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Feminist urban living labs and social sustainability: lessons from Sweden

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article

Abstract

A debate about emerging models of urban living labs (ULLs) 2.0 is taking place in the literature, highlighting the importance of social aspects. The aim of this paper is to examine feminist ULLs as a potential source of social sustainability. This is conducted through a case study of a feminist ULL in Sweden, where girls and young women, together with multiple professional stakeholders, used Minecraft to redesign a public square in their neighbourhood - a marginalised suburban area of Stockholm. Data was collected through participant observations of six experimental labs during 1 year, surveys of the ULL participants, and an analysis of the final Minecraft designs. The empirical findings reveal a process of mutual learning between girls and professional stakeholders, where the girls were viewed as place experts. The findings also reveal that the girls' visions include a socially sustainable transition of the urban square: from patriarchal to inclusive, from grey to green, and from a transit area to a meeting-place. There were some differences between girls and professional stakeholders. Whereas the professionals tended to emphasise security in their visions, the girls emphasised liveability. Although more research is needed, this paper concludes that feminist ULLs can be a possible source of social sustainability. However, the ULL process must both be inclusive, and at the same time unlock long-term transformation in the physical environment.

Keywords: Feminist urban living labs, Intersectionality, Livability, Marginal suburban areas, Minecraft, Public space, Social sustainability, Sweden, Urban squares, Young women

Science highlights

- Even though urban living labs (ULL) are intended to be inclusive and collaborative, pervading intersectional feminist approaches, methods and processes are not yet standard. If they are not employed in the conceptual (and practical) development of ULL 2.0, the unwanted outcomes risk remaining the same. Considering that the inequalities and patriarchy can be embedded in all aspects of society, including urban public space, there is a risk that it becomes accepted in everyday life.
- The current case study of a feminist ULL in Sweden called UrbanGirlsMovement (UGM) present certain empirical evidence that patriarchal and socially unsustain-



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able urban public spaces could be discharged by means of intersectional feminist approaches. The UGM, constituting a positive example of a feminist ULL, consisted of girls and young women who, together with multiple stakeholders, used Minecraft to redesign a public square in their own housing area - a marginalised suburban area. During the ULL process, the girls and young women were viewed as place experts.

- The empirical findings reveal that the girls' and young women's designs and visions include a socially sustainable transition of the suburban public square: from patriarchal to inclusive, from grey to green, from a transit area to a meeting-place.
- The findings also reveal differences between the girls and the other stakeholders, with possible implications for social sustainability. Whereas the professional stakeholders tended to emphasise security, the girls and young women emphasised liveability. Although not always so easily conducted, the importance of including a variety of different groups, including marginalised groups, in ULLs is therefore emphasised.
- There is reason to further explore feminist ULLs using inclusive and innovative methods (e.g. Minecraft) as a potential development from 'ULL 1.0' to '2.0'. This is particularly important when targeting public squares in socially conflicted urban areas, since squares often carry a symbolic value for communities and their residents.

Policy and practice recommendations highlights

- Our findings, where girls and young women emphasised liveability measures more strongly than direct security measures, oppose the ongoing standardization of surveillance and control as dominant measures in suburban areas characterised by conflict and social unrest.
- Including girls and young women as place experts in local urban experimental projects by means of intersectional feminist methods, is a seemingly informative and beneficial way to explore pathways for social sustainability in local urban change processes and ULL 2.0.
- Urban development stakeholders and planners can benefit from proactively revisiting plans and processes to critically discuss trade-offs and which interests are given priority, especially in the development of symbolic places in socially challenged neighbourhoods.
- To move from ULL 1.0 to ULL 2.0, more focus must be placed upon the local transfer of the ULL. Projectification and fancy labels must be replaced with actual transformation of the local community

Introduction

Cities are complex systems in constant flux. With a climate crisis and a growing urban population, cities around the world face a number of pressing challenges including climate mitigations and adaptations, increasing social inequalities, segregation, and shortages of public spaces (Fainstein and DeFilippis 2018). In Sweden, where this study is conducted, socio-economic inequalities and residential segregation have increased during the last decades (Delmos 2021; Statistics Sweden 2021). In Stockholm, which is one

of the fastest growing cities in Europe, there are increasing divides between different social groups and residential areas (Bremberg and Slättman 2021).

Suburban youth are often described as subject of social disorder and disintegration (Stigendal 2016). In recent years, tensions and conflicts in Swedish suburbs have also attracted increased attention (Dahlstedt and Ekholm 2019) with media reports about youth uprisings, burning cars, shootings, and criminal gangs. Regarding the political discourse, Thapar-Björkert et al. (2019) argue that there has been a shift from “from welfare to warfare”, leading to a ‘militarisation’ of Swedish suburbs with an increased focus on security and surveillance through images of criminality and vulnerability. It has been argued that the militarisation of suburbs is especially occurring in the demonised and stigmatised suburbs of the Million Program (Molina 2013; Thapar-Björkert et al. 2019).

In the 1960’s, due to housing shortages, Sweden implemented the Million Program – the largest national housing project in its history. One million new flats were built during a ten-year period. Now about fifty years later, many of the Million Program areas are being renovated. As noted by Baeten et al. (2017), the simultaneous need of ecological and “social” renovation has been discussed by The Swedish Association of Public Housing Companies and others, with the “social” renovation referring to social segregation and the Million Program estates largely being “occupied by poorer (non-Swedish) population segments” (p. 637). Overcrowding is another urgent and increasing problem in many Million program areas, an issue that has become more evident during the pandemic.

Consequently, there is a need to find solutions to combat these social dilemmas and urban challenges to achieve a more sustainable urban transformation. Research has increasingly pointed to the importance of socially innovative and experimental approaches in relation to urban sustainable transformation (see for instance Marvin et al. 2018). On this note, Wolfram (2016) argues that it is important to create alternative future scenarios based upon a variety of knowledge, to recognise both formal and informal participants as part of governance, as well as “undertake experiments for practical social learning and foster new values and meanings” (p. 125). Forging trusting relationships through collaboration across borders can have transformative effects on individual values and the wider society (Palmer et al. 2020).

Urban living labs and urban planning – social and gender aspects

Urban living labs (ULLs) have been practised in various countries for about a decade now. Although there is no generally agreed-upon definition, ULLs are often described as arenas for innovation and learning where citizens collaborate with other stakeholders to pursue sustainable transformation (Chronéer et al. 2019; JPI Urban Europe 2020).

In this paper, an urban living lab is defined as 1) a forum for innovation and learning where 2) a diversity of stakeholders participate, explore and experiment to deliver scenarios and methods with the intention to 3) respond to a challenge or dilemma in an everyday context in an urban area (Bulkeley et al. 2017; JPI Urban Europe 2020). As of today, most ULLs have been designed to address environmental challenges (Della Valle et al. 2021). Fewer ULLs have focused on social issues and it has recently been emphasised that they have rarely been applied in disadvantaged or diverse urban contexts, comprised of immigrants, youngsters, and socially disadvantaged groups (Aernouts

et al. 2020). To our knowledge, so far, few or even no ULLs have focused on girls and young women in marginalised suburban areas.

Not only do girls and young women receive less attention in media and political discourses about suburban areas than boys and young men, the voices of women in marginalised suburban areas are also often neglected in urban planning processes (Listerborn 2008). Moreover, many women in disadvantaged and stigmatised areas face multiple layers of discrimination as gender intersects with age, ethnicity, class, and space (Anneroth et al. forthcoming). The importance of using intersectional feminist approaches in urban planning have therefore lately been stressed in the literature (Beebeejaun 2017). Such approaches could challenge hierarchies and power relations in urban planning, such as professional or "expert" knowledge versus lived experience (Snyder 1995). As recently put by Listerborn (2020): "A radical transformation to a more gender equal city cannot only be attentive to white middle class women" (p. 14). We must listen to *all* women.

Although ULLs have been used in cities worldwide for about a decade, it has been argued that they have little impact upon urban sustainable transformation (Bulkeley et al. 2017; von Wirth et al. 2019). ULLs have been criticised for being temporary urban interventions – i.e. "projectification" – with minimal impact beyond their immediate lab environments, not achieving stated long-term sustainability goals. The importance of diffusion processes has been addressed in the literature, where von Wirth et al. (2019) identified three such processes: embedding, translating, and scaling. User involvement, inclusion, and ensuring steady participation of citizens are also challenges in ULL 1.0. Although co-production is regarded as an important aspect of ULLs, Nesti (2018) has questioned whether ULLs can be conceptualised as form of co-production. In his study of three ULLs, he found that there were problems of keeping motivation and participation among volunteers.

The need for new approaches to ULLs - ULL version 2.0 - is currently being discussed (Bylund, J., Riegler, J., and Wrangsten, C. Anticipating experimentation as the 'the new normal' through urban living labs 2.0: lessons learnt by JPI urban Europe, submitted); Wolfram et al. 2021). The importance of more socially oriented ULLs has been emphasised (Voytenko et al. 2015; Bulkeley et al. 2017:16; Menny et al. 2018; Aernouts et al. 2020; Pereira et al. 2020), with social sustainability identified as a one of the key elements in next generations of ULLs. In a discussion of the development of urban living labs 2.0 to boost urban sustainability, Mahmoud et al. (2021) recently urged for more research on "the relationship with social justice and social equity aspects" (p. 13). The features and components of ULL 1.0 and ULL 2.0 respectively are summarised and contrasted to our case study in Fig. 6.

Aim and research questions

In this article, we aim to explore the role of feminist urban living labs for sustainable urban transformation with a focus on social sustainability, as a possible direction for ULL 2.0.

This is conducted through an in-depth case study of the project UrbanGirlsMovement (UGM), a feminist urban living lab in Sweden. The ULL took place in Fittja, a marginalised suburban area of Stockholm during the period 2018- 2019. Here girls

and young women, in collaboration with other stakeholders and urban planning professionals from outside the area, used Minecraft to redesign a public square in the centre of the Fittja neighbourhood and tested their full designs using VR.

The UrbanGirlsMovement is examined in relation to social sustainability with a focus on the needs and urban visions of girls and young women. The questions to be answered are:

- 1) How do young women perceive the public square in their housing area?
- 2) What changes to the square do the young women propose through their designs?
- 3) How do the young women's visions and designs differ from other ULL stakeholders?

Urban public space and social sustainability

A public space can be described as a space that is publicly owned and (at least physically) accessible to most of the public, for free (UN Habitat 2015; Andersson 2016). As pointed out earlier, one of the dilemmas facing many cities is the decreasing amounts of public space. The need to increase urban environmental efficiency drives a densification process which, in combination with an increasing privatization in cities, has resulted in an overall decrease in the amount of public spaces, such as urban public squares (Memluk 2013; Madanipour 2019). This situation exposes a paradox, as the increase in population density means that more people will be reliant on fewer public spaces in cities. Limited amount of public space may lead tensions and conflicts due to competition for space. Madanipour (2004) has warned that intensive use of space by some groups might exclude and intimidate others.

Madanipour (2004) also points out that public space is especially important in marginalised urban areas, where a public space often constitutes an extension of an overcrowded home. The challenge thus becomes the creation of more inclusive and equal public spaces accessible to and used by many different groups, including those who are marginalised. This issue is also included in the Sustainable Development Goals (UN 2015): “by 2030, provide universal access to safe, inclusive and accessible, green and public spaces, particularly for women and children, older persons and persons with disabilities” (p. 26). Similarly, The World Bank urged cities to invest in public space with a focus on social needs for the creation of more livable and inclusive cities (Kaw et al. 2020) – or, in other words, socially sustainable cities.

Social sustainability is a popular, but complex, concept with no generally agreed-upon definition. Littig and Griessler (2005) define it as a quality of societies. Social sustainability is, according to them, given if an extended set of human needs are satisfied, in a way that nature is preserved and the normative claims of social justice, human dignity and participation are fulfilled. The needs of residents might not correspond to what urban planners might see as profitable for a neighbourhood (Gans 1962). Social sustainability is related to other older concepts, such as gender equality, intersectionality, social cohesion, and liveability.

Liveability is frequently incorporated in descriptions of the socially sustainable city. Liveability has been formulated in planning principles through ideas related to the

Protection	Against traffic and accidents	Against harm by others	Against unpleasant sensory experiences
Comfort	Options for mobility Options for seeing	Options to stand and linger Options for talking and listening	Options for sitting Options for play , exercise, and activities
Enjoyment	Human scale	Positive aspects of climate	Aesthetic qualities and positive sensory experiences

Fig. 1 12 criteria for qualitative public space (extracted from Gehl and Svarre 2013: 107)

traditional city, namely compactness, mixed functions, quality of public space and squares (Jacobs 2007), but also to less concrete qualities such as participation, meaning, and sense of enjoyment in urban public space (Jacobs and Appleyard 1987).

Scholars have for long been concerned that cities are becoming too large-scale, losing their connection to the human experience. Jacobs (1961) made connections between a living city and a secure city, arguing that “eyes on the street” means that people are less likely to commit or become victims of crime. In a similar vein, Gehl and Svarre (2013) reason that for urban squares to be lively yet safe, they should be small so that faces are recognizable. Gehl and Svarre (2013), argue that protection, comfort, and enjoyment are key features for qualitative public space (Fig. 1).

Public squares are destinations where inhabitants linger, whereas streets tend to be spaces for transit (Gehl and Svarre 2013). A square is what most clearly represents the image and identity of an urban area (Memluk 2013). It fosters cultural life and holds high symbolic value (Wojnarowska 2016). On this note, the importance of seating areas in public spaces was emphasised already by Whyte Jr. (1980) in his book *The Social Life in Small Urban Spaces*, and more recently by Javadi (2016), who claims that street furniture, such as seating, benches, and lighting elements, have positive impacts on the mental image of the square.

Public space has also been referred to as young people’s outdoor living rooms, for informal and spontaneous socialising (Lieberg 1998). Such space is important for youth identity formation and for engaging in urban life (Andersson et al. 2019). Public spaces can promote social cohesion and a sense of place, and it has been argued that they are especially important in marginalised and overcrowded housing areas (Timms and Ferlander 2011; Jukkala et al. 2020). Women tend to perceive and use urban public space and third places differently than men (Garcia-Ramon et al 2004; Beebeejaun 2017; Fullagar et al. 2019). In her book *Feminist City: Claiming Space in a Man-Made World*, Kern (2020) argues that cities are for men with public spaces not designed for women, for instance leading to young women struggling to find places to ‘hang’. Women often perceive urban public spaces as places of threat rather than places of social cohesion (Kern 2020).

Gender and urban public spaces in Sweden

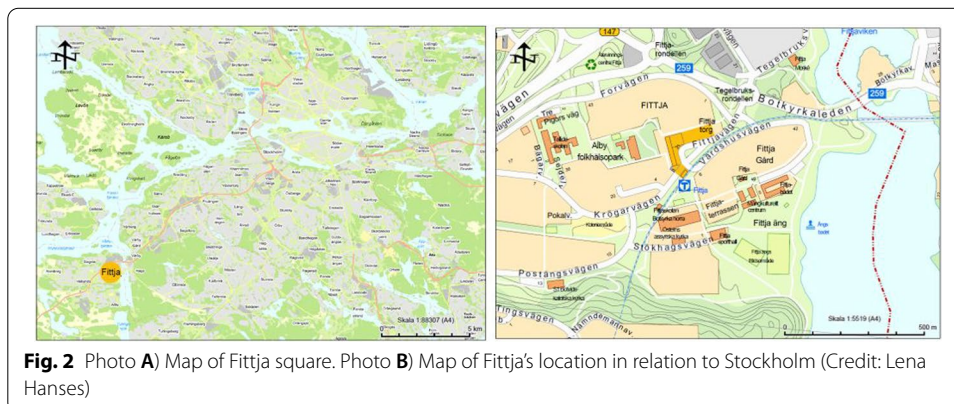
Sweden is often described as a good place to live in for women, with gender equality permeating most aspects of life. One exception, however, is according to previous research the production and use of urban public space. The planning of the Million Program has for instance been labelled “patriarchal urban planning” (Molina 2018), arguing that “the built environment that initially formed an all-male creation” (p. 30) continues to characterise social space a long time after it was built. It has been argued that the male dominance in public space in these areas might have a negative impact upon women’s feeling of safety (Skinnari et al. 2018). Numerous studies, including some conducted in suburban areas of Stockholm, conclude that the vast majority (80%) using outdoor public spaces for spontaneous sport activities are boys (Blomdahl et al. 2012). In other words, only 20% of the users of those urban public spaces are girls.

A male dominance and a general lack of children and women was found on suburban squares in an earlier study by Olsson et al. (2004). The authors argue the squares were avoided because it lacked activity opportunity for children, and by some women it was due to fear. On this note, women in urban studies have predominantly been researched as subjects of fear (Listerborn 2002; Larsson and Jalakis 2008; Listerborn 2020).

Urban girls movement: a feminist urban living lab

Between 2018 and 2019, the independent think tank Global Utmaning (In English: Global Challenge), in collaboration with the local NGO “Changers Hub” and Botkyrka municipality, ran the feminist urban living lab project UrbanGirlsMovement (UGM) in Fittja, a suburban area located in Botkyrka municipality in the southern parts of Stockholm, Sweden (Fig. 2). Compared to other municipalities in Sweden, Botkyrka has a relatively young population, with 25% of the population under age 18. About 100 different languages are spoken in the municipality, and 59% of the population were born in another country or are children of foreign-born parents (Botkyrka kommun 2019).

Fittja, and Fittja’s public square, was built about 50 years ago as part of the beforementioned housing project the Million program and is currently undergoing large refurbishments involving the municipal housing company and the owners of the shopping centre. In media, Fittja often receives negative attention for criminal activities, such as drug dealing and shootings on Fittja square (Velasquez 2011; Anneroth et al. 2022) which is a recurring issue for other Million program areas (Ericsson et al. 2002).



UrbanGirlsMovement (UGM) is an ULL approach consisting of six innovation labs/workshops (Table 1 in Additional file 1) from idea generation to written suggestions and plans handed over to the municipality. The ULL participants consisted of young girls aged 16-23, living in the area, and various professional stakeholders, such as staff from the municipality staff, a local NGO, the municipal housing company, an architect firm, the owner of the shopping centre and researchers. The UGM girls were recruited via the local NGO.

The number of ULL participants varied between the workshops. The number of girls varied between 4 and 15, while there were approximately 10-20 professionals present in each workshop. In total, there were more participants in the beginning of the project, and the decrease was more significant among the girls than among the professional stakeholders.

The purpose of the project was for girls and young female residents – who were given a central role as place experts – to experiment with and try to improve the public space. This was organised with the various stakeholders, as is usual in urban living labs, through site visits, designs in the computer game Minecraft, 3D testing, and workshops to deliver feasible plans. The aim of UGM was not to test digital tools per se, but rather to respond to social challenges in the housing area. UGM experimented with a different methodology and approach in ULLs, namely feminist methods. For an overview of the UrbanGirlsMovement project and methodology, please see the Urban Girls Catalogue (Andersdotter et al 2019).

Methodology

Our in-depth case study ran for approximately 1 year between 2018 and 2019, with an abductive study approach and by pending iteratively between field work for participation, data collection and analysis with few initial theoretical propositions. Working with multiple methods and reacting towards normative truths is at the core of feminist research (Haraway 1988), by using a variety of types of evidence (Yin 2014:12).

Multiple methods and data analysis

Data for this study was collected through participant observations and surveys of the ULL participants. Our main analysis however builds upon the Minecraft designs of Fittja square, which we compared with the municipal design plan of Fittja (Botkyrka kommun 2016). A full overview of data collection occasions and means for data analysis is available in Table 1 in the Additional file 1.

To answer research questions number one (*How do young women perceive the public square in their housing area?*) and two (*What changes to the square do the young women propose through their designs?*), we used participant observations and surveys. The final Minecraft designs of Fittja square consisted of four main illustrations, referred to as ‘the Greenhouse’, ‘the activity cubes’, ‘the hangout area outside the greenhouse’, and ‘the centre rooftop’ (see different angles in Fig. 4). To analyse the visual elements in the Minecraft illustrations, we used quotes and explanations collected during the participant observation of the workshops, to limit the risk of misinterpreting or misreading the designs.

When comparing the Minecraft designs and the municipal design plan, we applied comparative and interpretative analysis. The images by means of how the municipality had furnished the square versus how the UGM girls chose to furnish the square in their Minecraft designs were compared. We moreover focused on the prevalence of descriptive content in the municipal plan versus the quotes from the girls (e.g., safe, clean, green), “reading between the lines”/ interpreting (Drisko and Maschi 2015:2) the narratives around the square designed by the municipality versus by the girls.

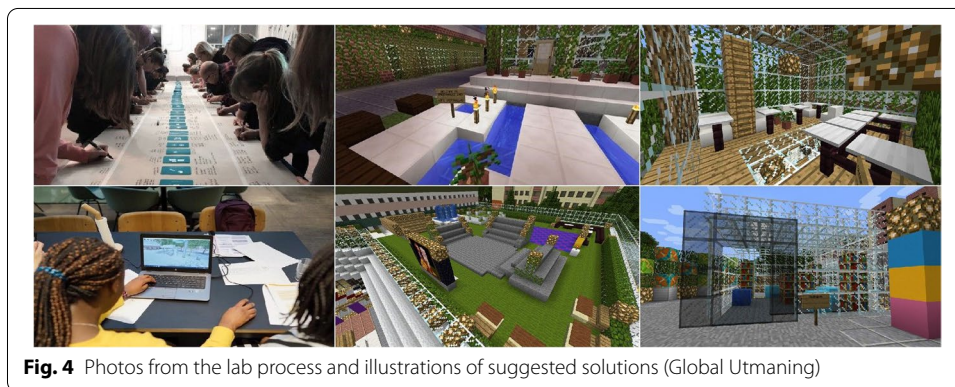
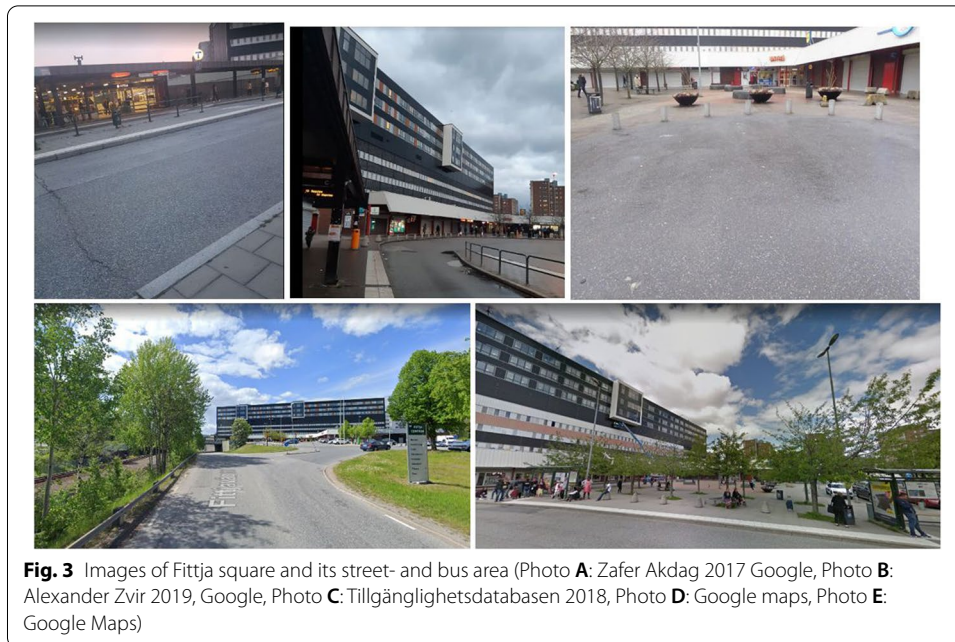
Observations were conducted of both Fittja square at various occasions and the UrbanGirlsMovement workshops/labs throughout the whole project. The observational data mainly consist of photos of the square (e.g., Fig. 4) and notes from conversations with the participants, primarily with the girls. To study the observational data from the labs, notes and photos of the square, we adopted thematic analysis (Bryman 2012) and colour coded these themes to see which prevalence they had.

The survey data from workshop 4 mainly aimed at answering research question number three (*How do the young women's visions and designs differ from other ULL stakeholders?*). The first survey was directed towards all participants in the workshop, with 21 respondents ranking 26 public space features on a four-grade scale from “not important” to “very important” for sustainable public space. In total, 21 participants answered the survey, out of those 10 were UGM girls. The survey questions were created from a merge of some of the most prevalent policy guidelines for sustainable public space, namely Gehl's 12 criteria for public space in Fig. 1 (Gehl and Svarre 2013:107), the New Urban Agenda, UN Habitat's Charter for Public Space, and target 11.7 in SDG 11.

The purpose of survey number two was to conduct a follow-up in order to examine possible trade-offs that five of the professionals would make. These survey questions also stem from Gehl's 12 quality criteria for good quality public space (Gehl and Svarre 2013:107). We later analysed this data to determine to what extent the priorities of professionals aligned with the statements and illustrations by the UGM girls during the observations and in the illustrations.

Ethical considerations and positionality

One important reason for including youth in research is that they are experts on their everyday lives. A similar logic is applied in feminist research methods, i.e. targeting power structures (Haraway 1988). In UGM, the girls and young women were logically regarded as the experts throughout the process, i.e. experts on their own neighbourhood. There is however a risk that young people do not perceive their participation in research as meaningful or rewarding. In relation to this, an important question posed by Källström and Andersson Bruck (2017) is whether children/youth get an adequate salary for their participation, or simply become cheap/free work force for the researcher and other projects. The UGM girls were therefore economically compensated for their participation by Global Utmaning (the UGM project owners) to increase a steady participation. Although the participating residents in Fittja were girls and young women aged 16- 23, they are throughout this paper referred to as “girls” since the majority were under 18 (compared to the professional stakeholders who were all adults, aged over 18).



One of the authors of this paper was also economically compensated by the UGM project in order to conduct research about the project, but the UGM project owner did not design or influence the research plan in any way. Knowing there is never such a thing as an entirely objective social researcher (Bryman 2012:41), we continuously looked for ways to guard the research integrity and to be reflexive about knowledge production and representation during the whole research process.

Results

In the following section, we present the girls' perceptions of the Fittja square in its current condition and their suggested solutions, visions and illustrations in Minecraft. The final section covers the municipal vision for Fittja square, and the participating professional's understanding of what constitutes a sustainable public space based on the survey data. The full data analysis is available in a table in the Additional file 1.

The Fittja public square and the girls' perceptions of it

The square in Fittja is furnished with round benches and bins, trees, three flowerpots and light poles with surrounding traffic blocks (see Fig. 3) and is encircled by a few shops. Few people tend to stop at the square, except a group of young men standing in the corner. This was noted during our observations, site visits, and through conversations with the girls.

When asking about the square, the girls generally described it as a place they did not want to spend time on, as it was “a grey transit-area mainly dominated by boys”. They said that “this place is grey and boring” and that “It also feels very insecure when there are lots of guys around here that, like, stare at you.” Some girls explained that they tend to leave Fittja to hangout in nearby malls instead. They repeatedly indicated that the square dominantly serves as a transit space, only to get to the store or the bus, but not to linger. Many of them also emphasised that there is nothing at the square to “look at.” According to the girls, the square lacks both a functional and an aesthetic design. The only place where you are protected from the wind at Fittja square is at the bus stop and in the corner by the mall entrance occupied by men who wears scarves over their mouth to hide their faces. When a TV-team visited the square during one of the workshops and conducted interviews with the girls, some young men yelled and tried to interrupt the interview. One of the professional stakeholders working in the area, a woman involved in youth empowerment and area development, commented: “This is how they let us know that this square belongs to them”.

Examining the girls' reasonings, it becomes clear that Fittja square has a socially unsustainable structure. The girls recognised the group of young men by the mall entrance at the square as part of the problem, but as they started working on the ideas for improvements of the square, they shifted focus to visual aspects and activities to break this pattern. One UGM girls explained to us that the boys and young men use the entrance to hide from all sorts of surveillance: “cause of the police, and cameras, mothers patrolling the area. But if there were cafés and some shops here, they might not hang out there in this way”.

The girls' Minecraft designs of Fittja square

Overall, through the designs the girls wanted to make Fittja square a more inclusive, green and social place. They want the square to change from a transit street to a destination. They propose new types of spaces, such as “Greenhouse 145” (145 is part of the ZIP code for Fittja) saying: “this is a bold building”... and a café on the second floor: “simple – very green!” (UGM girl). The girls' reasoning for multi-purpose designs was to attract more people from various groups to the square: “Entertainment is also important in life” said one UGM girl as she designed a dancefloor. The girls wanted to create an environment where one can choose to be passive, but also preserve the opportunity to engage in an activity. Figure 4 showcases photos from the lab process and four illustrations from workshop 4.

The final Minecraft models illustrated solutions to the built environment on Fittja square that consist of glass houses with a variety of activities and functions - ecological, social, and economic. The girls dressed their Minecraft buildings in greenery, created wind- and weather protection, planted trees and added elements of water. They created

a citizen dialogue hub, interactive digital street signs about local happenings, glass cubes with activities such as arts, locally produced food and reading, comfortable seating, hangout spaces and a combined graffiti and greenery wall. The suggestions display compactness, walkability and a more unstructured square that caters to socialization and enjoyment, beautification (picturesque environments), and environmental concerns in an integrated manner“. We removed the bus stop from here so that those who live nearby don't have to hear the vehicles all the time”, said one of the UGM girls.

One illustration has a sign on the mall's rooftop, reading “Fittja = home” with the following explanation: “Some of you might have heard people jokingly say that the national anthem of Fittja is the sound of police helicopters. Well, we designed this to remind those helicopters and the media that this is our home.” The girls wanted to highlight local artists, performers, and stories through their radio, art walls and stage designs: “We want to create a place that distinguishes Fittja in a positive manner” (UGM girl).

In the designs, the green spaces were weaved into the built environment (in walls, onto buildings), rather than made separate areas. This can be illustrated through some quotes from conversations with four different girls: “I need plants that I can hang”, “more greenery here, there's too much concrete”, “we planted one tree next to each bus stop to absorb the carbon dioxide emissions” and “the trees turned out really pretty” (UGM girls).

Visions of the square- young women versus professionals

There are certain commonalities between the UGM Minecraft designs and the text description in the municipal design plan (Botkyrka 2016) such as “human scale design”, “vibrancy”, and “opportunity for activity”. Figure 5 demonstrates 1) how the UGM solutions was illustrated in the Minecraft designs and 2) what the municipality envisions in their plan design. However, when zooming in on the illustrations, discrepancies appear between the two perspectives.

Overall, the girls' designs are more small scale, intimate and compact than elements in the municipal design plan. Differences lie in what the first impression of Fittja should be: the UGM girls want to write “home” on the top of the shopping centre while the municipality initially planned for a “Fittja tower” with hotels to give a first impression of Fittja. The girls want to furnish the square with activity opportunities, greenery, and hangout spaces. The initial municipal design plan (Botkyrka kommun 2016) left the square open and unfurnished without specific activity spaces – easy to cross with a bike (also highlighted by the professionals in the survey). The UGM illustration on the other hand is



Fig. 5 Fittja square in three versions. Photo **A**) View of Fittja square from inside the mall (Wrangsten 2019). Photo **B**) The municipality's vision for Fittja square (Botkyrka kommun 2016). Photo **C**): The UGM solution to Fittja square illustrated in Minecraft

neither a hotel nor a tower, but a 3-floor activity house named “Greenhouse 145”. The girls wanted to attract visitors from outside Fittja by means of local experiences and one of them commented: “It can attract people from other places to also visit Fittja. Stuff that are in the city should also be in the suburb (Swedish “orten”) (UGM girl).

According to the results of survey one, in general terms, the participating professionals and the girls seem to agree upon what is most important in good quality urban public space – but there is also some friction between ideas. In survey one, the working professionals emphasised biking and activities that are free of charge more often than the girls did. Interestingly, safety is not expressly emphasised by the girls during their design process; they instead turned to liveability.

In this survey, the girls put more value into features like green spaces, and emphasised that places should be accessible to wheelchair users more often than the professionals did. The girls also ranked general integrity aspects of being able to see, be seen, and be heard more than the professionals did. The girls also put more emphasis on the presence of diverse artforms, and the protection from “unpleasant experiences.” The UGM girls then visualise these need in Minecraft by designing “hangout spaces”, sitting places, greenery, activity opportunity, and “cool looking” lightning in their proposals. They consider the lightning of the area not just a safety measure but a chance to design something cool: “lightning and colour can do a lot” because today the square is “colour dead, everything looks the same” (UGM girl). The five professionals in survey two ranked safety and accessibility for vulnerable groups the highest when asked to prioritise public space targets.

In summary, studying the designs, observations, and survey data combined, the empirical data show that the girls seem to prioritise multifunctionality, sociability, compactness, greenery for beautification, small-scale designs, and inclusion of local cultures to attract visitors (livability and enjoyment) to improve Fittja square.

Discussion

This paper aimed to examine feminist ULLs as a potential source of social sustainability – and a possible direction for ULL 2.0. The results were derived through a case study approach where girls and young women, together with other stakeholders, used Minecraft to redesign a public square in their housing area. Using multiple methods, the empirical findings show that the girls’ visions include a socially sustainable transition of the square: from patriarchal to inclusive, from grey to green, and from a transit area to a meeting-place.

The professionals envisioned the square and public space in general quite differently than the girls and the young women. For instance, the professionals highlighted safety and biking more than the girls who instead highlighted green spaces, and accessibility. The municipality’s illustration of Fittja square was more large-scale and unfurnished.

The UGM girls wanted the square to become something new and different, but at the same time to keep the characteristics of their neighbourhood as means for both enjoyment and attracting outside visitors. The girls did articulate sincere concerns over the groups of young men who manifest power over the square. However, their designs were not very security-oriented, but rather liveability-oriented. This finding stands in contrast

to the perspectives of the professional stakeholders, the media coverage of Fittja and to previous research that have been much more security-oriented (Listerborn 2002).

Even though urban living labs are intended to be inclusive and collaborative per definition (and although scholars have long argued that the city is inherently patriarchal), feminist perspectives and methods are rarely prioritised in these spaces. Perhaps the social dimension, and the concept of social sustainability, can guide the next generation of urban living labs? In the following sections, we connect the empirical findings to social sustainability and to previous research about ULLs, in order to further discuss feminist urban living labs as a potential source of social sustainability, and a possible direction for ULL 2.0.

Feminist urban living labs and social sustainability

Linking the issue of increasing inequalities and segregation in urban areas with the growing concern that urban living labs are not delivering on their sustainability goals, creates an interesting—and highly important—discussion.

First of all, it is commonly known that social sustainability is interconnected to economic and ecological sustainability. Tensions and conflicts between groups can lead to costly consequences and/or hinder progress in all aspects of sustainability, which is why the ‘militarisation’ of Swedish suburbs with a focus on security, through images of criminality and vulnerability (Thapar-Björkert et al. 2019), is noteworthy. The intensive use of space of some groups might exclude and intimidate others (Madanipour 2004) which, by our results, have been the case on Fittja square. The square has been dominated by a group of young men. In this regard, it is seemingly interesting that the girls emphasised liveability within their illustrations, rather than security. The girls wanted to create places for all groups in response to the socially conflicted square (much in line with Jacobs 1961 theory on “eyes on the street” leading to less crimes). Similarly, street furniture, with an emphasis on seating, improves both sociability and the image of a place (Whyte Jr. 1980; Javadi 2016). The Botkyrka municipality however, in their plans for the square, left the area unfurnished (Botkyrka 2016).

In other words, our results challenge previous research and projects that take a safety-oriented focus when targeting girls and women (Listerborn 2002; Larsson and Jalakis 2008; Molina 2018). Following this line of thought, questions arise regarding misinterpretations that might happen when the voices of marginalised groups are not included in ULLs. Because when the needs of the residents are not consistent with the ideas of the urban planners, it can jeopardize a socially sustainable urban development (Gans 1962), whilst incorporating broad representations of different groups’ needs can improve social sustainability (Littig and Griessler 2005).

Learning about these trade-offs in UGM was important for the involved stakeholders as well who today use UGM as point of reference in their continued development of the square (see final chapter). Social learning is a fundamental way for urban living labs to make wider contributions (e.g Bulkeley et al. 2017; von Wirth et al. 2019) and is an issue that is called for in ULL 2.0. Fostering new values and meaning through social learning (which was central in the UGM process) is crucial to enable urban transformation, as well as creating alternative future scenarios based on a variety of knowledge (Wolfram

2016:125). In this sense, feminist ULLs could add to the knowledge base also regarding the complex trade-offs by professionals in public space developments (Dahlberg and Borgström 2017). Considering both the criticism to ULL 1.0 and that the UGM girls made different priorities than the professionals, questioning who is the “expert” and who is referred to as “public” or simply “user” in ULLs seem to be necessary. This can be done by acknowledging new types of agencies, something which Bulkeley et al. (2017) argue is a key element to create transformation through ULLs.

By carefully introducing suggested (small-scale) changes to the square digitally, the project with the girls as messengers could increase the potential that the suggestions and visions (Wolfram 2016:125) take hold in the community by means of a joint acceptance to the changes made. When it comes to social sustainability, it is generally known that this acceptance and sense of inclusion can mean that common resources are better cared for in the long run (which, logically, has environmental benefits).

Knowing the immense symbolism of public squares to neighbourhoods (Memluk 2013; Javadi 2016; Wojnarowska 2016), and how public space impacts youth’s identities (Andersson et al. 2019), strengthens the indication that feminist urban living labs on socially conflicted public squares can make a social impact beyond the project finish line.

Feminist urban living labs as ULLs 2.0?

The above indications of social sustainability in feminist urban living labs are one of the reasons to discuss them as a possible direction for ULL 2.0. The social aspects and matters of power have indeed been suggested by more scholars interested in ULLs (see e.g., Voytenko et al. 2015; Bulkeley et al. 2017; Menny et al. 2018; Pereira et al. 2020; Mahmoud et al. 2021). ULL 2.0 calls for a “wider group of stakeholders” to join processes and foster deeper values of meaning (Wolfram et al. 2021).

The examined feminist ULL, UrbanGirlsMovement, approached a few of the challenges within ULL 1.0, such as efforts to ensure general user involvement (Menny et al. 2018), inclusion of all relevant interests (Voytenko et al. 2015), and steady participation throughout the entire ULL process (Nesti 2018). For instance, the girls were given a salary to participate as a recognition of their key knowledge to the project. The reasons for this was twofold; to alter the power dynamics between the professionals and the girls, and to ensure steady participation (Nesti 2018). Nevertheless, the number of girls varied and were at times few compared to the number of professionals (see Table 1 in Additional file 1).

Moreover, the Minecraft tool allowed girls and professionals to meet on more equal footing in terms of experience. This created a “safe space”, which has support in “transformation labs” (Pereira et al. 2020). Minecraft, when adopted as an urban planning tool, can encourage essential skills to affect change that last beyond project timelines (von Heland et al. 2016).

Consequently, the participation was a stimulating and enriching experience for the girls, who displayed a sense of empowerment and ownership over the results and indicated increased societal trust as an effect of being more in control over their environment (Anneroth et al. 2022). Forging trusting relationships can have transformative effects on the wider society (Palmer et al. 2020).

To ensure chances of governance integration of results (a key aspect in ULL 2.0), timing matters; UGM was planned as vital step in a larger renovation process around the square. UGM was joined by municipal representatives in actual need of input – giving the ULL a more real opportunity to be picked up by the municipality and other stakeholders in the continued renovation process. In a similar way, the project targeted an issue that the municipality itself had not been able to handle (the socially unsustainable square). This is in ULL 2.0 literature referred to as a matter of operating in the “governance vacuum” (Bylund, J., Riegler, J., and Wrangsten, C. Anticipating experimentation as the ‘the new normal’ through urban living labs 2.0: lessons learnt by JPI urban Europe, submitted).

Considering the public square’s close linkage to liveability (Jacobs 2007) and being a masculine space (e.g. Molina 2018; Kern 2020) it is seemingly strategic and effective to target the square as a means of obtaining a wider impact on social sustainability (such as system change - from patriarchal to inclusive). Parallel discussions around gender equality, symbolism of the public square, and marginalised areas in relation to ULL have until now gone under the radar in the ULL literature, despite their interconnected role in sustainability. In patriarchal environments like the Fittja square, feminism seems a predominantly straightforward questioning of norms and power (over space).

The results of this study exemplify an altering of existing structures, cultures, and practices, recurrently stressed in urban transformation literature (Wolfram 2016; Frantzeskaki et al. 2017). Urban living lab processes are by no means neutral (Bulkeley et al. (2017), but perhaps they have been treated as such? In view of the overwhelming integration of patriarchal values in everyday life (Gemzöe 2008) and our results that contrasted the girls’ focus (liveability) with the professionals’ (security), it seems evident that without employing intersectional feminist perspectives in ULL 2.0, the chances of outcomes like urban transformation towards sustainability will arguably remain status quo. Having said this, urban transformation is indeed a complex process, and while the inclusion of feminist ULLs in public spaces is not a one-size-fits-all solution, but intersectional feminism could play an important role in forming ULL 2.0 and we suggest more research on this topic.

Knowing that ULL “2.0” needs to be a) integrated into governance structures, b) a multi-stakeholder process, c) experimental and d) a significant contributor to urban transformation processes (Bulkeley et al. 2017; von Wirth et al. 2019; JPI Urban Europe 2020). Will this list at one point be extended with e) socially oriented, or even f) feminist intersectional approach? Our findings can serve as a relevant starting point for further (transdisciplinary) research.

UGM and its digital illustrations was a symbolic first step to envision a transformed Fittja centre. Although our data collection does not cover the full follow-up of the UGM outcomes, it presents promising elements that are necessary to enable urban transformation and ULL 2.0 (see Fig. 6), e.g. alternative future scenarios, formal and informal governance, new values and meanings, etc. (Wolfram 2016:125). Needless to say, feminist methods in general does not automatically mean that boys and men are excluded from the process. Feminist labs’ emphasis upon power relations ensures safer spaces for all parties involved. It is about turning the tables to create a safe

ULL 1.0	UGM ULL 2.0
⊙ Experimentation	⊙ Experimentation
⊙ Learning	⊙ Learning
⊙ Transfer	⊙ Transfer
⊙ In everyday urban setting	⊙ In everyday urban setting
⊙ Multi-stakeholder	⊙ Multi-stakeholder
⊙ Arena for innovation	⊙ Arena for innovation
⊙ Aims for sustainable transformation →	⊙ Aims for sustainable transformation ⊙ Takes on issues that government fails to handle ⊙ Fosters new values and meaning ⊙ Recognises power structures and social justice aspects ⊕ Adopts feminist methods
⚠ Targets any urban area/place →	⊕ Targets a conflicted and symbolic area/place ⊕ Targets social sustainability in deprived urban areas
⚠ Municipality or researchers are the messengers →	⊕ Residents (such as girls) are the messengers
⚠ Professionals are experts →	⊕ Local girls/residents are experts
⚠ Starts anytime →	⊕ Starts in time for a larger refurbishment/ close to a planned transformation process to increase chances of governance integration of results
⚠ Solution-driven →	⊕ Challenge-driven
⚠ Unstable level of local participants/ volunteers →	⊕ Residents/ local volunteers are economically compensated for their participation/work in the project
⚠ "Projectification" and little to no effect outside the project or immediate lab area →	⊕ "Movement" and scaled globally

Fig. 6 A table contrasting Urban Living Labs 1.0 (ULL 1.0), Urban Living Labs 2.0, and the Urban Girls Movement living lab (UGM). The additions by UGM to already identified features of ULL 2.0 is marked with ⊕. Already identified issues with ULL 1.0 are marked with ⚠, and an arrow points to the feature of which UGM ULL 2.0 can respond to that particular issue. These are only indications based on our case study, and more research is needed

experimentation environment for opinions to be expressed and ideas to be welcomed throughout the whole process. This has support in the literature by the term transformation labs (Pereira et al. 2020).

UGM shows signs of all three of the ULL diffusion processes (embedding, translating, scaling) presented by von Wirth et al. (2019) and Bulkeley et al. (2017) as means for ULLs to be impactful. UGM a) borrows, adapts, and somewhat translates tools tested in other geographical contexts, b) embeds the process in a local multi-stakeholder setting, and c) works to scale the learnings and the method horizontally (via open access web portals with method guidelines and toolboxes).

Mobilisation is key to contribute to transformation (Bulkeley et al. 2017), and interestingly, the name UrbanGirlsMovement in itself indicates this ambition. The project now goes by the name Her City and has been adopted by the UN. Her City has since this

data was collected run urban living lab trainings in 90 countries and 280 cities across the globe (Her City 2021).

Conclusions and looking ahead

The property owner (Botkyrkabyggen) as well as the owner of the mall (Kungsvånin-gen) have now implemented several of the proposals from UGM. They both incorporated more colour than previously planned as well as light that shifts in different colour (Anneroth et al 2022).

The municipality, in turn, have been commissioned to re-design Fittja square, and the new vision and goals have much in common with the UGM proposals. Aside from accessibility to especially girls, women and elderly, focus is now on developing a unique character, multi functional, and installing a piece of locally developed art to represent Fittja's locality (Botkyrka kommun, e-mail correspondence 2021).

The municipality now drives, together with other local stakeholders, a collaboration platform in which UGM is a joint point of reference and considered a “bank of experiences” amongst employees. In summer 2021, the municipality built a pop-up “living room” on Fittja square with colourful seating furniture and plantations referencing the UGM proposals. The installation was covered on the municipality's website where visitors to the pop-up explained how they had found themselves in conversations with new people when lingering in this pop-up area on the square (Botkyrka kommun 2021). At the end of 2021, colourful new lightning and a dancefloor was installed during a public



Fig. 7 Photos from both permanent and pop-installations inspired by the UGM project. Photo **A**: A pop-up activity cube (2019), photo by Global Utmaning. Photo **B**: A pop-up hangout park (2021), photo by Botkyrka kommun. Photo **C** and **D**: Inauguration of the new colorful light instalments and a pop-up dance floor on Fittja square (2021), photos by S. Ferlander

inauguration ceremony. Photos of changes made to the square since the UGM labs are available in Fig. 7.

The long-term impact from Urban Girls Movement in Fittja is yet to be studied in full. For this study, we targeted the more immediate outputs of the UGM process as we were interested in the mere implications for urban living labs “2.0”. Since the study was limited to digital solutions and a few first installations, future research could entail closer studies of the implementation of the proposed changes both in Fittja and other contexts of feminist ULLs.

Feminist ULLs can be understood as a possible source of social sustainability in general, perhaps particularly if focused on marginalised suburban areas’ public squares, with liveability at the centre rather than security. However, to move from ULL 1.0 to ULL 2.0, more focus must be placed upon the local transfer of the ULL. Projectification and fancy labels must be replaced with actual transformation of the local community. Although more research is needed, this paper concludes that feminist ULLs is a possible source of social sustainability - and a possible direction for ULL 2.0.

Abbreviations

ULL: Urban living lab; UGM: Urban Girls Movement.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s42854-022-00034-8>.

Additional file 1.

Acknowledgements

We would like to thank the girls, the other participants, the Global Utmaning think tank, and the project lead Elin Andersdotter Fabre of the #UrbanGirlsMovement for welcoming us as researchers into the project. We would also like to thank the participants of the research network of the #UrbanGirlsMovement for providing an important fora for discussing the trans-disciplinary research conducted. Dr. Natasha Webster contributed to this work by supervising the MSc thesis project from which this paper originates. This manuscript was proofread by M.A. Rachel Kyes, University of Denver, and we sincerely thank her for her volunteer effort put into improving the readability of this text. As first author I, Caroline Wrangsten, would like to express my personal gratitude to co-author Assoc Prof. Sara Ferlander for an immense guidance and support in particularly the final stages of the manuscript. Finally, the research presented in this paper was supported by the #UrbanGirlsMovement project funded by Vinnova (project number 2017-04732), the “Green Access” project funded by Formas (project number 2016-00331) and the project “A city for everyone? A study about young women’s lives in a transforming suburb” funded by the Swedish Research Council (project number 2018-02173).

Authors’ contributions

C. Wrangsten: research design, data collection, analysis, writing. S. Ferlander: data collection, analysis, writing. S. Borgström: data collection, analysis, writing. The authors read and approved the final manuscript.

Funding

The project #UrbanGirlsMovement was funded by Vinnova, Hyresgästföreningen, White Architects, Mistra Urban Futures, Botkyrka municipality, UN-Habitat and Iteam, that thereby provided the opportunity for the trans-disciplinary research and data collection for the presented study. (Vinnova project number 2017-04732).

Formas: funded the “Green Access” project which supported the participation in the #UGM project, data collection, analysis and writing of the paper. (Project number 2016-00331).

Swedish Research Council: funded the project “A city for everyone? A study about young women’s lives in a transforming suburb” which supported the participation in the #UGM project, data collection, analysis and writing of the paper. (Project number 2018-02173).

Availability of data and materials

The data of this paper consists of observation notes and photos, meeting notes, and interview recordings and transcripts. All data was collected within a trans-disciplinary process relying on trust, which was enabled by the agreement that no information that could be traced back to individuals should be shared outside the participant group and project setting. If possible, without breaching participant confidentiality, materials described in the manuscript, including raw data, will be freely available from the corresponding author on reasonable request, to any researcher wishing to use them for non-commercial purposes. Secondary data in the forms of lab reports and project reports of

#UrbanGirlsMovement are available here: <http://www.urbangirlsmovement.org/> and here: <https://www.globalutmaning.se/rappporter/>. For example, a 3D version of the Minecraft designs from Urban Girls Movement.

Declarations

Competing interests

There are no competing interests related to the research presented in this paper or publication of its results.

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Received: 2 September 2020 Accepted: 27 February 2022

Published online: 15 April 2022

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