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Acta Horticulturae

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<https://doi.org/10.17660/ActaHortic.2021.1330.34>

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# Healthy urban neighborhoods: exploring the well-being benefits of green citizen initiatives

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## Abstract

**The evidence is piling: contact with nature is good for our health. But today's reality is that nature is not by default part of our lives, particularly not for citizens living in deprived urban neighborhoods. One strategy to increase nature contact locally, is through green citizen initiatives: gardens and urban agriculture projects initiated and run by citizens. We studied eight green citizen initiatives in Arnhem and Nijmegen in The Netherlands to explore what well-being benefits residents experience with regards to their participation in local green initiatives. This paper presents the methods developed to measure well-being outcomes, plus the first results. We conducted a questionnaire among 109 participants of green citizen initiatives in 2020. We found that participation in green initiatives creates positive experiences for six dimensions of well-being: meaningful involvement, personal development, social connection, sense of ownership, sense of safety and trust, and healthy lifestyle. Participants feel part of the initiative, gain social contacts and get to spend time outdoors. The greatest well-being benefit of green initiatives turned out to be a sense of safety and trust. We found less evidence of increased healthy food intake and other lifestyle aspects. This raises the question whether participants have already adopted relatively healthy lifestyles and/or whether the green initiatives attract a certain group of residents – and other groups not. With our study we provide a method and the first evidence on the value of green citizen initiatives as a bottom-up strategy to improve the health and well-being of citizens in deprived urban neighborhoods.**

**Keywords:** urban horticulture, health benefits, bottom-up initiatives, participatory greening, edible green, health promotion

## INTRODUCTION

Ongoing globalization and intensive population growth has pushed food production out of urban areas (Sorensen, 2000) and confined gardening to the private realm. However, in The Netherlands, a new trend has become visible in bringing back gardening and agriculture into the city and thereby contributing to the well-being of humans as well as to the flourishing of the natural environment (Hense et al., 2017). In today's crowded and built-up cities, the health promoting benefits of green spaces and gardens may be more essential than ever before. Unfortunately, not all citizens are able to fully reap their benefits. Residents of low-income neighborhoods are shown to be particularly deprived of local green space access, in terms of both quantity and quality and are at risk of being pushed out when green neighborhood investments take place (green gentrification) (Wolch et al., 2014; Derkzen et al., 2017; Venter et al., 2020). Due to their financial situation they have less opportunities to travel to natural areas outside of the city, while low-income neighborhoods feature less nature based initiatives. This is problematic because residents in a lower socio-economic position generally face disproportionate health risks and have a lower health status (WHO, 2016), indicating that especially this group would benefit from a healthy living environment (Groenewegen et al.,

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2018).

### **Benefits of green spaces and gardens**

Green spaces and gardens provide a place for exercise, sports, play and the development of motor skills (Kabisch et al., 2019; Tan et al., 2021) and can serve as a refuge from busy city life with restorative, stress-reducing effects (Alcock et al., 2014; Cervinka et al., 2016; Tillmann et al., 2018; Young et al., 2020; Yao et al., 2021). Green environments are associated with a decreased risk on mental health issues and chronic diseases, and this association seems to be stronger in low-income neighborhoods compared to high-income neighborhoods (Brown et al., 2016, 2018). Through shared experiences and social interactions, green spaces foster community building and sense of place, concepts that are known to benefit our well-being (South et al., 2019; Kingsley et al., 2020; Hanson et al., 2021). Last but not least, while providing a sense of fullness, resonance and joy in life, green environments increase the possibilities of living a good life (Rosa and Henning, 2018; Nussbaum, 2011).

### **Participation in green initiatives**

In the setting of low-income neighborhoods with little nature access and/or low quality neighborhood green space and often limited citizen participation, the beneficial effect of green spaces and gardens is expected to be especially valuable (Mitchell and Popham, 2008; Boyd et al., 2018). One of the strategies to increase and/or improve neighborhood green space and to stimulate participation is supporting green citizen initiatives. We understand green citizen initiatives as a bottom-up initiative or action to create or improve green areas, big or small, in which citizens are in the lead or take on a central role. Examples are a neighborhood garden, local food forest or community supported agriculture. Until now, the majority of such initiatives arise as part of a counter-culture movement against consumerism and industry or as an expression of a healthy, conscious urban lifestyle, described as a community action trajectory in which residents reclaim and transform public spaces into multifunctional green areas (Derksen et al., 2017). All of these are not typical settings for a low-income neighborhood, while in theory, participatory greening could also arise from and benefit people living here. Little research investigated participatory greening in low-income neighborhoods, although there exist examples of green citizen initiatives that have arisen in post-crisis situations such as the one in Detroit (Sivak et al., 2021). This makes our knowledge about residents' experience of participation in green citizen initiatives and its well-being benefits in low-income neighborhoods, as well as the development of methods to assess these, very limited.

### **Study aim**

The benefits that nature provides to people are well-understood and evidenced (de Vries et al., 2003; Maas et al., 2009; Keniger et al., 2013; Hartig et al., 2014; Soga et al., 2017;) and researchers agree that social and civic participation is beneficial to health (Lancee and Ter Hoeven, 2010; Ang, 2018; Dury et al., 2021). However, little research has focused on low-income neighborhoods, and to our knowledge, no research has investigated the well-being benefits of green citizen initiatives for residents participating in these initiatives. With this study, we aim to explore what well-being benefits residents experience with regards to their participation in local green initiatives. In order to do so, we first needed to operationalize well-being outcome measures to measure well-being in a standardized manner. Next we developed a questionnaire that was conducted at eight green initiatives in low-income neighborhoods in The Netherlands. With this paper we report on the operationalization, questionnaire development and first questionnaire results. With our study we hope to provide evidence of the value of green citizen initiatives as a strategy to improve the well-being of citizens in deprived urban neighborhoods.

## METHODS

### Well-being outcome measures and questionnaire development

To explore what well-being benefits residents experience with regards to their participation in local green initiatives we collected data among 109 participants during fieldwork between June and October 2020. The questionnaire was designed based on an existing questionnaire measuring the meaning of social enterprises in Arnhem (van Steen, 2019) that in turn is designed based on the national health monitor “GGD Gezondheidsmonitor Gelderland-Midden”, a validated survey on health, social situation and lifestyle conducted among more than 457,000 adults in The Netherlands (van Steen, 2019). We adapted the existing social enterprises questionnaire to better suit our project by adding questions on green and food related aspects of the initiatives. To further inform the questionnaire with regards to activities that take place at the green initiatives, and to get a better picture of the initiatives’ goals and target group, ten initiative leaders were interviewed in June and July 2020.

The questionnaire contains 49 questions divided over two parts. Matrix questions worked with a 5-point Likert scale, closed questions with multiple responses including the option for an alternative answer, and open questions featured a dotted line or text block where respondents could provide their answer. Part one covers the topics green space and the living environment, the neighborhood, social cohesion, loneliness, self-esteem, sense of meaning and control, perceived health, physical activity, and demographics. Table 1 shows the original source and adaptations for each outcome measure. Part two covers questions on the meaning that respondents attribute to the initiative where they volunteer, visit or garden.

Table 1. Well-being outcome measures with source and adaptations made for current study.

Outcome measure	Source	Adaptations
Social cohesion	Safety, Livability and Well-being Monitor (Gemeente Arnhem, 2019)	Added “I have plenty of contact with my neighbors” and “In this neighborhood, people look after each other”
Social neighborhood strength	Safety, Livability and Well-being Monitor (Gemeente Arnhem, 2019)	
Active in the neighborhood	Safety, Livability and Well-being Monitor (Gemeente Arnhem, 2019)	
Overall physical health	PROMIS Scale v1.2 – Global Physical Health G03 (PHO, 2018)	
Exercise	National health monitor (GGD, 2016)	Simplified layout to improve readability
Mental health	Mental health inventory 5 (MHI-5)	
Loneliness	Short Loneliness Scale (De Jong Gierveld and Van Tilburg, 2006)	
Self esteem	Dutch Rosenberg Self-Esteem Scale (Franck, De Readt, Barbez and Rosseel, 2008)	Adjusted wording that was experienced as too complex in a language test (see below)
Sense of meaning and control	Combination of GGD Monitor Gelderland-Midden and Daily Meaning Scale (Steger, Kashdan and Oishi, 2008)	Added “I experience moments of deep happiness, connectedness, kindness and peace”
Demographics	Combination of National health monitor (GGD, 2016) and Safety, Livability and Well-being Monitor (Gemeente Arnhem, 2019)	
Changes due to COVID-19 crisis	National health monitor (GGD, 2020)	

Part two of the questionnaire covers questions on the meaning and well-being effects that respondents attribute to the initiative where they volunteer, visit or garden (Table 2). These have been categorized into five well-being dimensions, based on the social enterprise questionnaire (van Steen, 2019) from which we reordered and added several items to better fit the nature of the green initiatives in this study. Similar well-being themes were found in a systematic literature review of the contribution of allotment gardening to health and wellbeing by Genter et al.(2015).

Table 2. Well-being dimensions related to the green initiatives with their questionnaire items.

Well-being dimension	Items
Meaningful involvement	<ul style="list-style-type: none"> <li>- Through participation in this initiative I feel useful</li> <li>- Participation in X gives meaning to my life</li> <li>- Participation in X means that I have a more pleasant day</li> <li>- Involvement in X distracts me from my problems</li> <li>- X contributes to my personal development</li> <li>- Because of participation in X I develop work skills</li> </ul>
Personal development	<ul style="list-style-type: none"> <li>- Through X I learn to better get along with others</li> <li>- Participation in X helps me to better understand myself</li> <li>- Through X I learn to better deal with setbacks</li> <li>- X helps me to take hold of my life</li> <li>- Participation in X makes that I think more positively about myself</li> </ul>
Social connection	<ul style="list-style-type: none"> <li>- Because of X I have more contact with others</li> <li>- Because of X I participate more in society</li> <li>- Because of X I get to see more people</li> <li>- Because of X I feel more at home in the neighborhood</li> </ul>
Sense of ownership	<ul style="list-style-type: none"> <li>- I feel part of the initiative</li> <li>- I feel responsible that all is going well at X</li> <li>- If new people arrive, I help them on their way</li> <li>- I am proud to participate in X</li> <li>- If something goes wrong, I speak up</li> <li>- I have the feeling that X is part of me too</li> </ul>
Sense of safety and trust	<ul style="list-style-type: none"> <li>- I feel accepted at X</li> <li>- X has a pleasant ambience</li> <li>- I am sufficiently challenged at X</li> <li>- I feel like I can start my own activities here</li> <li>- X encourages me to think along</li> </ul>
Healthy lifestyle	<ul style="list-style-type: none"> <li>- Since I participate in X, I move/exercise more</li> <li>- Because of X, I get outside more</li> <li>- I feel fitter because I participate in X</li> <li>- By participating in the initiative I started to eat healthier</li> <li>- Through the initiative I learn about healthy food</li> <li>- Participating in X helps me to live a healthier life</li> <li>- I have less stress because I participate in X</li> </ul>

Late July the questionnaire was assessed by 'language ambassadors', experiential experts of Pharos (National Expertise Centre for reducing health inequalities) on low literacy, who tested the questionnaire on wording, layout and readability. Based on their advice, we checked the entire questionnaire for unnecessary difficulties and adjusted wording and layout accordingly. We ran a pilot test in a green citizen initiative, not part of the project but otherwise following the selection criteria, in September, after which we improved the text about personal data and data processing in the consent form.

### Selection of green initiatives

For this study we selected eight green citizen initiatives in Arnhem and Nijmegen, two middle-sized cities in The Netherlands. The researchers have been in contact with a number of green initiatives in 2019 and 2020 before selecting the initiatives for this study. Selection criteria were:

- the initiative has a garden;
  - the initiative is started and run by citizens;
  - the initiative is located in a low- or middle-income neighborhood;
  - the initiative offers diverse activities for citizens to participate in;
  - the initiative has volunteers, gardeners and/or regular visitors;
  - the initiative is interested to be part of the research project between 2020 and 2022.
- Table 3 gives an overview of the initiatives and their main characteristics.

Table 3. Overview of the green initiatives and their main characteristics.

Initiative	# of questionnaires conducted	Type	Activities				
			Vegetable gardening	Experimenting e.g., food forest, permaculture	Cooking	Creative	Workshops
A	37	Fresh produce for Food Bank	x	x			
B	2	Ecology & learning		x			
C	1	Ecology & learning	x		x		
D	21	Neighborhood garden	x		x		
E	10	Neighborhood garden	x	x	x		
F	10	Neighborhood garden	x				
G	19	Creative & social	x		x	x	x
H	9	Creative & social	x		x	x	x

### Questionnaire distribution

The questionnaire was conducted in September and October 2020. Respondents were volunteers, gardeners or visitors of the initiative irrespective of their gender, age, activity or other any other characteristics. Initiative leaders and coordinators helped distributing the questionnaire among participants. The questionnaire was administered on site, after an introduction by the researchers. We also left behind a number of questionnaires at the initiatives for visitors to fill out on days that a researcher could not be present. Each respondent received an information page and a consent form to read prior to starting the questionnaire, informing them that their data would be handled anonymously. Both the respondent and the researcher signed the consent form. It took respondents 10-25 min to finish the questionnaire. All respondents received a € 10 gift card as a sign of gratitude for their participation.

### Descriptive analysis

This paper focuses on the well-being dimensions described in Table 2. These were measured using 5-point Likert scale matrix questions. Each well-being dimension consists of multiple items (four or more) for which we made composite variables in SPSS 25. We calculated composite scores by adding up the individual item scores per well-being dimension and dividing the total score by the number of items. This resulted in a well-being score per respondent per well-being dimension and an overall mean score per well-being dimension. To explore variation in well-being scores among the different green initiatives, we grouped the initiatives according to their characteristics (see 'type' in Table 3), and calculated well-

being scores for each initiative type.

## RESULTS AND DISCUSSION

### Overall well-being scores

The average score for the well-being dimensions (which could be scored 1-5) is 3.6, with sense of safety and trust scoring highest (4.0) and personal development (3.1) scoring lowest, followed by healthy lifestyle (3.3) (Table 4; Figure 1). Looking at the scores per initiative, there is little variation in the average scores but we can distinguish quite some differences when looking at each dimension separately. Initiative B and C, the smallest initiatives, score relatively high on personal development and initiative C is the only initiative with a high score on healthy lifestyle. Initiative H, which aims to foster solidarity and compassion, scores relatively high on sense of ownership and sense of safety and trust.

Table 4. Overall mean score per well-being dimension ( $n=109$ ) and per initiative.

Well-being dimension	Initiative								
	All	A	B	C	D	E	F	G	H
Meaningful involvement	3.7	3.7	4.0	4.0	3.6	3.4	3.5	3.8	3.7
Personal development	3.1	3.2	4.4	4.0	2.7	2.9	2.8	3.5	3.1
Social connection	3.8	3.8	4.1	4.0	3.8	3.5	3.9	4.1	3.7
Sense of ownership	3.9	3.9	4.0	3.8	3.9	3.8	3.9	3.8	4.1
Sense of safety and trust	4.0	4.0	3.5	3.8	4.0	4.0	3.9	4.1	4.2
Healthy lifestyle	3.3	3.6	3.5	3.9	3.0	3.3	3.1	3.3	2.8
Average	3.6	3.7	3.9	3.9	3.5	3.5	3.5	3.8	3.6

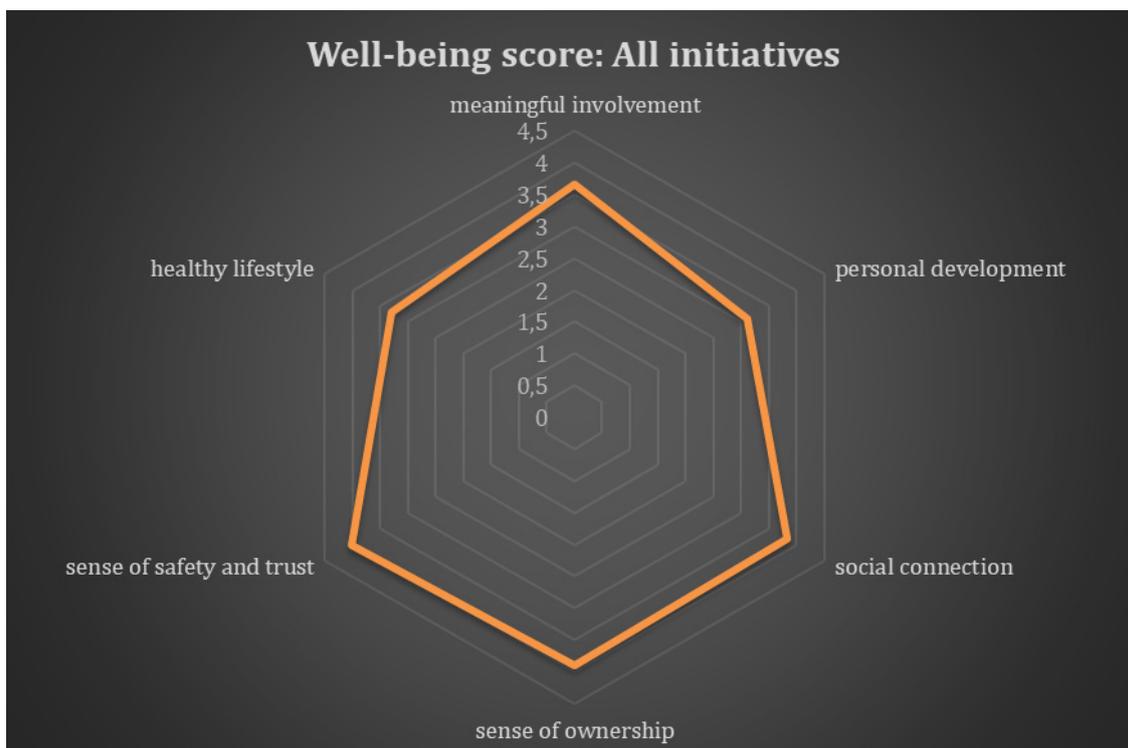


Figure 1. Spider diagram showing mean score per well-being dimension for initiatives combined.

### Well-being scores per initiative type

The eight initiatives were categorized into four different types, based on their goals and the activities that they provide (Table 3). For each type, we calculated well-being scores per dimension (Table 5; Figure 2). Initiative A is the largest and produces vegetables for the food bank in Arnhem (Type 1) and scores averagely on the well-being dimensions. Two small-scale initiatives focus on ecology and learning and work with just a handful of volunteers who are mostly part of a learning or work reintegration trajectory (Type 2). This type scores highest on the well-being outcomes, especially regarding meaningful involvement and personal development. On sense of safety and trust, this type of initiative scores lowest. The tree initiatives that make up Type 3 are centrally located in the neighborhood and serve as a local meeting spot for residents interested in green and gardening. These initiatives score on the lower side, especially for personal development and healthy lifestyle. Two initiatives offer much more than a garden and serve a wider audience with workshops, walk-in soup, yoga and a repair café (Type 4). These initiatives also score averagely with the exception of sense of safety and trust which is perceived as very high at these locations.

Table 5. Mean well-being scores per initiative type.

	Type 1: Fresh produce for Food Bank (n=37)	Type 2: Ecology & learning (n=3)	Type 3: Neighborhood garden (n=41)	Type 4: Creative & social (n=28)	Average
Meaningful involvement	3.7	4	3.5	3.7	3.7
Personal development	3.2	4.3	2.8	3.4	3.4
Social connection	3.8	4.1	3.7	4.0	3.9
Sense of ownership	3.9	3.9	3.9	3.9	3.9
Sense of safety and trust	4.0	3.6	4.0	4.2	3.9
Healthy lifestyle	3.6	3.6	3.1	3.1	3.4
Average	3.7	3.9	3.5	3.7	3.7

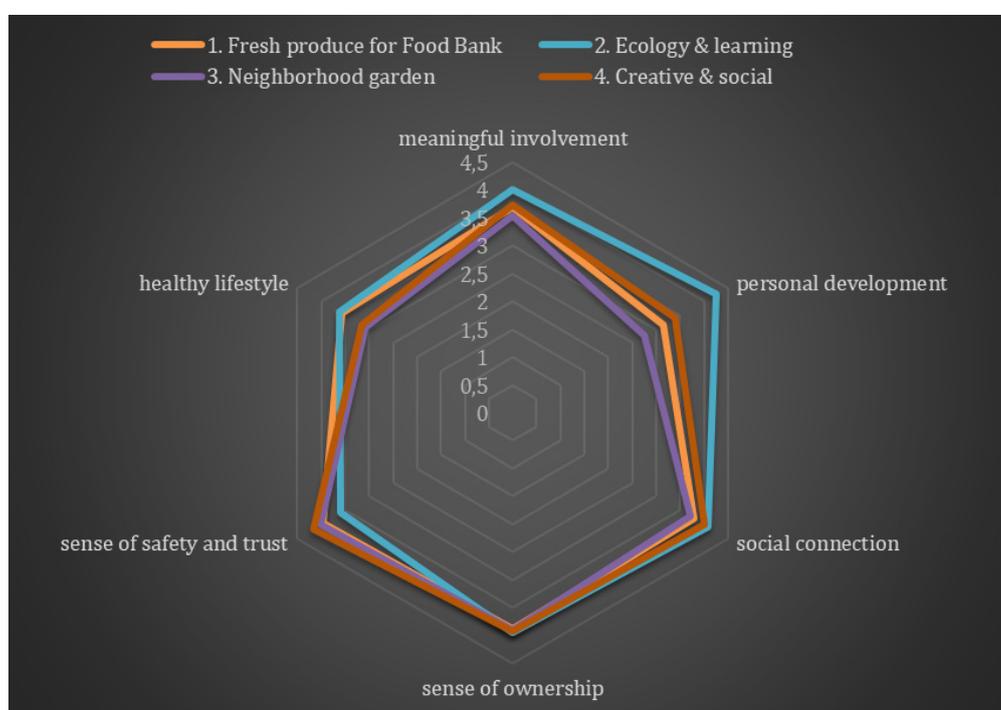


Figure 2. Spider diagram showing mean scores per well-being dimension and initiative type.

## **Reflection on results**

These first results show that positive experiences and meanings dominate. Participants of local green initiatives feel part of the initiative, showing a high sense of ownership. Participants also show strong social connections which was confirmed when we visited the garden and spoke to individuals: gaining social contacts was one of the aspects that people mentioned upon each and every visit. Participants also mentioned the positive effect of spending more time outdoors, although the dimension healthy lifestyle scored relatively low. This may be because we found little evidence of increased healthy food intake, although people do take home fresh harvest when they work in the garden. It could be that the initiatives attract people that have already adopted a relatively healthy lifestyle. This raises the question whether the green initiatives attract a certain group of residents.

Furthermore the results hint that differences in well-being scores among the green initiatives can, at least partly, be explained by the different objectives and activities that initiatives have. Initiatives that facilitate a learning environment, score highest on the personal development dimension, while the broader initiatives for which gardening is not the main feature score highest on sense of safety and trust. This indicates that the way an initiative is developed and coordinated, influences the type of effect it has on participants' well-being.

## **Methodological limitations**

The applied method has several limitations. First, a questionnaire is not well suited to reveal personal motivations and challenges which are essential in understanding the meaning that residents attribute to a green initiative. Different or underlying well-being effects could be missed by a questionnaire. Second, some initiatives are very small-scale and feature less than a handful of volunteers which makes it hard to compare outcome measures. Third, we only asked questions about positive aspects of the green initiatives and not about negative aspects that a community garden can also entail such as stress (Young et al., 2020). Fourth, the COVID-19 measures in 2020 may have led to a possible underrepresentation of vulnerable groups e.g., residents who were not visiting the initiative.

## **Next steps/future research**

Late 2021 we plan to conduct additional in-depth interviews with participants of the green initiatives in this study to provide contextual understanding that can help interpret the questionnaire results. Interviews will focus on motivations and experienced (well-being) benefits and constraints of participating in a green initiative. Also planned for late 2021 is an explorative study that includes non-participating residents of the low-income neighborhoods in which the green initiatives are located. We are curious to learn whether other residents are aware of the presence of the green initiative in their neighborhood, and what their reasons are for (not) visiting such an initiative. Residents may be willing to become active in their neighborhood but a green initiative may not be their first choice, based on interest, or the garden may not be a place where they feel comfortable or that is easily accessible to them. We would like to further explore the possible avenues for residents of low-income neighborhoods to participate locally, and understand the well-being effects of such participation.

## **CONCLUSIONS**

This study aimed to explore the benefits that residents experience from participating in green citizen initiatives. We provided the first evidence on the value of green citizen initiatives as a strategy to improve sustainable urban development in terms of health and well-being of citizens in deprived urban neighborhoods. Green citizen initiatives show potential to 'upgrade' deprived neighborhoods in a participatory manner, and contribute to residents' health and well-being which in turn is a signal for an equitable and sustainable urban future.

## **ACKNOWLEDGEMENTS**

We would like to thank all participants of this study for welcoming us in the garden and for their willingness to cooperate, including those leading and coordinating the green initiatives. This project was funded by the Netherlands Organization for Health Research and

Development ZonMw, project no. 531001318.

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