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The Role of Serious Games and Youth as Co-designers in the 'Ideal City': Considering a Healthy and Sustainable Auckland

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Abstract

Serious games are an innovative means of contributing to complex problem-solving today. They provide opportunities to consider the many variables involved in each problem and to develop innovative solutions. City-building games, such as SimCity and Cities: Skyline, are widely used in various settings, including education, helping learners and facilitators understand cities as complex systems. Many of the urban issues presented in these games (traffic, pollution, natural disasters, waste accumulation, activity spaces) relate to health outcomes as well as the urban environment. As such, although not designed for health, they often reflect the determinants of health challenges and fit well with a 21st century planetary health model.

This small-scale exploratory study, conducted in Auckland, Aotearoa New Zealand, aimed to advance the healthy cities agenda by creating a collaborative space where university students could envision and design sustainable urban futures. The study used a codesign workshop to elicit ideas for future healthy and sustainable cities, modelling themes which could inform the creation of serious games. The study was undertaken as part of a student summer research project which included the codesign workshop, a review, and a poster presentation at the Planetary Health Alliance annual meeting. It responds to the *Rangahau Aranga's* call for papers exploring Auckland in 2050 with a focus on wellbeing.

Four student codesigners, considered issues and solutions for an ideal or reimagined future city. World-building, a key feature of games, serves as a valuable 'thought experiment', going beyond the status quo to alternative futures, to the potential of new technologies alongside traditional values, such as indigenous Kaitiakitanga (Māori guardianship of the natural environment).

Serious games codesign offers a more creative space than normative education for youth to explore key strategies and ideas, yet it is less commonly used in urban health or public health. World-building enables those involved to move beyond siloed disciplinary and sectoral norms. Further research would benefit from exploring the disruptive, fun, challenging, capacity-building, and wicked problem-solving potential of serious games in public health.

Introduction

The Rise of Urbanisation

Stemming from early human settlements such as those in Mesopotamia and Egypt, the emergence of cities is pivotal in relation to the social and ecological development of our planet (de Leeuw, 2017). In the 21st century, there has been tremendous growth and development of cities worldwide. Today, roughly 57% of the world's population lives in urban areas—a figure projected to reach 68–70% by 2050, adding approximately 2.4 billion urban residents, especially in Asia and Africa (World Bank 2022). Given that humans are contributing to climate change, where humans live, work, and play for most of their lives is likely to have a significant impact on climate and on health.

As a fast-growing urban area, Auckland is facing similar challenges to those of other cities around the world. In 2025, the Auckland urban region is estimated to have a population of approximately 1.71 million, comprising about 33–34% of New Zealand's total population (Statistics New Zealand, 2024).

Despite the array of benefits that urbanisation brings, such as access to jobs and education, it is evident that it also creates health issues for urban populations. Significant attention has been given to the impact that the development of cities has had on the health of population groups by policy makers and organisations. The concept of the determinants of health stipulates that multiple social and environmental factors affecting the conditions in which individuals are born, live, work and age have an impact on their overall health, and this is viewed increasingly in the context of cities (World Health Organization Europe, 2020a and b c). WHO (2020a and b) states that the uneven distribution of these conditions (such as inequitable housing, incomes, education and health care services) contributes to differences in health status between groups in society. Groups who are disadvantaged have less opportunity to be healthy and face an increased risk of illness coupled with a decreased life expectancy (World Health Organization Europe, 2020 a b c).

In the words of Corburn (2017) "city planning acts as a structural determinant of health" (p.31). To prevent this and ensure the benefits of urbanisation are shared by all, urban growth must manage in such a way that the needs of vulnerable groups and the urban poor are met (United Nations Department of Social and Economic Affairs, 2018). The World Health Organization's 2025 Urban Health Fact Sheet shows a clear link between noncommunicable diseases—such as cardiovascular disease, diabetes, cancer, and chronic respiratory illness—and urban-associated risk factors like unhealthy diets, physical inactivity, air pollution, unsafe transport, and stress (WHO, 2025).

Climate Change and Planetary Health

Planetary Health is a framework recognising that human health is inseparable from the health of natural systems (Whitmee et al., 2015).

The Rockefeller–Lancet Commission's report was key to the mainstreaming of the concept, highlighting that global health improvements have often come at the expense of ecological stability. A core challenge is society's tendency to prioritise short-term

gains over long-term sustainability, leading to environmental degradation that disproportionately affects already vulnerable populations (Whitmee et al., 2015). Increasingly, climate change is recognised as a key determinant of health, exacerbating existing inequalities and impacting access to clean air, water, food, and shelter.

Many indigenous health belief systems emphasize relationships between the land and human society (Prescott & Logan, 2019). In the Aotearoa New Zealand context, the concept of Kaitiakitanga, meaning guardianship of the land, encompasses notions of environmental sustainability and conservation (Science Learning Hub – Pokapū Akoranga Pūtaiao, 2017). Walker et al. (2019) note that Kaitiakitanga practises are particularly important for Māori, as it fosters their connection to the land. Furthermore, this impacts Māori wellbeing by improving the sense of self and connection to spiritual ancestors. Arguably, notions of natural guardianship are rooted in many indigenous systems and have wide application beyond the confines of one place. Thus, Kaitiakitanga offers a value-based model of guardianship and sustainability leadership for the wider community in Aotearoa New Zealand (Walker at al. 2019).

Healthy and Sustainable Cities as a Wicked Problem

Healthy Cities are defined as places which provide for people and the planet and "engage the whole of society, encouraging the participation of all communities in the pursuit of peace and prosperity" (World Health Organization Europe, 2020a, para. 1). The goals of healthy cities align strongly with addressing issues relating to the determinants of health and now more than ever to the widely supported Sustainable Development Goals (SDGs). WHO (2020b) describes the healthy cities approach as a process in which a variety of political and social decision makers contribute to the health of city dwellers by enabling them to reach their full potential. This approach places health high on the political and social agenda of cities. The key challenge that Corburn (2017) presents is the need for city planning and public health to be connected in a way that addresses the underlying causes of health inequity, as opposed to merely addressing specific diseases on an individual level.

Portney and Sansom (2017) in their study aimed to prove that sustainability initiatives have a direct link to the health outcomes of individuals and therefore can be used as a means of addressing health concerns. Using bivariate data from the United States' largest cities, they found an empirical link between a cities aggressive pursuit of sustainability policies, and lower obesity rates. While this does represent a narrow view of what it means to be in good health, it does provide a starting point for further research. It reinforces, to a degree, the argument that sustainability initiatives have a positive impact on the health of those living in cities.

'Wicked problems' are those that are seemingly impossible to solve due to their complex nature and volatile requirements. Kumlien and Coughlan (2018) note that wicked problems are so complex and multifaceted that it is difficult to determine what the problem is and how it can be addressed. They describe them as follows, "like a tangled mess of thread" (para. 1), and it is impossible to know which thread should be pulled first. Addressing the determinants of health while developing a healthy city in a

sustainable way is an example of a wicked problem that both public health practitioners and city developers face.

Guy et al. (2005) describes wicked problems as ones with incomplete, contradictory, and changing requirements. They argue that serious games provide a suitable platform for exploring and addressing wicked problems. Their research into the use of existing games, and the development of their own game, GamePlan, found that serious games have the potential to "generate efficiencies, certainties, comradery and economic growth - whilst also producing socially and economically sustainable streets and places" (p. 4). They propose that serious games allow players to engage with and develop a variety of perspectives on an issue.

The games are not intended to replace existing systems or groups but rather empower them with the skills and ability to address the wicked problems these groups and systems face.

Serious Games and World Building for Health

In the last few years there have been significant developments in relation to serious games, including for health (Tolks et al., 2019). This is unsurprising given the strong link between rapidly evolving digital technologies and the gaming industry (Tolks et al., 2019). While it remains difficult to provide an exact definition of serious games, the literature suggests they are commonly defined as games which have the implicit goal of educating players (Wattanasoontorn et al., 2013; Baranowski, 2018; Tolks et al., 2020). The goal of serious games for health can be summarized as games that aim to increase player health knowledge and competencies, contribute to player rehabilitation, generate health-related behaviour change in players, and/or improve the health of players (Wattanasoontorn et al., 2013; Tolks et al., 2020). Gamification is another term which frequently overlaps with serious games; however, it is distinct in that it refers to the use of game elements outside of a formal game environment (Baranowski, 2018; Tolks et al., 2020). It is associated with notions of gaining competence and developing solutions in complex circumstances.

In 2013, Wattanasoontorn et al. aimed to provide an overview of serious games for health by surveying and classifying over 100 such games. They ultimately found great variability between different serious games, and that the purposes of these games exist within a wide range of possibilities. In the same vein, Tolks et al. (2020) argue that serious games have widespread potential to be used in a variety of situations. Tolks et al. (2020) go on to emphasise the usefulness of serious games and gamification techniques for engaging with groups who are normally disinterested or hard to reach, or indeed for engaging groups together who would normally not collaborate, such as sector specialists. Baranowski (2018) highlights the need to understand how different types of games can be used for different purposes, what their positives and negatives are, and which target groups and environments will be most suited to the implementation of serious games for health. The limited research into specific types of games and game outcomes suggests there is a need for further studies. It is evident that further research is needed to fully understand the usefulness

and potential of serious games for health (Wattanasoontorn et al., 2013; Baranowski, 2018; Tolks et al., 2020).

A common theme in the literature, one which is highly significant for this study, is that serious games for health focuses on individual health behaviours and outcomes, rather than societal actions and outcomes. For example, Wattanasoontorn et al's (2013) summary of over 100 serious games was limited to the immediate health implications on individuals. Similarly, Tolks et al. (2019) emphasize the potential that serious games have in health prevention and promotion, with a focus on educating and improving the skills of individuals. This view is limited for our purposes as it does not consider a wider understanding of health, that of public health models, which recognise that health impacts go beyond the individual and are often affected by health environments, the spaces, and places where communities live, work and play. In other words, the world in which we inhabit and that the game inhabits, for example the city context, is a vital component of serious games and healthy and sustainable cities.

Serious Games for Urban Planning

Urban planning and city development are where serious games have been given significant attention. Role-playing games (RPGs) and city building games (CBGs) are popular due to their ability to consider wider social, economic structural and political factors which are part of the world-building element of such games (Edwards et al., 2019; Bereitschaft, 2016).

Bereitschaft (2016) reflected on the value of CBGs as a tool that effectively introduces urban design students to urban planning concepts. He found that CBGs are a unique learning medium which can introduce students to aspects of city building and urban development and help them to understand cities as complex systems. CBGs challenge players to develop creative thinking skills, as well as encourage them to exercise adaptive critical reasoning (Bereitschaft, 2016). Many of the issues students are introduced to in these CBGs share similarities to the issues public health students are taught to consider in their programme designs (Whitmee et al., 2015). For example, traffic, pollution, natural disasters and waste accumulation are all examples of issues players may learn about when playing CBGs, and they are all also related to the determinants of health.

Like Bereitschaft (2016), Minnery and Searle (2014) examined the use of SimCity 4, a CBG, in undergraduate and postgraduate planning education. Their findings support the notion that CBGs can be used to help students learn about complex systems, develop creative and critical thinking skills and understand the immediate and long-term impacts of urban development. SimCity 4 is a popular CBG which is widely used in urban planning education (Gaber, 2007, as cited in Minnery & Searle, 2014). Minnery and Searle (2014) found that the game, while helpful for understanding concepts such as zoning, land/transport use and budget constraints, had obvious differences to real life. The major differences that Minnery and Searle (2014) found was the centralisation of power and corresponding lack of citizen involvement. SimCity 4 appoints the player as both mayor and city developer, giving them almost unlimited power to make decisions about the development of the city (Minnery & Searle, 2014).

Edwards et al. (2019) explored another type of serious game which are commonly used in an educational setting: RPGs. They considered the use of RPGs as a means of addressing issues in employing adaptive governance and found that RPGs can be successfully used to address the complex issues which arise when implementing adaptive governance. Another finding was that RPGs are highly adaptable, meaning they have the potential to be used in a wide variety of contexts, situations and at micro, meso and macro scales. There is also the ability for them to include an interdisciplinary approach, enabling players from a range of backgrounds to realise the value in each other's fields, and ultimately increase their learning. RPGs could provide a learning opportunity for public health professionals as well as government officials, which could enable them to develop adaptive governance skills to solve the wider public and planetary health problems that cities face using a collaborative approach.

A common theme in the review was that serious games such as CBGs and RPGs have the potential to serve as a tool for providing a wider health perspective, such as that of a focus on determinants of health, health inequities and a planetary health approach. Ultimately, the ability of serious games to provide players with a safe space to experiment and explore a variety of possibilities makes them an ideal learning environment, allowing players to take risks and observe consequences without any real-life impacts (Devisch et al 2016). Bereitschaft (2016) found that serious games can be used as a tool for teaching skills which can foster creative and critical thinking, and consequently improve the player's ability to solve future, real-world problems. This supports Guy et al's. (2005) view that serious games have the potential to address wicked problems.

The success of serious games being used in tertiary urban planning education settings suggests that it may be possible to introduce serious games into public health education too (Edwards et al., 2019). This would allow for the games to be evaluated in an academic setting, as well as provide students with the creative and critical problem-solving skills, they will need to address the wicked problems of the future.

Overall, the literature suggests that there is a need for collaboration between policy makers, city planners and government groups as they work to improve the health of their cities, and this requires new and innovative modalities for success. WHO (2019) argues that a multilevel governance approach is needed to reduce the prevalence of NCD's within cities.

This review has found that there is scope for serious games to be used as a tool to support students and other actors to become better equipped at tackling wicked problems which are related to climate change and the development of healthy urban spaces.

Methodology

This research aimed to contribute to a future healthy cities agenda by providing a collaborative space for university students to work alongside faculty, as a summer project with faculty supervising a student researcher.

A codesign focus group workshop was conducted with four university students and the student researcher. Co-design is grounded in participatory design principles that aim to make design processes democratic, inclusive, and knowledge-producing (Busciantella-Ricci & Scataglini, 2004). Participants came from different academic disciplines; however, all shared an interest in serious game design and healthy cities.

The focus group was guided by the prompt: “Imagine your IDEAL CITY of the future…”, with a specific emphasis on urban health. The discussion was audio-recorded, and photographs were taken of the visual materials produced during the workshop. Following the focus group, the audio recording was transcribed verbatim.

Data were analysed using an inductive thematic analysis approach. Key themes were identified based on their relevance to the research aim and their prominence within the data. This approach involves “searching across the data for patterns of meaning” and is described as data-driven rather than theory-driven or based on prior assumptions by the researcher (Braun & Clarke, 2006, p. 83).

Ethical approval for the study was granted by Auckland University of Technology (AUTEC 20/326).

The focus group was advertised, and further communication was conducted, by email to student groups and their friends. The participants were all recently graduated or near graduation. Participants were invited to give consent, and confidentiality was provided in line with the requirements of AUTEC. The focus group was conducted in a meeting space on the Auckland University of Technology city campus and was three hours long with a short break for food and chat. The student researcher presented the aim of the study and invited the participants to imagine their ideal city of the future.

Results from the Codesign Workshop

The results are presented in the order that the activities took place. First, the focus group identified current issues and problems in the context of urban Auckland as they saw them. They then identified possible solutions (Figure 1 presents these using ‘traffic lights’ to denote what was mentioned the most or the least).

Issues Identified	Potential Solutions
Loss of meaning/purpose in life*	Education
Suicide & Depression	Support services
Lack of daily structure/routine	Law enforcement
Obesity	Increased diversity
Diabetes	Decreased advertising + media influence
Illness	Health promotion
Body image issues	Renewable energy
Lack of harmony with natural world	Open source technologies
Lack of physical connection/poor relationships	< More frequently mentioned Less frequently mentioned >
Overpopulation/lack of resources*	
Climate change*	
Privacy/free choice	

Figure 1 – Issues Identified and Potential Solutions

The themes identified with asterisks were explicitly identified as wicked problems by the participants. The following quotes explain how the participants felt the issue met the criteria of a wicked problem –

> "I feel like we've established climate change is a wicked problem"
>
> "I think we're a little bit screwed"
>
> "Who would manage all of this?"
>
> "AI [Artificial Intelligence]… we wouldn't… we always mess things up."

(Participants A-D)

For the next exercise participants were invited to write their ideas for an ideal city on post-its.

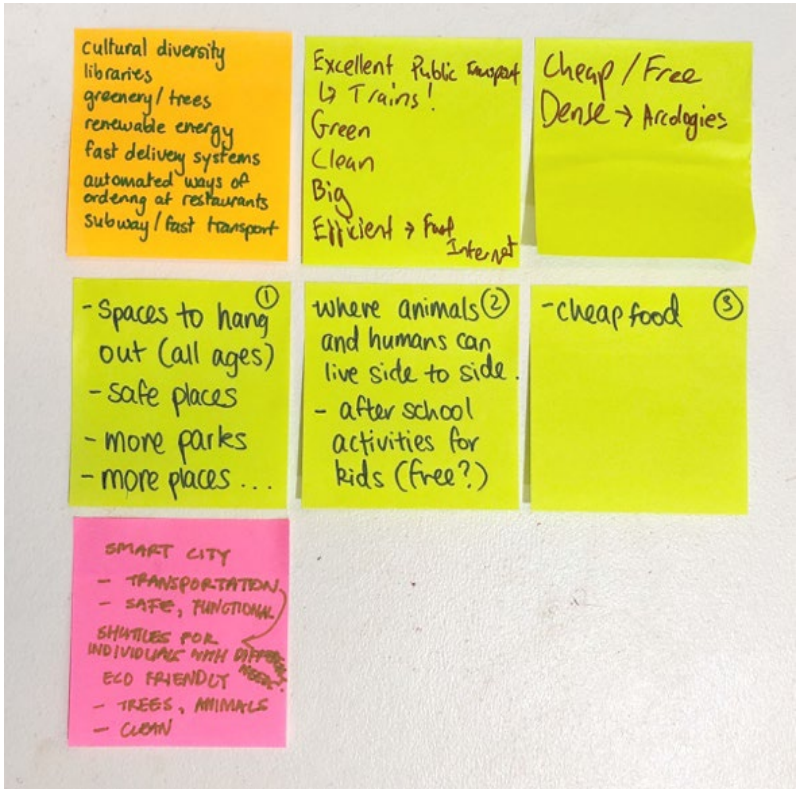

Figure 2 – Ideas for an ideal city

Towards the end of the session, they depicted an ideal city with a montage of images and text (Figure 3).

Figure 3 – A montage of images of associated with the ideal city

The group expressed an interest in a strong educational focus; diverse spaces for nature and people to live side by side; technological advances and equity were other aspirations –

"More parks, more places where animals and humans can live side by side."

"I think it would be cool to have wild animals do their own thing and coexist."

Participant C

"I want there to be lots of trees, animals and I want the environment to be clean."

(Participant D).

Wearable technology and cyborg-like technological developments exist in their world and is incorporated into the city's infrastructure.

"I wanted the city to be really smart and how we can use our smartphones. And the same with transportation. I hate for the bus…I want it to come on time. And I want it to be safe and functional, like for example if I'm coming into the city, I sleep on the bus. It's only 40 minutes but I sleep."

(Participant D)

There was considerable emphasis on spaces – green spaces, safe spaces – spaces to hang out, big cities but dense cities, eco 'bubbles' as types of space.

The latter idea was that the city would no longer rely on seasons as we know them, but rather 'eco' bubbles which contain different climates for different activities – depending on need. There is efficient transport between the bubbles allowing people to commute as needed –

"…dense archologies, because I like the idea of huge mega structures that can serve multiple functions."

(Participant B)

"The idea of archology is pretty much a massive structure where you can have everything. So, it's basically the idea of a very efficient space that can serve every function in a small area.

So I think that ties into all that sort of stuff, so you have your own community in a relatively small area, but because its thought about in such a clever way you can fit so much within the space, because it gets bigger and more dense."

(Participant B)

The participants idealised that money would not be an issue for anyone. Everything is provided freely or affordably, and citizens would have significant amounts of free time to pursue hobbies and interests -

"Cheap/free – it would be cool if everything was free."

(Participant B)

The group believed that potential solutions for the issues they identified are access to education, increased community support, the removal of the influence of advertising and media, improved spaces, better technology and greater equity. Education was one of the most prominent suggested solutions, and one participant described it a need for "really, really intense education."

Concluding Remarks

This exploratory study highlights the potential of serious games and youth-led co-design in envisioning healthy, sustainable urban futures, with Auckland as a case study. Through a small-scale codesign workshop involving university students, the research engaged youth as future leaders in imagining their ideal city and tackling wicked problems such as climate change, overpopulation, and loss of meaning. The participants emphasized environmental sustainability, equity, access to education, and human-centred technology. In the review, serious games—particularly those involving world-building—were identified as powerful tools to enable creative, interdisciplinary thinking about complex urban health issues. Participants proposed solutions ranging from eco-bubbles and archologies to better transport and free, community-based services. The workshop also reflected values like Kaitiakitanga (Māori environmental guardianship), demonstrating how indigenous perspectives can be integrated into future city design.

Although the context of serious game development was discussed it played a limited role in the focus group discussion. This may be because the participants were really focused on the scenario setting process and designing a game would be a later process. This would be in line with codesign which typically follows a number of steps and requires a number of meetings which were not possible in the time allotted.

The study suggests that serious games can provide an engaging platform for learning and problem-solving in urban and public health contexts. Unlike traditional education methods, these games allow for participatory and experiential learning, breaking disciplinary silos and fostering systems thinking. The inclusion of youth as codesigners also proved crucial, as it empowered them to generate innovative, hopeful, and inclusive visions of urban life.

The group consisted of university students, and they may have been biased toward seeing education as a solution due to their investment in their own study. This research could have benefitted from having young people of many backgrounds participate.

Future research should expand the participatory approach to include a more diverse range of youth voices, including those not currently engaged in higher education, to ensure broader representativeness. Future research would also need to allow additional time and events to follow the co-design process further through ideation to game design. Additionally, other studies could examine how participation in codesign and serious game development influences youth perspectives on sustainability and health over time.

There is also scope for designing and testing actual serious games based on the ideas generated in such workshops, to evaluate their effectiveness in real educational and health policy settings. Further interdisciplinary collaboration between game developers, urban planners, educators, and public health professionals is essential to harness the full potential of serious games for addressing the wicked problems of urban sustainability and planetary health.

The study responds to the *Rangahau Aranga's* call for papers exploring Auckland in 2050 with a focus on wellbeing. It is recommended that relevant stakeholders should embed youth-led co-design and serious games within policy development processes to ensure young people's perspectives inform long-term sustainability and health strategies in cities such as Auckland.

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