realistic plans and goals for my future" and "Adversity in life makes me desperate (negative item)".

Initially, we started with 16 items distributed equally in four dimensions. The confirmatory factor analysis (CFA) found the measure is better suited as a two-factor scale. This was achieved by removing two items, one step at a time. The dimension of social competence was merged with problem solving, and the autonomy dimension was merged with a sense of purpose for the future. The two-factor scale sat well with the data as shown by the acceptable level of fit indices: CFI = 0.92, root mean square of approximation (RMSEA) = 0.09 and the standardized root mean squared (SRMR) = 0.05, which, according to Hu and Bentler (1999), can be considered valid. We obtained nine items for the social competence and problem-solving dimension and five items for the autonomy and sense of purpose and future dimension. These items had a moderate level of factor loadings, ranging from 0.49 to 0.65 (see Appendix 1 for a comprehensive overview of the validated measure).

Fornell and Larcker (1981) suggested average variance extracted (AVE) values can be used to assess convergent and discriminant validity. In terms of convergent validity, the two dimensions had AVE values of 0.31 and a composite reliability (CR) of 0.80 for social competence and problem-solving dimension, and AVE of 0.67 and CR of 0.91 for autonomy and sense of purpose and future dimension. For convergent validity,



the AVE value should be greater than 0.50. Whereas for discriminant validity, the AVE values should be greater than the correlation coefficient between other constructs (see Table 2). However, when the value is lower, but is accompanied with a CR of at least 0.60, then the dimension can still be considered valid.

Finally, the two-factor scale was shown to be reliable across samples, with  $\alpha = 0.91$  for both dimensions. Later in the analysis, we computed the score of individual resilience by adding all the dimensions and divided them by the number of items ( $N = 14$ ) to maintain the score within its scale range.

**Relational wellbeing.** The measure for relational wellbeing was developed by the authors using White's (2010) theoretical framework on relational wellbeing, which delineates three primary overarching dimensions: subjective, material, and relational or social. The scale measures individuals' evaluation towards their achievement which revolves around these dimensions. The material dimension encompasses aspects such as satisfaction with their current income, the subjective dimension includes factors such as religiosity and self-concept, and the relational dimension involves aspects such like family and community involvement, as well as security and competition (White, 2010). The scale was initially developed by Riasnugrahani et al. (2022) using the same dataset as the study. In the initial phase, they generated 58 items to measure various constructs, such as "I am a hard worker" to measure self-concept, "Practicing religious rituals is a way to get me strong in living through adversity" and "My religious beliefs have a great deal of influence on how I relate with others" to measure religiosity, "I can spend quality time with my family" to measure family and community involvement, and "I feel comfortable living in this neighbourhood" to measure security and competition. All these statements were rated on a six-point Likert scale that ranges from 1 "strongly disagree" to 6 "strongly agree". Higher scores indicate more positive evaluations.

In its initial development, all items were combined using principal axis factoring to identify common variance among all items and unique variances between emerging factors (Schmitt, 2011). Their results demonstrates that, instead of three broad dimensions, the measure consists of six dimensions, namely: (1) family and community participation, (2) security and competition, (3) subjective material wellbeing, (4) public facility satisfaction, (5) religiosity and (6) self-concept. When compared against the subjective aspects of the relational wellbeing dimensions proposed by White (2010), we can categorize that

family and community participation, security and competition, and public facility satisfaction fall within the relational dimension. Subjective material wellbeing, as its name indicates, refers to the material dimension. Whereas religiosity and self-concept fall within the subjective dimension.

Specifically for this study, we used CFA to validate the relational wellbeing scale that was developed earlier. The CFA model fits the data well with a slight adjustment to the number of factors. Since we started out with The six-factor scale showed an acceptable level of fit indices: CFI = 0.91, RMSEA = 0.08 and SRMR = 0.07 (Hu & Bentler, 1999). Each dimension also showed moderate to high level of unstandardized factor loadings, ranging from 0.46 to 1.17. We also calculated alpha Cronbach to determine the reliability of each dimension. All dimensions showed a high level of reliability, ranging from 0.80 (self-concept) to 0.95 (security and competition). In total, we used seven items for family and community participation, five items for public facility satisfaction, four items for security and competition, as well as subjective material wellbeing and self-concept, and three items for religiosity.

**Protective factors.** According to Benard (2004), resilient people require a good family and community to protect them when they experience adversity. Protective factors are social system of individuals that reduce the likelihood of negative outcomes and help the development of resilience in individuals. Family and community are the two main protective factors shown to buffer the negative effect of a given adversity. Family and community with warm and caring relationships, high expectations and providing opportunities to participate will increase individual resilience.

Based on Benard's (1991) findings on the aspects of protective factors, the scale measures to what extent individuals perceive their family and community they belong to provide caring, high expectation and opportunity to participate (Benard, 1991). We asked statements, such as "My family recognizes when I have problems" to measure caring in the family and "My family believes that I will succeed in life" to measure high expectation in the family. While statements such as "Apart from my family, the people around me care about me" was used to measure caring in the community, and "Apart from my family, other people encourage me to do my best" was used to measure high expectation in the community. All statements were rated on a

**Table 3** Bivariate correlations among constructs.

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Individual resilience	1	<b>0.28</b>	<b>-0.18</b>	<b>-0.25</b>	<b>0.07</b>	<b>0.23</b>	0.01	<b>0.12</b>	<b>-0.21</b>	0.01	<b>0.15</b>	<b>0.26</b>	<b>-0.11</b>	<b>0.23</b>
2. Family & community participation		1	<b>-0.21</b>	<b>0.25</b>	<b>0.35</b>	<b>0.45</b>	<b>0.36</b>	<b>0.43</b>	<b>0.26</b>	<b>0.25</b>	<b>0.09</b>	<b>0.26</b>	<b>-0.08</b>	<b>-0.08</b>
3. Security & competition			1	0.01	<b>0.10</b>	<b>-0.12</b>	<b>0.08</b>	<b>0.09</b>	<b>0.21</b>	<b>-0.02</b>	<b>-0.21</b>	<b>-0.18</b>	0.01	<b>-0.07</b>
4. Subjective material wellbeing				1	<b>0.21</b>	<b>0.15</b>	<b>0.41</b>	<b>0.32</b>	<b>0.34</b>	0.06	<b>0.16</b>	<b>0.13</b>	0.01	<b>-0.01</b>
5. Public facility satisfaction					1	<b>0.39</b>	<b>0.35</b>	<b>0.47</b>	<b>0.39</b>	<b>0.25</b>	<b>-0.05</b>	0.04	<b>-0.01</b>	<b>-0.32</b>
6. Religiosity						1	<b>0.42</b>	<b>0.28</b>	<b>0.12</b>	<b>0.23</b>	<b>0.13</b>	<b>0.28</b>	<b>-0.02</b>	<b>-0.07</b>
7. Self-concept							1	<b>0.50</b>	<b>0.48</b>	<b>0.30</b>	<b>0.08</b>	<b>0.19</b>	0.01	<b>-0.25</b>
8. Family protective factor								1	<b>0.68</b>	<b>0.15</b>	0.00	<b>0.13</b>	<b>-0.03</b>	<b>-0.20</b>
9. Community protective factor									1	<b>0.21</b>	<b>-0.06</b>	<b>-0.03</b>	<b>-0.01</b>	<b>-0.38</b>
10. Physical										1	<b>-0.06</b>	<b>0.16</b>	0.05	<b>-0.31</b>
11. Social											1	<b>0.27</b>	<b>-0.11</b>	<b>0.11</b>
12. Economic												1	<b>-0.06</b>	<b>-0.08</b>
13. Institution													1	<b>-0.04</b>
14. Natural														1
AVE		0.31	0.25	0.80	0.55	0.42	0.41	0.37	0.42	0.52	-	-	-	-

<sup>a</sup>Bold indicates significance at  $p < 0.05$ . AVE values are written in diagonal corresponding to its construct.

six-point Likert scale. Table 3 provides the correlations between all measures employed in the study.

We conducted a CFA to test the validity of family and community protective factor measures. We first used a six-factor scale - with three factors for each level of protective factor. Several CFA runs confirmed a four-factor scale was better. High expectations were merged with caring relationships at the family and community levels meaning each protective factor for family and community had two dimensions, namely: (1) Caring and expectation and (2) opportunity and participation. The CFA shows a good-fit model:  $CFI = 0.90$ ,  $RMSEA = 0.09$  and  $SRMR = 0.04$ . All factors also were shown to have high level of reliability, with  $\alpha$  ranging from 0.87 (opportunity and participation from community) to 0.93 (caring and expectation from family). In total, we had eight items for caring and expectation from family relationship, six items for caring and expectation from community relationship, three items for opportunity and participation from community, and three items for opportunity and participation from family.

Later, we computed the composite score because the two dimensions have been demonstrated to be concomitant with each other in explaining a protective factor, and thus, both dimensions contribute in the same direction towards identifying each protective factor. A higher score indicates a stronger protective factor (Benard, 1991). We computed the composite score for each protective factor by calculating the average of the scores of all items (in each protective factor). The outcome yielded a single score for each family and community protective factor.

**Community resilience.** Using a CDRI framework (Joerin et al., 2014) as a guide to community resilience, we composed a measure assessing the five dimensions of community resilience based on relevant items available in the dataset. These dimensions include physical, social, economic, institutional, and natural aspects. The framework has been previously employed in studies assessing a city's resilience to disasters in Asian contexts, such as Kuala Lumpur, Malaysia (Wan Mohd Rani et al., 2018) and Chennai, India (Joerin et al., 2014).

In this study, the physical dimension pertains to the accessibility of public facilities, such as distance to a sub-district office, health centre, and hospital, as well as access to electricity, water resources, and sanitation facilities (Joerin et al., 2014). Items like "Minutes taken to reach a public health centre" and "Main source of lighting" represent the physical dimension. The social dimension focuses on the level of education and poverty rate. Items such as "Highest level of education completed" and "Proof of being below poverty rate" reflect the social dimension. The economic dimension encompasses household income, savings, and assets, such as motorcycles and refrigerators. Items like "Does any family member have savings in the form of money or goods?" and "Does this household own a motorcycle?" represent the economic dimension. The institutional dimension relates to individuals' social interactions with local key figures and their evaluation of the impact of these figures (Kulig and Botey, 2016). Items like "Frequency of interaction with the head of the neighbourhood community" and "Perceived impact of the neighbourhood head" represent the institutional dimension. Lastly, the natural dimension considers individuals' experiences and expectations regarding flood disasters, river contamination, and access to clean water. Items such as "Has flooding disrupted daily activities in the past five years (2016–2021)?" and "Do you expect flooding to disrupt daily activities in the next five years (2016–2021)?" represent the natural dimension. Participants were asked to evaluate all the aforementioned indicators, and higher scores indicate higher levels of resilience. The analysis was

conducted based on the mean scores reported across all dimensions.

**Individual characteristics.** We assessed demographic information to ensure the relations under study would not be affected by individual characteristics. This covered participants' age, gender, education and income levels as control variables. Age and gender measures were straightforward questions. Educational levels were determined by asking people's highest level of education completed. This ranged from 1 for "Did not go to school" to 10 for "Doctoral degree". Income levels were positioned by asking participants to estimate their average monthly income. This ranged from 1 as having "Lower than Rp. 1,000,000" to 10 as having "Larger than Rp. 10,000,000".

## Results

To address our hypotheses, we performed a parallel mediation analysis using the lavaan package in R (Rosseel, 2018). This analysis is commonly employed to simultaneously test the coefficients of two or more mediators that independently predict the outcome variable (Agler and De Boeck, 2017). Table 1 provides the results of descriptive analysis that show significant differences between the three cities in terms of participants' resilience  $F(2,697) = 304.10$ ,  $p < 0.05$ . Pontianak had the highest level of individual resilience, whereas Manado comes last. We also observed significant differences in all other employed measures. Manado had a much higher level of income ( $M = 7.99$ ,  $SD = 18.56$ ) but, in relation to the level of resilience, they had the lowest level ( $M = 3.65$ ,  $SD = 0.33$ ).

Table 4 provides the initial pathway of the relationship between relational wellbeing and resilience (path  $c'$  on individual resilience). We discovered partial evidence supporting the hypothesis that there are positive associations between relational wellbeing dimensions and individual resilience ( $H1$ ). Specifically, we found that only family and community participation ( $b = 0.18$ ,  $p < 0.001$ ) and public facility satisfaction ( $b = 0.07$ ,  $p = 0.01$ ) were positively correlated with individual resilience. Based on these findings, we assert that  $H1$  is partially supported.

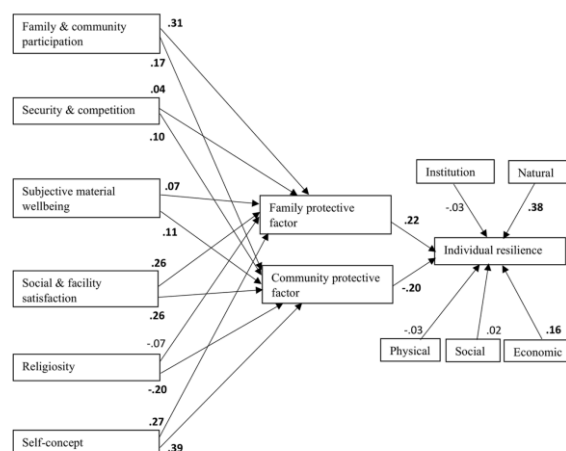
Furthermore, while controlling for age, gender, and community resilience dimensions, Table 4 illustrates the indirect relationships between relational wellbeing dimensions and individual resilience through family and community protective factors. The family protective factor was found to positively mediate most of the relational wellbeing dimensions and individual resilience, except for religiosity dimension ( $b = -0.01$ ,  $p = 0.06$ ). Therefore,  $H2$  is predominantly supported. Additionally, we computed the effect size for each significant indirect effect through the family protective factor using MBESS package in R (Preacher and Kelley, 2011). Using Cohen's benchmarks to interpret effect size, all the significant indirect effects were found to have a small effect size, ranging from 0.01 to 0.06 (Fairchild et al., 2009).

Meanwhile, we observed an inconsistent mediation model (Mackinnon et al., 2000): The community protective factor was found to negatively mediate all the relations between relational wellbeing dimensions and individual resilience, except for religiosity ( $b = 0.04$ ,  $p = < 0.001$ ). This finding does not confirm  $H3$ . Interestingly, this particular protective factor is associated with individual resilience ( $b = -0.20$ ,  $p = < 0.001$ ). However, when considering Cohen's effect size definition, the inverse effect size is considered small to medium (Fairchild et al., 2009). Hence, even when individuals have positive relations between their relational wellbeing dimensions, such as their family and community participation and religiosity, and their individual resilience, those who are actively involved in their community may experience a decreased level of individual resilience.

**Table 4 Mediation effect of protective factors on the relation between relational wellbeing dimensions and individual resilience.**

Variables	Path c' on individual resilience	Path b on individual resilience	Path a on b1 (family protective factor)	Path c (indirect effect through b1)	Path a on b2 (community protective factor)	Path c (indirect effect through b2)
Family & community participation	<b>0.18</b>		<b>0.31</b>	<b>0.07</b>	<b>0.17</b>	<b>-0.03</b>
Security & competition	-0.02		<b>0.04</b>	<b>0.01</b>	<b>0.10</b>	<b>-0.02</b>
Subjective material wellbeing	<b>-0.21</b>		<b>0.07</b>	<b>0.02</b>	<b>0.11</b>	<b>-0.02</b>
Public facility satisfaction	<b>0.07</b>		<b>0.26</b>	<b>0.06</b>	<b>0.26</b>	<b>-0.05</b>
Religiosity	0.03		-0.07	-0.01	<b>-0.20</b>	<b>0.04</b>
Self-concept	0.04		<b>0.27</b>	<b>0.06</b>	<b>0.39</b>	<b>-0.08</b>
Family protective factor		<b>0.22</b>				
Community protective factor		<b>-0.20</b>				
Age	<b>-0.00</b>					
Gender (female as reference)	0.06					
Physical dimension	-0.03					
Social dimension	<b>0.02</b>					
Economic dimension	<b>0.16</b>					
Institution dimension	-0.03					
Natural dimension	<b>0.38</b>		<b>0.40</b>		<b>0.36</b>	
R <sup>2</sup>	<b>0.38</b>					

Bold indicates significance at  $p < 0.05$ .



**Fig. 1 Multi-mediation analysis on the relation between relational wellbeing dimensions and individual resilience via protective factors of individual resilience.** \*Bold indicates significance at  $p < 0.05$ . Path  $c$  (IV-DV) is omitted for the sake of visibility.

Additionally, we noticed that the indirect relationship between religiosity and individual resilience via community protective factor remains positive ( $b = 0.04$ ,  $p = < 0.001$ ). Further calculations were conducted to test whether the presence of a weaker community protective factor reduces the positive relation between religiosity and individual resilience. The results are presented in Appendix 2. Here, we find that there is a negative interaction between religiosity and the community protective factor on individual resilience ( $b = -0.11$ ,  $p = < 0.001$ ). In other words, the slope of the relationship between religiosity and individual resilience is decreased by the negative interaction.

In addition, our analysis indicates that gender is not significantly associated with individual resilience. However, the findings reveal that age is negatively correlated with individual resilience ( $b = -0.00$ ,  $p = 0.003$ ). However, the coefficient is too small so we should be careful in inferring such relation. Finally, our analysis indicates that only economic ( $b = 0.16$ ,  $p = < 0.001$ ) and natural ( $b = 0.38$ ,  $p = < 0.001$ ) dimensions are positively associated with individual resilience.

Figure 1 provides a visualization of mediational relations of family and community protective factors on the relation between relational wellbeing and individual resilience.

## Discussion and conclusion

This study examined the relational dimensions of individual wellbeing and resilience mediated by family and community protective factors. We found that family protective factors positively mediated most of the relational dimensions of individual wellbeing and resilience, except for the religiosity dimension. On the other hand, societal protective factors negatively mediated all relationships between the relational dimensions of wellbeing and individual resilience.

We begin by discussing how the family protective factor serves as a positive mediator between relational wellbeing dimensions and resilience. Specifically, the findings demonstrate that individuals who positively assess their family and community

participation, their sense of security and competition in their neighbourhood, their current financial circumstances, their satisfaction with public facilities, and their self-concept are likely to engage positively with their family. This positive interaction involves exchanging care, expectations, and opportunities for growth, which in turn helps them develop a higher level of individual resilience. According to Chaigneau et al. (2022), relational wellbeing is a source of resilience. Individuals who have their needs met and have a good quality of life may be more resilient than those who do not. Resilience can be enhanced by providing social support and access to knowledge and resources. Resources from family and society can be protective factors for individuals. Benard (2004) argued that family protective factors, such as warm relationships and opportunities to contribute, can make individuals feel loved, safe and competent. Therefore, if they face difficulties in life, they can obtain help, bounce back, and be better equipped to solve their problems and show more resilience. We can safely conclude that relational wellbeing is interrelated with individuals' development of positive family relationships, which then positively relates to their ability to face difficult times.

The negative relationship between religiosity and the community protective factor was unexpected. However, considering the impact of religion, it can be understood that religion can have both positive and negative impacts on individuals, families and communities (Dollahite et al., 2018). Religion can have positive impacts if it promotes tolerance and harmony. It can have negative impacts, if it promotes prejudice and intolerance (Donahue and Nielsen, 2005). In Indonesia, religious identity plays a crucial role in many aspects of life, including policy-making and educational curriculum (Bruinessen, 2018; French et al., 2008). In terms of personal life, the impact of having high level of religiosity has also been shown to reflect individuals' use of religious coping in dealing stressful life circumstances (Aflakseir and Mahdiyar, 2016). Religious coping refers to the use of religious beliefs and/or rituals in times of hardships. Those who employ religious coping strategies are reported to feel less pressure to manage their circumstances and fret about the outcomes. This is similar to the term "surrendering to God" in times of adversity



(Wong-Mcdonald and Gorsuch, 2000). Surrendering to God is based on the assumption that one has reached a point where they believe that human efforts are no longer sufficient and, thus, only God has control over one's problems. In both terms, there is an active act in solving the problems, which are often directed to follow more strictly their religious beliefs and practices. Considering that participants in our study face constant daily life challenges while living in disaster-prone areas, people are likely to turn to surrendering to God rather than being actively engaged in their community, for instance, in collective efforts to reduce flood risks. However, it is important to note that this assumption may overlook other variables that play a role in reducing flood risks or ameliorating living conditions, such as local government policies. Nevertheless, within the scope of the present study, we can infer that religiosity may indeed induce individuals to focus on surrendering to God, and consequently, diminishing the relevance of their community protective factor.

As a result, the community protective factor negatively mediates the relationship between relational wellbeing dimensions and resilience. This result is not in line with previous research, which suggests that people who receive attention and support and have the opportunity to participate in society will feel supported and accepted (Jain and Cohen, 2013). Those who receive such support from their neighbourhood or community have been shown to be better in solving problems, gaining insight and dealing with hardships (Benard, 2004). We offer three explanations for this contradiction.

First, community protective factor is a multi-functional concept which can have different impacts individually, depending on people's areas of life (e.g., academic, career, or mental health). For example, individual's development of their capacity to solve problems without experiencing anxiety is highly related to family support (Benard, 1993; Rothon et al., 2012), while social capital is less prominent (Rothon et al., 2012). In addition, opportunities for individuals to participate and be involved in activities in society are not always positively related to their mental health (Rothon et al., 2012), unless their participation is purely voluntary or driven by their intrinsic motivation (Kim and Morgül, 2017).

Second, there might be a confounding variable between community protective factors and resilience that might have played a role among participants – this being collective efficacy. According to Yu et al. (2022), collective efficacy drives disaster preparedness at the individual level. When people face large-scale problems, such as natural disasters, the perceived collective efficacy is likely to play a significant role in motivating individuals to be resilient and prepare to take protective actions. We argue that community protective factors should provide social support and also encourage individuals to take actions by providing opportunities, knowledge and collective efficacy. Only then can individuals utilize their community protective factors and avoid being over-reliant on community support. This buffers the risks of creating a false sense of security and reluctance in anticipating future outlook (Sarason et al., 1983; Babicky and Seebauer, 2020).

Third, according to Lee et al. (2022), types of social support that are non-empowering (i.e., offering only short-term and immediate solutions) or assistance that provide the "recipient a complete solution to a problem" (dependency-oriented) can cause psychological harm by creating feelings of dependency and incompetence (Koo et al., 2023). Furthermore, Gray et al. (2020) argued that community support, which is inadequacy-implied support, makes the recipient feel inadequate or incompetent and this feeling is the opposite of resilience.

These three explanations mean we concluded that any protective factor, particularly community protective ones, are related to individual resilience when individuals act actively to learn and develop those skills and knowledge required to overcome difficulties in any given time of their life.

Several limitations of our study need to be acknowledged. Firstly, the study focused solely on locations in urban areas. Although this is key to understanding individuals' adaptation in ever-increasing ecological change in their living area, many settlements in rural areas in Indonesia are also experiencing the impacts of climate change (World Bank Group and Global Water Security and Sanitation Partnership, 2021). Therefore, future studies should consider expanding the locations to provide a urban-rural comparison in individuals' relational wellbeing and their resilience. Secondly, the current study did not involve specific types of community activities in their locations. Therefore, we were unable to compare different activities in their relations to individual resilience. Thirdly, we acknowledge that most of the significant coefficients obtained in the study are rather small, ranging from  $-0.02$  to  $0.39$  (see Table 4). While these findings suggest a weak relation with the predictor in terms of statistical significance, we still consider these relations to be significant because they are unlikely to occur by chance. However, in terms of practical significance, we acknowledge that all the statistically significant indirect effects of relational wellbeing dimensions through family and community protective factors are rather weak. This indicates that there may be other plausible mediators that could more strongly explain the relations of interest. Finally, as our participants live in disaster-prone areas, relying solely on a cross-sectional data, inhibited us from drawing any inference on the changes that might occur during 'normal times' and 'flooding periods'. Therefore, future studies should pursue further data collection, especially during flooding periods, to see the complex interplay between individuals' relational wellbeing and their individual resilience, while still taking account of their family and community conditions.

Nevertheless, we believe that our research offers important contributions for the extant literature on slum communities and resilience. Our findings contribute to an improved understanding of the complex intertwining of wellbeing and resilience, especially by which family and community supports relate to individuals' adaptability in their slum communities. Finally, these findings can offer valuable insights for policymakers in crafting family-oriented interventions that foster resilience and leverage community resources to facilitate the positive development of individuals. This could involve providing opportunities for individuals to acquire essential skills for self-sufficiency and adaptability within their environment. Through fostering positive experiences within families and communities, such interventions have the potential to empower individuals, enhancing their sense of agency. This, in turn, may enable them to more effectively regulate their needs, strategize on achieving their goals, and critically reflect on their progress in pursuing them (Bandura, 2018).

#### Data availability

The datasets generated during and/or analysed during the current study are available in the online archiving system repository. We have deposited the dataset for this study on DANS platform at <https://doi.org/10.17026/dans-z5q-d3ae>.

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### Author contributions

All authors contributed to each phase of the publication, including conceptualization, methodology, validation, formal analysis, investigation, resources, data curation, and writing.

### Competing interests

The authors declare no competing interests.

### Ethical approval

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of the authors' university. The data collection process had been reviewed and granted permission from The Directorate General of Politics and General Administration from The Ministry of Home Affairs of the Republic of Indonesia (470.02/7428/Polpum) and by the Research Ethical Committee of Universitas Kristen Maranatha (No.134/KEP/X/2022).

### Informed consent

Informed consent was obtained from all participants by requesting them to sign the written informed consent prior to guided interview.

### Additional information

**Supplementary information** The online version contains supplementary material available at <https://doi.org/10.1057/s41599-024-03440-4>.

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# A dual pathway for understanding the relation between wellbeing and resilience

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