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Personal Wellbeing Amid Pandemic Response: Impacts of Neighborhood Built Environment, Risk Communication and Health

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Abstract

Maintaining personal wellbeing is essential for an effective pandemic response due to its multifaceted impacts on various aspects of society. This study aimed to evaluate personal wellbeing during pandemic response and investigate the effects of built environment in neighborhoods, risk communication, and health indicators. A cross-sectional survey design was adopted. A sample with 5458 participants was collected in Hong Kong through a self-administered online survey. Personal Wellbeing Index-Adult (PWI-A) was adopted to measure personal wellbeing. This study indicated a more than 20% decrease in personal wellbeing among Hong Kong residents during the pandemic, particularly impacting future security, personal safety, and living standards. Positive influences on wellbeing included more open spaces, using more traditional information channels, seeking reliable media sources, and confidence in information seeking. Conversely, wellbeing was negatively affected by a higher percentage of public residential areas, using more new information channels, increased social media time, smoking habits and chronic health conditions. These findings provide critical insights into the diverse impacts of the pandemic on individuals and communities. They guide targeted interventions and contribute to building resilience against future crises.

Keywords Wellbeing · Pandemics · Open space · Public housing · Information acquisition · Chronic disease

Introduction

Personal wellbeing is an important subjective dimension of quality of life. It generally refers to the level of life satisfaction and happiness possessed by an individual, in which the sense of wellness is contributed by healthy behaviors (Corbin & Pangrazi, 2001). Studying personal wellbeing is crucial for an effective pandemic

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response due to its multifaceted impacts on various aspects of society. Research has shown that during the COVID-19 pandemic, individuals across different professions and age groups experienced significant challenges related to their wellbeing (De Pue et al., 2021; Dinsuhaimi et al., 2022; Owens et al., 2022; Quirk et al., 2023; Shek, 2021).

For instance, the lockdown associated with pandemics such as COVID-19 is believed to cause a wellbeing crisis, with detrimental effects on an individual's physical and mental wellbeing, especially for vulnerable populations (Dinsuhaimi et al., 2022; Hedley et al., 2021; Owens et al., 2022). Physically, a study in the UK reported that both males and females were found to have less physical activity, poorer sleep quality and more unhealthy dietary habits during pandemic, and those unhealthy lifestyles may result in low physical wellbeing (Owens et al., 2022). More importantly, from a mental perspective, it is reported that longer duration of isolation and restricted access to outside natural environments seem to be positively associated with poorer mental health (Owens et al., 2022). Moreover, the economy has been severely disrupted by pandemic, increased risk of unemployment and income loss would potentially lead to higher perceived emotional distresses such as feelings of defeat, shame and hopelessness, eventually hindering mental and psychological wellbeing with lower satisfaction in personal safety, future security and personal achievement (Dinsuhaimi et al., 2022; Owens et al., 2022). Therefore, maintaining personal wellbeing is not only essential for individuals but also for the overall functioning of society.

Personal wellbeing during pandemic response is influenced by a multitude of factors that encompass various aspects of an individual's life. Research has shown that the built environment can significantly influence physical activity levels, social interactions, and mental wellbeing (Hunter et al., 2019; Rajani et al., 2019). Studying the relationship between the neighborhood built environment and personal wellbeing during a pandemic can help identify how access to green spaces, walkability, and community amenities impact individuals' mental health and quality of life (Tomasso et al., 2021). Moreover, effective risk communication plays a vital role in shaping individuals' perceptions, behaviors, and mental wellbeing during a pandemic (Fan & Smith, 2021). Understanding how risk communication influences personal wellbeing can inform the development of clear, accurate, and timely communication efforts that address individuals' concerns and promote resilience (Losecaat Vermeer et al., 2022). Furthermore, health habits, such as smoking and drinking habits, could cause adverse impacts on physical health and mental health, and exposure to pandemic would potentially exacerbate the situation and hence threaten wellbeing (Churchill & Farrell, 2017). Chronic patients are one of the important vulnerable groups when responding to pandemics. They may face disruptions in accessing essential healthcare services, including routine check-ups, treatments, and medications, during a pandemic (De Pue et al., 2021). In addition, sociodemographic variables such as age, gender, and socioeconomic status can influence individuals' vulnerability and access to resources during a pandemic, which further affects individuals' personal wellbeing (Garnett et al., 2021; Rajani et al., 2019; Tomasso et al., 2021). By studying these factors, we can gain a comprehensive understanding of the complex interplay between environmental, communication, health, and sociodemographic factors

on personal wellbeing during a pandemic. This knowledge can guide the development of holistic approaches to support individuals, communities, and healthcare systems in promoting mental wellbeing, resilience, and quality of life during public health crises.

Hong Kong, a mega city in Asia, was selected to examine the impact of neighborhood built environment, risk communication and health indicators on personal wellbeing during pandemic response. First, Hong Kong provides a unique setting for studying the impact of neighborhood built environments on personal wellbeing due to its ultra-dense urban environment, limited green spaces, and high population density (Guo et al., 2020a, b; Ho et al., 2022; Huang et al., 2020). Second, Hong Kong is known for its technological advancements and high smartphone/internet penetration rates. Exploring the use of technology such as social media in pandemic risk communication and its effects on personal wellbeing can provide valuable insights into leveraging digital platforms for disseminating health information and promoting wellbeing during a pandemic (Gong et al., 2022a, b; Guo et al., 2020a, b). Last but not least, Hong Kong's diverse population offers a unique opportunity to investigate the cross-cultural equivalence of health indicators and their effect on personal wellbeing (Guo et al., 2020a, b). By studying the impact of neighborhood built environment, risk communication and health indicators on personal wellbeing during pandemic response in Hong Kong, important insights could be provided especially about the factors influencing individuals' mental health, quality of life, and resilience in the cities with similar crisis situations. This knowledge can inform the development of targeted interventions, support services, and policies to promote wellbeing and mental health in the face of public health emergencies.

Literature Review

Personal Wellbeing

Personal wellbeing is a multidimensional concept which is influenced by numerous factors at different extents, and the relative importance, impact and value of each domain differs according to each individual, depending on how they define and conceptualize wellbeing (Kiefer, 2008). Therefore, the complexity of wellbeing seems unlikely to be easily captured (Kiefer, 2008). Despite the absence of a uniform definition of wellbeing, growing interest in wellbeing research has allowed the operationalization of wellbeing in literature, giving rise to the identification of domains widely accepted and included in wellbeing (Charlemagne-Badal et al., 2015). Literature has proposed and summarized several domains most commonly considered when examining personal wellbeing, which could be further divided into categories, including but not limited to standard of living, physical health, mental (emotional) health, social relationship, personal safety, connection with community, and future security (Charlemagne-Badal et al., 2015; Corbin & Pangrazi, 2001; Cummins, 1996; Kiefer, 2008).

The framework of personal wellbeing is multifaceted and interconnected. Higher standards of living are typically associated with improved personal wellbeing, as

they enable individuals to meet their basic needs, leading to enhanced health, happiness, and life satisfaction (Gerrans et al., 2014). Physical health plays a pivotal role in personal wellbeing. Individuals in good health often experience heightened energy levels, reduced pain, and an increased capacity to engage in activities they love, thereby augmenting happiness, satisfaction, and overall wellbeing (Zhang & Chen, 2019). Robust mental health enhances an individual's resilience, enabling them to cope with stress, overcome challenges, and recover from setbacks, all of which significantly contribute to personal wellbeing (Charlemagne-Badal et al., 2015). Social relationships and community connections are integral to personal wellbeing (Kiefer, 2008). They provide emotional and material support in challenging times and foster a sense of belonging, thereby significantly enhancing overall wellbeing (Dinsuhaimi et al., 2022). Personal safety, defined by living in an environment with a reduced risk of physical harm, also contributes positively to personal wellbeing (Charlemagne-Badal et al., 2015). Lastly, future security, playing a vital role in mental health, alleviates stress and anxiety associated with meeting basic needs and planning for significant life events, such as education, employment, or health emergencies. This sense of security significantly contributes to personal wellbeing (Dinsuhaimi et al., 2022).

Personal Wellbeing Index-Adult (PWI-A) is one of the methods which has been applied in many countries to measure personal wellbeing. For instance, in Australia, it was found that the score of PWI-A was 75.7 on average in 2021, while the mean of PWI-A in Austria is 75.0 with normative ranges between 70–80 points (Khor et al., 2022; Yiengprugsawan et al., 2010). On the contrary, it was found that the PWI-A scores in Hong Kong and China were about 10 points less when compared with those in Western countries (Lau, 2021). Algeria, one of the least developed countries, had relatively low PWI-A scores with a mean of 50.0 (Tiliouine et al., 2006). Thailand, another example of developing countries, has PWI-A scores with a mean of 70, which is very close to that of most Westerners (Yiengprugsawan et al., 2010). PWI-A during a pandemic is vital for understanding the diverse impacts on individuals and communities, informing targeted interventions, and building resilience to future crises.

Environmental Factors and Personal Wellbeing

Environmental factors, which could influence life satisfaction, is highly correlated with personal wellbeing (Rajani et al., 2019). For instance, it is emphasized that urban green space proximity is positively correlated with personal wellbeing, in which increased nature exposure could provide opportunities to conduct green exercise and hence potentially bring health outcomes and improve personal wellbeing (Hunter et al., 2019; Tomasso et al., 2021). It is noted that public open spaces such as parks, vacant lot greening, greenway for walking or biking as well as green roofs, together with private green spaces such as private gardens, serve as an essential health source in times of pandemic (Hunter et al., 2019; Poortinga et al., 2021). Not only can green infrastructure bring physical health benefits such as improved air quality and enhanced physical activity, but those natural capital could also improve

social outcomes through crime reduction, increased safety perceptions and a sense of better social cohesion, which eventually contribute to stress reduction and hence higher life satisfaction, favoring both physical and mental wellbeing (Poortinga et al., 2021).

Apart from that, sufficient evidence has proven the positive correlation between environmental housing quality and self-rated health (and hence personal wellbeing), with housing quality dimensions such as perceived air quality, comfort and apartment condition as well as cleanliness of surroundings (Kahlmeier et al., 2001). It is believed that poor housing conditions, such as aging drainage systems or other unexpected failure of infrastructure, would result in psychological risk of hindered social trust that citizens might not be able to cooperate to socially and physically support each other, and poor disaster and pandemic response would be the outcome (Guo et al., 2020a, b). Consequently, when assessing individuals' personal wellbeing, it is crucial to consider environmental factors, encompassing both the physical and built environments.

Pandemic Risk Communication and Personal Wellbeing

Media has been serving as platforms for strategic crisis communication, which has two main functions: an informative function of providing timely information on local conditions to citizens, and a persuasive function of making clear direction for receivers to rationally understand the risk as well as encouraging adoption of appropriate actions so as to prevent or lessen any possible negative outcomes resulting from the crisis (Guo et al., 2020a, 2020b; Spence et al., 2007). Moreover, It is claimed that actively spending time in getting information about COVID-19 is associated with more positive personal wellbeing, but acquiring excessive information, misinformation and those lacking clarity could result in information overload, bringing negative effects on personal wellbeing such as increased distress and anxiety (Fan & Smith, 2021). Since the pandemic, humans are facing enhanced loneliness due to high uncertainty and lockdowns, and literature has supported the view that trait curiosity and information-seeking motivation have the potentials of reducing loneliness, fostering personal wellbeing during adaptation in changing environments (Losecaat Vermeer et al., 2022). Therefore, it could be predicted that there will be more information-seeking behaviors during the pandemic.

Previous studies have found that information-seeking via different channels could result in different understanding of health-related messages, and information accuracy is likely to be the reason causing the differences (Fan & Smith, 2021; Guo et al., 2020a, b). There are mainly two means of information acquisition: traditional information channel utilization (TICU) and new information channel utilization (NICU). While TICU comprised traditional sources such as television, radio, newspapers or people around (family/colleagues/friends/relatives), NICU comprised of newly emerging media forms, such as knowledge sharing websites, apps via smartphone, official websites (WHO) and social media platforms (Weibo/QQ/Facebook/WhatsApp/Messages) (Chen et al., 2020; Fan & Smith, 2021; Guo et al., 2020a, b).

Furthermore, the level of trust in information contributes to different modes of information acquisition, and it has been found that public perception regarding social media (be categorized to NICU) is actually not trustworthy (Ali et al., 2021; Guo et al., 2020a, b). Ali et al. (2021) have stressed that social media allows fast dissemination of information addressing critical problems and health risks, thus information might not be accurate. Studies have also reported that "infodemic" is common in social media in which false news, conspiracy theories, magical cures and racist news are shared at an alarming rate, which may potentially exacerbate the psychological distress of individuals or even lead to larger-scale impacts such as social anxiety, discrimination and desocialization (Chen et al., 2020; Rathore & Farooq, 2020; Sandu, 2020). In Pakistan, forwarding a mix of unconfirmed information and conveying misinformation is a common practice for social media users, and hence they are more likely to face anxiety, panic disorders and depression due to the breaking news, undermining psychological wellbeing (Ali et al., 2021). It seems that information acquisition through contemporary media during the pandemic would result in lower personal wellbeing than through traditional media. However, Chen et al. (2020) have pointed out that modes of information acquisition could also be influenced by age and education levels, in which elderly may prefer getting news from traditional sources (be categorized to TICU) while people with lower education levels would be less likely to obtain up-to-date information through social media websites. Therefore, the relationship between information acquisition and personal wellbeing under COVID-19 for different social groups needs further research.

Health Indicators and Personal Wellbeing

Evidence of daily habits' impact on health and hence personal wellbeing is well substantiated in scientific literature. For instance, Churchill and Farrell (2017) supported the negative correlation between smoking and mental health. It is highlighted that tobacco smoking could cause adverse implications on physical health such as lung cancer and chronic obstructive pulmonary disease, and it was found that people with smoking addictive behaviors were associated with lower levels of happiness and higher levels of depression (Churchill & Farrell, 2017; Shastri et al., 2021). It is hence clear that smoking behaviors would potentially induce physical and mental health costs to individuals, resulting in poorer personal wellbeing perceived (Churchill & Farrell, 2017).

Overall, it is suggested that combined exposure to cigarette smoking and alcohol drinking is linked to severe COVID-19 (Fang et al., 2022). A study targeting adults in the UK also found that people with chronic diseases such as high blood pressure, diabetes and cancer are more likely to experience severe COVID-19 symptoms (Garnett et al., 2021). However, whether these health risk behaviors have significant impacts on personal wellbeing remains unclear. Therefore, the relationship between cigarette smoking/alcohol drinking and personal wellbeing in the context of the pandemic needs further research.

Furthermore, chronic patients are more susceptible to severe illness and complications from infectious diseases, including COVID-19, due to their underlying

health conditions. This increased vulnerability can impact their overall wellbeing and mental health during a pandemic (De Pue et al., 2021). In addition, the demographic factors of personal wellbeing, including but not limited to age, gender, education levels, ethnicity, marital status, employment and financial situation, are good indicators reflecting the socioeconomic position of individuals (Garnett et al., 2021; Rajani et al., 2019; Tomasso et al., 2021). However, further research is needed to explore the specific relationship between health risk behaviors and personal wellbeing in the context of a pandemic.

Methodology

Study Design and Data Collection

A cross-sectional survey design was adopted in this study. Data collected was conducted during the fourth wave of COVID-19 in Hong Kong with the severe impacts of COVID-19 and restricted social distance measures from November 2020 to May 2021, which was the second phase of Urban AB-C (Urban Accessibility and Behaviors-cohort). To facilitate the participant's recruitment during the critical moment of COVID-19, data were collected through an online platform with a public participation geographic information system (PPGIS) through the PopPanel operated by the Hong Kong Public Opinion Research Institute (HKPORI). Particularly, PopPanel was a joint panel of: 1) a probability-based recruitment randomly through telephone surveys of the representative Hong Kong population, and 2) a non-probability-based recruitment from volunteers through online registration, in which all panel members were continuously invited to participate in different surveys. PPGIS was an online platform allowing participants to provide volunteered geographic information (VGI) including location matters through maps and other tools.

Through PopPanel, invitations of questionnaire were sent via email. A total of 97445 Hong Kong individuals were invited. However, due to the possibility of being identified as spam/junk mails, there were only 7852 panel members clicked on the link of invitation and started the survey. About 81.0% (n = 6362) of the respondents have completed the questionnaire. The respondents who did not indicate VGI were removed from the database. Therefore, a sample of 5458 participants aged > = 18 was used for data analysis in this research. The participants selected from the three regions in Hong Kong—Hong Kong Island, Kowloon, and New Territories—were representative of the current geographical population distribution in Hong Kong (Fig. 1).

Measurements

Personal Wellbeing

PWI-A, which comprised satisfaction with seven specific life domains (International Wellbeing Group, 2013), was adopted to measure participants' personal wellbeing

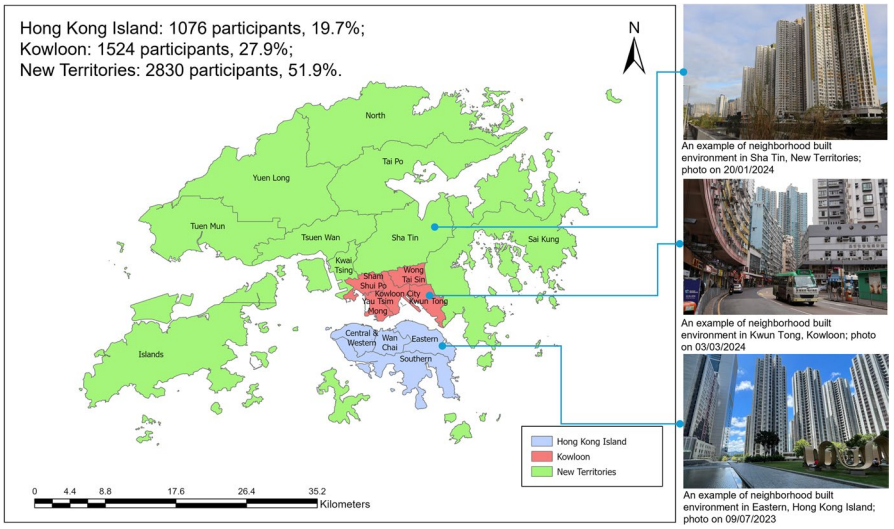

Fig. 1 The map of Hong Kong and examples of neighborhood built environments

amid pandemic response. The seven specific life domains were standard of living, personal health, achieving in life, personal relationship, personal safety, community-connectedness, and future security (Dinsuhaimi et al., 2022; International Wellbeing Group, 2013). Respondents were instructed to rate each domain in an 11-point end-defined response scale, ranging from 0 (no satisfaction at all) to 10 (complete satisfaction). After standardization, each domain was assigned a score between 0 and 100. The average of these scores across the seven domains was then calculated to derive the overall personal wellbeing score, which also ranged from 0 to 100.

Validity was assessed using Pearson Correlation Analysis to determine the relationship between scores for each question representing the seven domains and the total PWI-A score. Results revealed statistically significant positive correlations ($p < 0.05$) between the total PWI-A score and all seven domains, confirming the tool's validity in measuring personal wellbeing. Reliability was evaluated using Cronbach's Alpha Coefficient, resulting in a value of 0.867, indicating good internal consistency while $\alpha > 0.700$ was widely adopted as the acceptable range (Bland & Altman, 1997; Tavakol & Dennick, 2011). Therefore, the PWI-A tool utilized in this study was deemed both valid and reliable.

Neighborhood Built Environment

A 500-m radius was applied to spatially buffer the surrounding environment from the VGI location reported by the participants, in order to estimate neighborhood built environment within a walkable distance in Hong Kong. Particularly, five indicators regarding the land use were generated based on Land Utilization Map retrieved from Hong Kong Planning Department: percentage of open space (% open space, such as plazas, parks), percentage of public residential land (% public residential land, the

land of mass housing provided/subsidized by the government), percentage of private residential land (% private residential land, the land of housing developed by private developers), percentage of government institutional and community land (% institutional land, such as government office buildings, libraries) and percentage of road network (% road network).

Greenness was determined by the average of Normalized Difference Vegetation Index (NDVI) within a walkable distance, which was a spectral index calculated from the red and near-infrared band of a multispectral remote sensing image with a range from – 1 to 1. Negative values indicated clouds and water, positive values near zero indicate bare soil, and higher positive values of NDVI range from sparse vegetation (0.1—0.5) to dense green vegetation (0.6 and above) (NASA, 2000). SPOT-6 image 6-m resolution was applied to measure the greenness in a micro-scale urban level.

To tackle the high-rise, high-density characteristics of Hong Kong, urban sky view factor (SVF) was applied in this study. SVF was an indicator of unobstructed sky across the urban area ranging from 0 to 1, which demonstrated the urban density due to three-dimensional built environment. A lower SVF indicated an area with more obstructed sky due to a high-density built environment, and a higher SVF represented an area with less obstructed sky. Building data retrieved from Hong Kong's Common Spatial Data Infrastructure were applied to estimate SVF across Hong Kong.

Pandemic Risk Communication

Pandemic risk communication was measured by the number of channels utilized to acquire COVID-19 relevant information, credibility judgments in the information-seeking process (score 2–10), the level of intention to seek information from reliable media (score 2–10), confidence in information seeking (score 2–10) and times spend on social media per day (0–24 h).

The information acquisition channels were divided into traditional information channel utilization (including television, radio, telephone, newspapers/journals, information from family/friends/colleagues, schools/work places and community organizations) and new information channel utilization (including internet, communication APPs and social media) (Guo et al., 2020a, b). Each type of information seeking was measured as the sum of the specific channels, according to channel complementarity theory (Dutta-Bergman, 2004a, b), as this would reveal whether the variety of channels used for information seeking increased when responding to the pandemic.

Credibility judgments in the information-seeking process were measured based on two statements: "you will tend to find more credible media" and "you will take the initiative to find more credible media". The level of intention to seek information from reliable media was measured by the agreement with statements of "you will confirm the credibility of the information" and "you will compare information from different media before drawing conclusions". Similarly, the level of confidence in information seeking was evaluated through the agreement with the statements like "you feel confident in existing information platforms" and "you think it is easy to

obtain information related to the epidemic". A 5-point Likert scale was used for all measurements, with 1 indicating strongly disagree and 5 indicating strongly agree. The sum of the item scores was calculated, resulting in scores ranging from 2 to 10 for each measurement.

Health Indicators and Sociodemographic Factors

The sociodemographic factors considered in this study encompassed gender (male/female), age (18–39 years, 40–59 years, 60 or above), education (senior secondary or below, postsecondary), household income per month (< HKD20000, HKD20000-39999, ≥ HKD40000) and geographical location (Hong Kong Island, Kowloon, New Territories). Additionally, the health indicators examined included alcohol use habit (no or yes), tobacco use habit (no or yes) and chronic patient (no or yes).

Data Analysis

The study followed a three-step approach for data analysis. Firstly, descriptive statistics were conducted to analyze the sample and independent variables. Secondly, the researchers assessed the level of personal wellbeing among different groups of participants. One-way ANOVA was applied to test the significance of the differences among different groups. Lastly, a multi-level and multi-variable linear regression was performed to investigate the influences of multiple factors on personal wellbeing amid pandemic response. This analysis considered three categories of independent variables: (a) neighborhood built environment, (b) information seeking behaviors, and (c) health indicators and sociodemographic factors. The regression model was formulated as follows:

$$\text{Personal wellbeing} \approx \beta 0 + \beta 1 \times \text{var1} + \cdots + \beta \text{n} \times \text{var n}$$

where personal wellbeing was the summation of the seven domains of life satisfaction, which ranged from 0 to 1100; var1 to var n were variables from the three different categories. The aim of this step was to identify the most significant predictors across various dimensions and observe the interactions between these dimensions in determining individual wellbeing. Listwise deletion was employed to handle missing data in the regression analysis, meaning only cases with valid values for all variables were included. Consequently, the sample size varied across models with different dependent variables. The statistical analysis was conducted using IBM SPSS software, version 29.0, with a significance level set at $\alpha = 0.05$ (two-tailed).

Findings

Descriptive Analyses of Sociodemographic, Health, Neighborhood Built Environment, Pandemic Risk Communication and Personal Wellbeing

The study collected data from 5458 valid respondents, who reported a PWI-A mean score at 49.00 with a standard deviation (SD) of 16.77. It comprised an almost equal distribution of male and female participants, with males representing 50.6% and females representing 49.4% (Table 1). However, there was a statistically significant difference in their personal wellbeing scores. The mean

Table 1 Sociodemographic factors, health characteristics and personal wellbeing score of the survey respondents (N = 5458)

	Total sample N(%)	Personal wellbeing Mean (SD)	ANOVA test
Gender			$F(1) = 11.752$, $p < 0.01$
Male	2729 (50.6%)	48.19(16.88)	
Female	2667 (49.4%)	49.77(16.67)	
Age			$F(2) = 88.722$, $p < 0.001$
18–39 years	2073 (38.2%)	45.61(16.42)	
40–59 years	2652 (48.9%)	50.27(16.49)	
60 or above	696 (12.8%)	54.47(16.81)	
Education			$F(2) = 11.099$, $p < 0.01$
Senior secondary or below	872 (16.1%)	47.27(16.59)	
Postsecondary	4559 (83.9%)	49.34(16.79)	
Household income per month			$F(2) = 33.084$, $p < 0.001$
< HKD20000	465 (12.1%)	46.34(17.65)	
HKD20000-39999	833 (21.7%)	47.74(16.32)	
≥ HKD40000	2541 (66.2%)	51.76(16.28)	
Geographical location			$F(2) = 8.241$, $p < 0.01$
Hong Kong Island	1076 (19.7%)	50.78(16.94)	
Kowloon	1524 (27.9%)	48.11(16.79)	
New Territories	2830 (51.9%)	48.86(16.66)	
Alcohol use habit			$F(1) = 0.342$, $p = 0.559$
No drinking habit	4659 (85.5%)	48.94(16.73)	
Having drinking habits	789 (14.5%)	49.32(17.04)	
Tobacco use habit			$F(1) = 24.992$, $p < 0.001$
No smoking habit	4976 (91.6%)	49.3616.79)	
Having smoking habits	454 (8.4%)	45.24(15.98)	
Chronic patient			$F(1) = 10.309$, $p < 0.01$
Not a chronic patient	4369 (81.5%)	49.45(16.63)	
Chronic patients	991 (18.5%)	47.55(17.22)	

wellbeing score for males was 48.19 (SD = 16.88), while for females, it was slightly higher at 49.77 (SD = 16.67).

The youngest age group (18–39 years) had the lowest wellbeing score of 45.61 (SD = 16.42), while the oldest age group (60 years or above) had the highest score of 54.47 (SD = 16.81). Those with a postsecondary education, making up the majority at 83.9%, had a higher wellbeing score of 49.34 (SD = 16.79), compared to those with a secondary education or below, who scored 47.27 (SD = 16.59). Participants with a household income of HKD40000 or more had the highest wellbeing score of 51.76 (SD = 16.28). Those with a household income of less than HKD20000 had the lowest score of 46.34 (SD = 17.65).

Geographical location was another factor that significantly influenced personal wellbeing. Participants residing in Hong Kong Island had a higher wellbeing score of 50.78 (SD = 16.94) compared to those in Kowloon and the New Territories, who scored 48.11 (SD = 16.79) and 48.86 (SD = 16.66), respectively.

The study also examined the relationship between alcohol consumption habits and personal wellbeing, but no significant difference was found ($F(1) = 0.342$, $p = 0.559$). In contrast, tobacco usage habits showed a significant impact on personal wellbeing. Participants without smoking habits had a higher wellbeing score than those with smoking habits (49.36 VS 45.24, $F(1) = 24.992$, $p < 0.001$). It was also found that those who were not chronic patients had a higher wellbeing score than chronic patients (49.45 VS 47.55, $F(1) = 10.309$, $p < 0.01$).

Table 2 presents descriptive analysis results for various environmental factors and pandemic risk communication across different regions of Hong Kong, including Hong Kong Island, Kowloon, and the New Territories. The findings indicated significant variations in these environmental factors across different regions. For instance, the percentage of open space was highest in Kowloon (10.1%) compared to Hong Kong Island (6.8%) and the New Territories (7.9%). Similarly, the percentage of private residential area was highest in Hong Kong Island (17.8%) compared to Kowloon (13.5%) and the New Territories (9.8%).

Furthermore, the analysis reveals significant differences in other factors as well. The percentage of public residential area was highest in the New Territories (16.5%), while the percentage of government institutional and community land was highest in Kowloon (10.2%). Road cover was highest in Kowloon (23.6%), and the normalized difference vegetation index was slightly higher in the New Territories (0.4%). The sky view factor, which represents the amount of visible sky from a given location, is highest in the New Territories (mean = 68.7, SD = 10.0) compared to Hong Kong Island (mean = 60.0, SD = 10.1) and Kowloon (mean = 61.8, SD = 10.0).

No spatial differences were identified for most of the information acquisition behaviors among residents in Hong Kong Island, Kowloon and the New Territories, except traditional information channel utilization ($F(2) = 5.254$, $p < 0.01$). The participants presented similar patterns when acquiring pandemic relevant information. The participants also reported spending an average of 2.9 h per day on social media, with no significant differences between the regions.

Table 2 Descriptive analysis of environmental factors and information seeking behaviors (N = 5458)

	Total sample	Hong Kong Island	Kowloon	New Territories	ANOVA test
Neighborhood built environment [#]					
% of open space	8.3 (6.3)	6.8 (5.5)	10.1 (5.7)	7.9 (6.8)	$F(2) = 96.528$, $p < 0.001$
% of private residential area	12.4 (10.6)	17.8 (11.2)	13.5 (9.9)	9.8 (9.9)	$F(2) = 246.719$, $p < 0.001$
% of public residential area	11.9 (11.6)	6.6 (9.2)	16.5 (14.4)	11.4 (9.7)	$F(2) = 255.484$, $p < 0.001$
% of government institutional and community land	8.0 (5.9)	8.4 (6.0)	10.2 (6.4)	6.7 (5.2)	$F(2) = 186.688$, $p < 0.001$
% of road cover	19.8 (9.1)	17.8 (8.3)	23.6 (9.0)	18.6 (8.9)	$F(2) = 198.575$, $p < 0.001$
Normalized difference vegetation index	0.3 (0.1)	0.3 (0.2)	0.3 (0.1)	0.4 (0.1)	$F(2) = 130.582$, $p < 0.001$
Sky view factor	62.0 (10.1)	60.0 (10.1)	61.8 (10.0)	68.7 (10.0)	$F(2) = 465.216$, $p < 0.001$
Pandemic risk communication					
Traditional information channel utilization (0–7)	2.4 (1.6)	2.4 (1.5)	2.3 (1.5)	2.4 (1.9)	$F(2) = 5.254$, $p < 0.01$
New information channel utilization (0–3)	2.4 (0.7)	2.4 (0.8)	2.4 (0.8)	2.4 (0.7)	$F(2) = 0.191$, $p = 0.826$
Credibility judgments in the information-seeking process (2–10)	8.9 (1.3)	8.9 (1.3)	8.8 (1.4)	8.9 (1.3)	$F(2) = 1.209$, $p = 0.299$
Intention to seek information from reliable media (2–10)	8.2 (1.4)	8.2 (1.5)	8.2 (1.5)	8.2 (1.5)	$F(2) = 0.007$, $p = 0.993$
Confidence in information seeking (2–10)	8.5 (1.7)	6.4 (1.6)	6.4 (1.6)	6.5 (1.7)	$F(2) = 2.390$, $p = 0.092$
Average time spend on social media per day (hours)	2.9 (2.3)	2.9 (2.2)	2.9 (2.2)	3.0 (2.3)	$F(2) = 0.659$, $p = 0.518$

[#], the data of all the environmental factors were collected for the area that was within a 500-m radius of the participant's residence; mean and SD were included for each environmental factor

Descriptive Analyses of Personal Wellbeing During Pandemic Response

Among the seven subdomains, the participants reported the highest score in personal health (mean = 60.93, SD = 20.71), followed by personal relationship (mean = 56.48, SD = 21.65). The subdomain of satisfaction on future security received the lowest mean score (mean = 34.45, SD = 23.84).

The ANOVA test results indicated significant differences in the means of most wellbeing subdomains across the three regions (Table 3). Hong Kong Island had the highest average score of 50.78 (SD = 16.94), while Kowloon and the New Territories scored slightly lower. Hong Kong Island also scored slightly higher than the other two regions in the seven subdomains. Interestingly, personal relationships did not show a significant difference across the regions, with a p-value of 0.087, indicating that the sense of personal relationships remained relatively stable across all regions during the pandemic.

Regression Analyses of Personal Wellbeing During Pandemic Response

Four linear regression models were constructed for examining the impacts of environmental factors, information seeking behaviors, sociodemographic and health on participants' personal wellbeing amid pandemic response (Table 4). To ensure the validity of the regression analysis, a collinearity test was conducted. A tolerance value below 0.1 or a variance inflation factor (VIF) above 5.0 indicates the presence of high multicollinearity (Shrestha, 2020; Wondola et al., 2020). However, the results showed that the tolerance values (ranging from 0.337 to 0.971 for the included independent variables) and VIF values (ranging from 1.030 to 2.973 for the included) were within acceptable ranges. This suggested that there was low risk of multicollinearity in the regression models established in this study.

Neighborhood built environment: In all models, an increase in the percentage of open space was associated with an increase in personal wellbeing (Model 1: 0.035, $p < 0.05$; Model 4: 0.047, $p < 0.01$). Conversely, an increase in the percentage of public residential area was associated with a decrease in personal wellbeing (Model 1: -0.104, $p < 0.001$; Model 4: -0.079, $p < 0.001$).

Pandemic risk communication: Traditional information channel utilization was positively associated with personal wellbeing (Model 2: 0.059, $p < 0.001$; Model 4: 0.056, $p < 0.001$). However, new information channel utilization was negatively associated with personal wellbeing (Model 2: -0.046, $p < 0.01$; Model 3: -0.029, $p < 0.05$). Both the intention to seek information from reliable media wellbeing (Model 2: 0.042, $p < 0.01$; Model 4: 0.046, $p < 0.05$) and confidence in information seeking wellbeing (Model 2: 0.223, $p < 0.001$; Model 4: 0.226, $p < 0.001$) were associated with an increase in personal wellbeing. Spending more time on social media per day significantly decreased the personal wellbeing score (Model 2: -0.114, $p < 0.001$; Model 4: -0.093, $p < 0.001$).

Health indicators: Having smoking habits (Model 3: -0.060, $p < 0.001$; Model 4: -0.048, $p < 0.001$) and being a chronic patient (Model 3: -0.091, $p < 0.001$; Model 4: -0.087, $p < 0.001$) were negatively associated with personal wellbeing.

Sociodemographic factors: Being female was positively associated with personal wellbeing (Model 3: 0.046, $p < 0.01$; Model 4: 0.047, $p < 0.01$). Older age groups (40–59 years and 60 or above) and higher education level also showed a positive association with personal wellbeing (Model 3 and 4, $p < 0.001$).

Among all the models, Model 4 has the highest R squared value (0.126), suggesting that it explains the most variations in personal wellbeing compared to the other models.

Discussion

Personal Wellbeing During Pandemic Response

The data gathered from Hong Kong indicates that the response to the pandemic has markedly affected personal wellbeing compared to conditions in 2005 (Lau, 2021). Participants in 2021 reported a Personal Wellbeing Index-Adults (PWI-A) mean score of 49.0, in contrast to the score of 67.0 derived from the 2005 sample (Lau, 2021). This suggests a decline of over 20% in the personal wellbeing of Hong Kong residents compared to the pre-pandemic period. The most affected aspects appear to be satisfaction with future security, personal safety, and standard of living.

The decline in future security and personal safety ratings among Hong Kong residents in surveys can be attributed to various factors related to the socio-political landscape since 2019. The protests that occurred in Hong Kong in 2019–2020 had a significant impact on the region including people's quality of life and wellbeing (Shek, 2020). The pandemic also broke out in the twilight of intense socio-political unrest in Hong Kong, forcing the citizens to live under a depressive and unstable social climate (Lau et al., 2021). The political unrest led to the implementation of a national security law and alterations in the electoral system by China's National People's Congress. Consequently, there was a notable increase in the emigration from Hong Kong starting in 2019 (Chan et al., 2022). Previous research has also suggested that the events have triggered political unrest and pessimistic anticipations over socio-political developments in Hong Kong, in which socio-political tensions might significantly depleted individuals' internal and external resources, potentially leading to substantial mental health distresses such as depression, anxiety and insecurity (Yang et al., 2020).These events might instill a sense of uncertainty and instability among the population, influencing their perceptions of future security and personal safety, potentially threatening personal wellbeing.

Moreover, the socio-economic repercussions of the pandemic, such as job losses, income reductions, business closures, and financial instability, have significantly affected individuals' standard of living and wellbeing (Cao et al., 2022; Chung et al., 2021). It has been proven that the pandemic might aggravate economic challenges and cause drastic changes in lifestyle, especially for those vulnerable groups such as individuals with chronic health conditions, those living under poverty, gig workers

Table 3 Descriptive analysis of personal wellbeing during pandemic response and its subdomains (N = 5458)

	Total sample	Lau's HK data (2021)^	Hong Kong Island	Kowloon	New Territories	ANOVA test
Standard of living	46.21 (23.71)	66.8 (14.5)	48.34 (24.17)	45.28 (23.89)	45.97 (23.41)	$F(2) = 5.658$, $p < 0.01$
Personal health	60.93 (20.71)	68.2 (16.3)	62.76 (20.99)	60.34 (21.02)	60.62 (20.39)	$F(2) = 5.154$, $p < 0.01$
Achieving in life	49.37 (21.87)	63.3 (16.9)	50.84 (22.34)	48.58 (21.73)	49.30 (21.79)	$F(2) = 3.417$, $p < 0.05$
Personal relationship	56.48 (21.65)	73.0 (14.5)	57.82 (21.53)	56.03 (21.95)	56.33 (21.54)	$F(2) = 2.443$, $p = 0.087$
Personal safety	46.94 (24.30)	70.0 (16.9)	49.02 (24.90)	45.97 (24.00)	46.77 (24.22)	$F(2) = 5.208$, $p < 0.01$
Community-connectedness	48.48 (21.18)	63.7 (17.2)	49.65 (21.03)	47.21 (21.07)	48.79 (21.29)	$F(2) = 4.660$, $p < 0.05$
Satisfaction on future security	34.45 (23.84)	64.5 (17.1)	36.76 (24.36)	33.49 (23.81)	34.16 (23.62)	$F(2) = 6.508$, $p < 0.01$
Personal wellbeing	49.00 (16.77)	67.0 (15.5)	50.78 (16.94)	48.11 (16.79)	48.86 (16.66)	$F(2) = 8.241$, $p < 0.001$

^, The data was collected in 2005 (Lau, 2021)

as well as employees with job instability due to pandemic (Lau et al., 2021). These economic challenges might decreased the standard of living and led to increased stress, anxiety, and uncertainty among the population, impacting their overall satisfaction with their standard of living (Gong et al., 2022a, b). In addition, the pandemic's disproportionate impact on various socioeconomic groups has amplified pre-existing disparities and inequalities, resulting in an expanding divide in living standards between affluent and marginalized populations. For instance, pandemic would enlarge disparity in access to information technology such that elderly, ethnic minority and populations of low educational attainment might have limited access to receive updated information about the pandemic, hence having poorer pandemic risk communication (Lau et al., 2021). The uneven allocation of resources, healthcare access, and social support systems have significantly shaped individuals' perceptions of their living standards, especially among the vulnerable and disadvantaged groups.

Impacts of Neighborhood Built Environment, Risk Communication and Health

The data collected in Hong Kong underscores higher percentage of open spaces in the neighborhood increased personal wellbeing during pandemic responses, which was consistent to the other research (e.g., Lin et al., 2023; Slater et al., 2020). Spending time in nature and having a high orientation to nature are linked to improved wellbeing, acting as a buffer for mental health during stressful periods like the pandemic (Lin et al., 2023). Access to urban green spaces can provide opportunities for physical activity, stress reduction, and social connectedness, which are all crucial for maintaining wellbeing during challenging times (Slater et al., 2020). In a densely populated city like Hong Kong, open spaces are essential for social distancing, a key measure in controlling the spread of the virus by allowing people to get out of their homes for exercise or relaxation while still maintaining a safe distance from others.

A higher percentage of public housing in the neighborhood can potentially decrease personal wellbeing during the pandemic response. Living in a high-risk neighborhood is significantly associated with higher perceived COVID-19 risk and distress during the pandemic (Huang et al., 2020). In Hong Kong, public housing often involves higher population densities, which can make social distancing difficult. This can lead to increased stress and anxiety due to fears of contracting the virus. Living in neighborhoods with a higher concentration of public housing may lead to challenges related to poverty, limited access to resources, and social disparities, which can contribute to increased stress, reduced sense of safety, and overall lower wellbeing among residents. The lack of adequate housing conditions, limited access to green spaces, and higher levels of neighborhood distress in areas with a higher percentage of public housing can further impact personal wellbeing during the pandemic response.

Regarding pandemic risk communication, adopting an increased number of new information channels (e.g., internet, communication APPs and social media) for pandemic-related information acquisition, or spending more time per day on social media, can potentially reduce personal wellbeing during pandemic

Table 4 Impacts of environmental factors, information seeking behaviors, sociodemographic and health on participants' personal wellbeing amid pandemic response

Factors	Items	Model 1	Model 2	Model 3	Model 4
Neighborhood built environment[#]	*% open space*	**0.035, $p < 0.05$ [0.016,0.167]**			**0.047, $p < 0.01$ [0.047,0.203]**
	% private residential area	**0.038, $p < 0.05$ [0.005,0.114]**			0.013, $p = 0.490$ [-0.034,0.077]
	% public residential area	**-0.104, $p < 0.001$ [-0.200,-0.101]**			**-0.079, $p < 0.001$ [-0.168,-0.057]**
	% government institutional and community land	0.008, $p = 0.578$ [-0.057,0.103]			0.019, $p = 0.199$ [-0.029,0.139]
	% road cover	-0.027, $p = 0.150$ [-0.117,0.018]			-0.021, $p = 0.311$ [-0.111,0.035]
	Normalized difference vegetation index	0.024, $p = 0.172$ [-1.320,7.407]			0.005, $p = 0.795$ [-3.973,5.186]
	Sky view factor	-0.003, $p = 0.891$ [-0.071,0.062]			0.012, $p = 0.628$ [-0.059,0.097]
Pandemic risk communication	*Traditional information channel utilization*		**0.059, $p < 0.001$ [0.329,0.939]**		**0.056, $p < 0.001$ [0.296,0.909]**
	New information channel utilization		**-0.046, $p < 0.01$ [-1.690,-0.390]**		**-0.029, $p < 0.05$ [-1.323,-0.005]**
	Credibility judgments in the information-seeking process		-0.017, $p = 0.279$ [-0.627,0.181]		**-0.031, $p = 0.050$ [-0.809,0.000]**
	Intention to seek information from reliable media		**0.042, $p < 0.01$ [0.119,0.844]**		**0.046, $p < 0.01$ [0.172,0.897]**
	Confidence in information seeking		**0.223, $p < 0.001$ [1.978,2.540]**		**0.226, $p < 0.001$ [2.019,2.581]**
	Average time spend on social media per day (hours)		**-0.114, $p < 0.001$ [-1.025,-0.626]**		**-0.093, $p < 0.001$ [-0.890,-0.484]**

Table 4 (continued)

Factors	Items	Model 1	Model 2	Model 3	Model 4
Health indicators	*Having drinking habits*			0.015, $p = 0.270$ [-0.562,2.010]	0.023, $p = 0.104$ [-0.223,2.410]
	Having smoking habits			**-0.060, $p < 0.001$ [-5.273,-1.974]**	**-0.048, $p < 0.001$ [-4.614,-1.225]**
	Chronic patients			**-0.091, $p < 0.001$ [-5.142,-2.730]**	**-0.087, $p < 0.001$ [-5.009,-2.546]**
Gender	*Female*			**0.046, $p < 0.001$ [0.663,2.445]**	**0.047, $p < 0.01$ [0.644,2.495]**
Age (Ref. 18–39 years)	*40–59 years*			**0.172, $p < 0.001$ [4.799,6.789]**	**0.148, $p < 0.001$ [3.904,5.952]**
	60 or above			**0.218, $p < 0.001$ [9.446,12.522]**	**0.186, $p < 0.001$ [7.987,11.261]**
Education (Ref. Secondary or below)	*Postsecondary*			**0.079, $p < 0.001$ [2.327,4.833]**	**0.068, $p < 0.001$ [1.831,4.449]**
Geographical location (Ref. HK Island)	*Kowloon*			**-0.047, $p < 0.01$ [-3.089,-0.458]**	-0.032, $p = 0.146$ [-2.762,0.410]
	New Territories			-0.027, $p = 0.133$ [-2.089,0.276]	-0.028, $p = 0.204$ [-2.401,0.513]
Model performance		$F(7) = 11.642$ $p < 0.001$ $R^2 = 0.015$	$F(6) = 60.715$ $p < 0.001$ $R^2 = 0.071$	$F(9) = 33.342$ $p < 0.001$ $R^2 = 0.055$	$F(23) = 29.924$ $p < 0.001$ $R^2 = 0.126$

[#], the data of all the environmental factors were collected for the area that was within a 500-m radius of the participant's residence; standardized coefficients were reported for each model

response. While social media can serve as a tool for connection and support during crises, excessive passive consumption of information without active engagement or interaction may not provide the same benefits and could potentially lead to negative outcomes (Sun et al., 2022). Spending more time on social media during the pandemic can have a negative impact on personal wellbeing due to factors such as increased anxiety (Gong et al., 2022a, b), exposure to negative representations and misinformation (Zhou et al., 2023). Excessive exposure to social media, or social media addition, has been correlated with depression and anxiety, potentially leading to more mental health issues especially for the younger population (Akbari et al., 2024). It is crucial for individuals to be mindful of their social media usage and actively engage in positive interactions to mitigate potential negative effects on their mental health and overall wellbeing.

When comparing to social media, traditional media sources, such as television, radio, newspapers, and podcasts, have been identified as the primary sources of COVID-19 information for a significant portion of the population (Ali et al., 2020). These channels often provide reliable and verified information, which can help individuals stay informed without being overwhelmed by misinformation or sensationalized content commonly found on social media platforms (Piltch-Loeb et al., 2021). Trust in information is essential for individuals to make informed decisions and feel reassured, which can have a direct impact on mental wellbeing (Adam et al., 2023). Research has also shown that traditional media channels, including national TV and newspapers, play a crucial role in increasing the likelihood of vaccine acceptance (Piltch-Loeb et al., 2021). This suggests that information obtained through traditional sources can positively influence health-related decisions and behaviors, contributing to a sense of security and empowerment during uncertain times like a pandemic.

Regarding health indicators, both smoking habits and chronic patients significantly correlate with personal wellbeing during pandemic response. Active smoking would increase susceptibility to COVID-19 infection, causing more severe COVID-19 symptoms and a higher risk of hospitalization and mortality (Kashyap et al., 2020; Shastri et al., 2021). It is evident that COVID-19 would undermine the physical health of smokers with worsened outcomes. Particularly, the pandemic-related stress, such as boredom and restriction in movement, would stimulate smoking behaviors, making quitting more difficult and further undermining health and personal wellbeing (Bommelé et al., 2020). Moreover, individuals with chronic conditions might be at a higher risk of severe illness if they contracted Covid-19 (De Pue et al., 2021). This increased risk could cause stress and anxiety, negatively impacting their wellbeing. The pandemic led to disruptions in healthcare services in many places including Hong Kong (Teo et al., 2020), with many routine appointments and treatments being postponed or cancelled. This could lead to worsening health conditions for chronic patients, affecting their personal wellbeing. Understanding these interrelated factors is crucial for developing targeted interventions to address the adverse effects of increased drinking habits on mental health during challenging times like the COVID-19 pandemic.

Recommendations

According to the study of personal wellbeing during pandemic response, there are some recommendations for enhancing personal wellbeing during pandemic response. First, a tailored intervention program and resources for intervention should be directed towards areas with a high percentage of public housing. This is due to the fact that residing in neighborhoods with high concentrations of public housing can potentially lead to elevated stress levels and diminished personal wellbeing. It is crucial to procure support and resources to tackle issues related to poverty, limited resource access, and social disparities for improving personal as well as family wellbeing (Shek, 2021; Shek et al., 2023).

Second, policy recommendations should be made for urban planning. Access to open spaces and green areas can enhance wellbeing during challenging times of pandemic response. It is beneficial to utilize urban green spaces for physical activity, stress reduction, and fostering social connections, while still adhering to social distancing guidelines.

Third, being mindful of personal social media use and actively engaging in positive interactions is crucial to counteract potential negative effects of extensive social media use on mental health. Excessive passive consumption of pandemic-related information on social media can lead to heightened anxiety, exposure to infodemics. WHO defined an infodemic as "too much information including false or misleading information in digital and physical environments during a disease outbreak" (WHO, 2020). Interventions are urgently needed to dispel pandemic infodemics. Specifically, educational interventions target at addressing infodemics-induced challenges would be necessary. Local government may launch educational campaigns to empower local with the essential skills to identify credible source for processing health information in objective manners, thoughtfully considering of the veracity and quality of health information (Su et al., 2021; Wang et al., 2022). In the long run, citizens may be educated to develop good health literacy to distinguish credible information from misleading information, reducing their exposure to stressful and unreliable information and hence lowering their risk to be mentally influenced by bias in social media (Su et al., 2021). Usually, traditional media channels like television, radio, newspapers, and podcasts offer reliable and verified information. Having trust in these sources of information can positively impact decision-making, foster a sense of security and empowerment, and ultimately strengthen personal wellbeing.

Last but not least, it is essential to be mindful of smoking habits and chronic diseases, and to seek healthier coping mechanisms during the pandemic response. If routine appointments are postponed or cancelled due to the pandemic, they should seek alternative ways to manage their conditions, such as telemedicine or home-based care.

Limitations and Research in Future

The research presents certain limitations due to the potential sampling bias inherent in online surveys. Firstly, not all demographics had equal access to or familiarity with the internet, which might skew the sample towards younger, higher educated and more tech-savvy individuals. Secondly, those who choose to participate in online surveys might have different characteristics or attitudes than those who do not, introducing a self-selection bias. Lastly, the anonymity of online surveys could lead to careless or dishonest responses. Despite efforts to ensure a representative sample, these biases could limit the generalizability of the research findings.

This study provides a snapshot of Hong Kong population at a single point in time, which could make it difficult to establish cause-and-effect relationships. Cross-sectional studies were also susceptible to temporal bias, as they did not account for changes of personal wellbeing over time. These limitations could potentially affect the interpretation and applicability of the research findings. Longitudinal research is necessary to overcome the limitations of cross-sectional design because it allows for the study of changes over time (Shek et al., 2023).

Conclusions

This study reveals a significant decrease in personal wellbeing among Hong Kong residents during the pandemic, with a reduction of over 20% compared to the pre-pandemic period. The most profoundly affected areas include satisfaction with future security, personal safety, and living standards. Factors positively associated with personal wellbeing during the pandemic response include a higher percentage of open spaces in the neighborhood, the use of more traditional information channels, a tendency to seek information from reliable media sources, and increased confidence in information seeking. Conversely, factors negatively associated with personal wellbeing include a higher percentage of public residential areas, the use of more new information channels, spending more time on social media, smoking habits, and chronic health conditions. These findings provide critical insights into the diverse impacts of the pandemic on individuals and communities. They guide targeted interventions and contribute to building resilience against future crises. By prioritizing personal wellbeing in pandemic responses, policymakers, healthcare providers, and institutions are better positioned to support individuals in maintaining their mental health, quality of life, and overall wellbeing.

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Data Availability The data that support the findings of this study are available from the corresponding authors upon reasonable request.

Declarations

Ethics Approval This study was approved by Human and Artefacts Ethics Sub-committee, City University of Hong Kong (reference: 27609824).

Conflict of Interest No potential conflict of interest was reported by the authors.

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