Research Paper

A Case Study of Singapore HDB Residents on the Formation of Community Attachment in Community Gardens

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Abstract

*Rapid urbanization is a global phenomenon that, while driving economic growth and social development, can also pose a number of challenges and problems (Nations, 2017). As a developed country, Singapore, in the course of rapid urbanization, has had to cope with changes in the demand for social services, including health care, housing and community support, brought about by demographic changes. It has also led to a weakening of residents' sense of identity and belonging to their communities (*Building community resilience*, 2022). Against this backdrop, building and maintaining social capital, as well as enhancing the resilience and adaptive capacity of communities, has become particularly important (Benjumea et al., 2022). Singapore has addressed this challenge through multi-stakeholder engagement and a system of indicators to measure community resilience. In particular, National Parks Singapore launched the 'community in bloom' project in 2005, which aims to improve the community environment through the construction of community gardens, while enhancing social welfare and community cohesion (Tan and Neo, 2009). Existing studies have shown that community gardens are effective in improving the overall quality of life and social capital of communities (Lovell et al., 2014). Their specific positive impacts on the community are mainly reflected in the following aspects: Empowering residents to provide opportunities to get close to nature and improve their physical and mental health (Lal, 2020); Supporting local food production and promoting sustainable lifestyles (Opitz et al. 2016); And as well as serving as a platform for education and environmental awareness promotion (Hume et al., 2022). However, the impact of community gardens on community belonging and community attachment has not been adequately studied. Therefore, four community gardens constructed in the last five years in Singapore and the HDB Community in which they are located were selected for this study. First, basic information about the community gardens was obtained from the leaders of the gardens through semi-structured interviews. After that, a questionnaire based on the Community Attachment Scale was used to investigate the gardeners and non-gardeners in the communities where the community gardens were located. Finally, the obtained data were analysed and processed using Structural Equation Modelling (SEM). The results of the study indicate that community gardening positively affects community attachment by increasing residents' community satisfaction, improving neighbourhood relations, and enhancing community perceptions and emotions. A cross-sectional comparison of the relationship between the four gardens and community attachment showed that garden size, organizational structure, and event hosting were positively related to community attachment.*

Keywords

Community Garden, Community Attachment, CIB program, Structural Equation Modelling, HDB Estate, Singapore

1. Introduction

Rapid urbanization is a key feature of global development in the twenty-first century, and it is having a profound impact on the world's cities. According to the Human Development Report of the United Nations Development Programme, by 2050, more than two thirds of the global population is expected to live in urban areas (Nations, 2017). As populations continue to gather and increase, cities are expanding rapidly. This brings not only economic prosperity and increased cultural diversity, but also a series of challenges, such as inadequate infrastructure, environmental pollution, traffic congestion, tight housing and social stratification (Brueckner and Largey, 2008). In the process of urbanization, how to balance development and sustainability and safeguard the quality of life of residents has become an important issue for city managers and planners (Forrest and Kearns, 2001).

Singapore is a tropical island nation in Southeast Asia, known for its highly developed economy and high standard of living. In 2018, Singapore's urbanization rate reached 100%, with all its citizens identified as "urban population" (Nations, 2018). Research in 2019 shows that more than 40% of Singapore's population are immigrants. And increased immigration has been one of the main factors behind Singapore's rapid population growth (Richards et al., 2020). When new residents enter a new living environment, their emotional attachment and community identity are not formed as quickly, leading to isolation from their original productive living environment (Cheong et al., 2007). At the same time, the arrival of foreign immigrants has changed the original living and social environment of the community, and the local sentiments of the original residents have also been affected. This can lead to a decline in the residents' sense of community belonging and identity (Hesari et al., 2020). All these factors will lead to a deterioration in neighborhood relations and are not conducive to the formation of a good social network. In more serious cases, they can even endanger the health and safety of individuals and groups (Berkman, 2000).

In response to the challenges to community resilience posed by a growing population and changing demographics as a result of full urbanisation, Singapore has undertaken a number of efforts (*Building community resilience*, 2022). One of these is the Community in Bloom (CIB) programme, officially launched by the National Parks Board of Singapore in 2005 to encourage residents to establish community gardens (Tan and Neo, 2009)(Figure 1). Community gardens under Singapore's CIB programme are implemented and managed through a government-community partnership model, with residents' committees responsible for the day-to-day management of the gardens, providing a link between higher-level government agencies and residents. The Government encourages more people to visit the gardens as a way to connect with the rest of the community and enjoy the health and well-being benefits of being closer to nature. To date, around 40,000 residents have participated in the programme and more than 1,700 community gardens have been established. The core value of the programme is public participation, bringing together the wisdom and consensus of the community in a collaborative effort to create an inclusive environment (Tan and Neo, 2009).

Figure 1. The Community in Bloom (CIB) program.

Source： National Parks Website. https://gardeningsg.nparks.gov.sg/get-involved/community-gardens/

2. Literature review

2.1. Benefits of community garden

Community gardening began in the 1890s. Early on, academics discovered the benefits of community gardening in terms of beautifying the community environment, increasing the availability of fresh produce in the community, providing opportunities for outdoor physical activity and improving mental health. As a result, community gardens have become an increasingly popular topic of research in recent decades. Community gardens are seen as a 'link' and 'bridge' (Putnam, 2000) to social capital within a community, helping people to become and remain involved in community activities (Sempik et al., 2003). Previous research has identified community gardens as 'social' (Glover et al., 2005), ' socially produced spaces ' (Chitov, 2006), ' spaces of connection ' and 'belonging spaces' (Diamant and Waterhouse, 2010) as they provide opportunities to meet, interact and build relationships with others. Glover states that 'the community garden is not so much about gardening as it is about community' (GLOVER, 2004). This is because it provides a 'third space' away from work and home where people can come together, make connections and develop a sense of community identity.

However, it is only in recent years that attention has been paid to assessing the benefits of community gardens in response to the growing demand for health and well-being among urban residents. (Lovell et al., 2014) summarised the benefits of community gardening in four areas: physical health, mental health, social well-being and quality of life. The researchers found that gardening can address chronic and non-communicable diseases by providing opportunities for physical activity, improved nutrition and stress reduction (Lal, 2020). Community gardening and positive community psychological outcomes were later confirmed (Diamant and Waterhouse, 2010). Participation in gardening can improve well-being through increased community interaction and cultural engagement (Benjumea et al., 2022). Community gardening is also an effective way for residents of high-density cities to interact with nature and build psychological resilience during epidemics. In addition, community gardens provide space for volunteerism and community engagement to enhance residents' personal fulfilment and esteem, and contribute to quality of life (Ohmer et al., 2022). A recent study of community gardens in Japan showed that community gardens play an important role in social networks that contribute to urban resilience (Shimpo, 2024). Overall, the benefits of community gardening are not limited to the individual, but also include improving the environment and sharing the fruits of their labour, helping to create more harmonious and cohesive communities.

2.2. Community attachment

Emotions and feelings shape the world we know and live in, and people form certain emotional relationships with specific spaces. Community attachment theory, based on urban and rural planning, human geography, and environmental psychology, is gaining more and more attention as an effective tool for interpreting and measuring residents' feelings (Anderson and Smith, 2001). Community attachment is a description of the feelings between residents and the community, and it is an important perspective for analyzing the social contents of the community and the living conditions of the residents (Pile, 2010).

Community attachment may be thought of as the extent to which residents of a place possess cognitive or affective ties to each other and to that place (Trentelman, 2009). Social scientists interested in the concept of community attachment have generally defined it as a sense of belonging or rootedness in a community (Cross, 2003). Some researchers explicitly identify dimensions of attachment. Bolan (1997) distinguishes between attitudinal attachment (comprising evaluation and sentiment), and behavioral attachment (comprising informal interaction and formal participation in the community). (Stinner et al., 1990) use three concepts to denote community attachment – amity (local friendships), involvement (participation in the community), and sentiment (degree of satisfaction with the community).

Summarizing previous explanations and definitions of community attachment by many scholars, Cross defined Community Attachment as: A positive effective bond between an individual and the place in which they reside, the main characteristic of which is the desire of the individual to maintain close to that place (Cross 2003). According to this definition, we can see that community attachment has multiple dimensions. Within a community, attachment figures can be the built environment, the natural environment, and the social environment (Figure 2). In addition to attachment objects, attachment itself can also be multi-dimensional, which includes several significant aspects: satisfaction, cognitive preferences (perception of and preference for a place or kind of place), sense of belonging or home, identification with place, and dependence on the place (Cheng et al., 2021) (Figure 3).

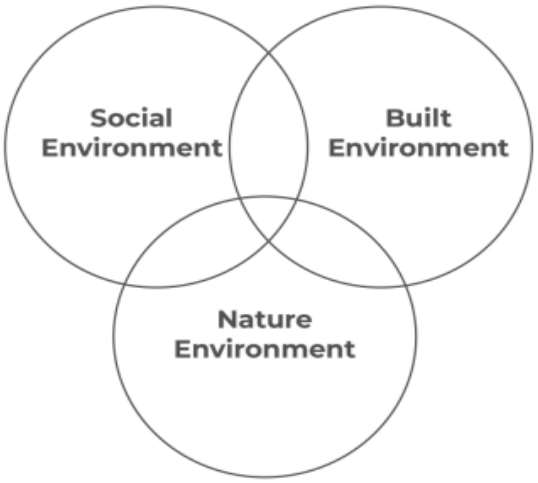

Figure 2. Object of Attachment (Cross 2003)

Figure 3. Community Attachment Model (Cross 2003)

2.3. Research Questions and Aims

Based on the above literature review on community gardens and community attachment, two research questions were posed in this study:

1) Do some characteristics of CIB community gardens more strongly facilitate community attachment?

2) How does participation in CIB community gardens facilitate community attachment?

The aim of this research was to demonstrate the positive significance of community gardens to community attachment in order to inform the design principles and construction and operation of community gardens.

3. Methodology

This research employs a mixed-methods analysis including interviews, questionnaire surveys, observations, documents, and photography. Qualitative and quantitative data were collected by distributing closed - ended questionnaires and QR code posters to collect qualitative and quantitative data and to compare data obtained from gardeners and non-gardeners. The questionnaire covered respondents' level of participation in community gardening, the value placed on community gardens, measures of community attachment and personal information (Table 1). In previous research, community attachment has typically been measured to capture residents' emotions and feelings about their local community. The questionnaire survey in this study combined scales summarized by previous researchers to measure community attachment (Jeni Cross, 2003; Theodori, 2004). We also conducted semi-open-ended interviews with key managers of all gardens in order to understand basic information about the gardens, their staffing, operational practices, and social impacts.

Table 1. Questionnaire survey

Factors		Questions
Participate	Q1	Do you currently participate in community garden activities?
	Q2	How often you are active in the community garden?
	Q3	How long have you participated in the community garden?
Importance of Community Gardens	Q5-1	Community gardens are very important to me.
	Q5-2	Community gardens are very important to all community residents.
Cognitive	Q6-1	Your current satisfaction with the community.
	Q6-2	Your initial satisfaction with the community.
Dependence	Q7-1	They are good people.
	Q7-2	I am happy to be their neighbors.
	Q7-3	We greet each other with a friendly hello.
	Q7-4	They try not to make as much noise as possible for us.
	Q7-5	I do not like my neighbors.
	Q7-6	I treat my neighbors as friends.
Identity	Q8-1	This is the ideal community to live in.
	Q8-2	I feel at home in this community.
	Q8-3	I like living in this community.
	Q8-4	This community is part of my identity.
	Q8-5	I feel I belong to this community.
Affective	Q9-1	I would be sorry to move out of my community, without the people who live there.
	Q9-2	I would be sorry if the people who I appreciated in the community moved out.
	Q9-3	I would be sorry if both I and the people who I appreciated in the community moved out.

Personal Information	Q10-1	Your Age
	Q10-2	How long have you lived in this HDB ?
	Q10-3	Which garden do you usually participate in or where do you live nearby? - Selected Choice

3.1. Site selection and sampling

By looking at the registered gardens on the Nparks website and the basic social media profiles of the gardens in question, I finally identified four new community gardens that have been built in the last five years (Figure 4). The selection of new gardens ensures that the residents of the community annexes in the respective neighbourhoods are not disturbed by too many factors other than the gardens, such as the level of improvement of the community infrastructure, the quality of the community council services and the impact of other community engagement activities. This study involved a survey of community residents. The boundaries were determined by the boundaries of the HDB estates served by the specific gardens.

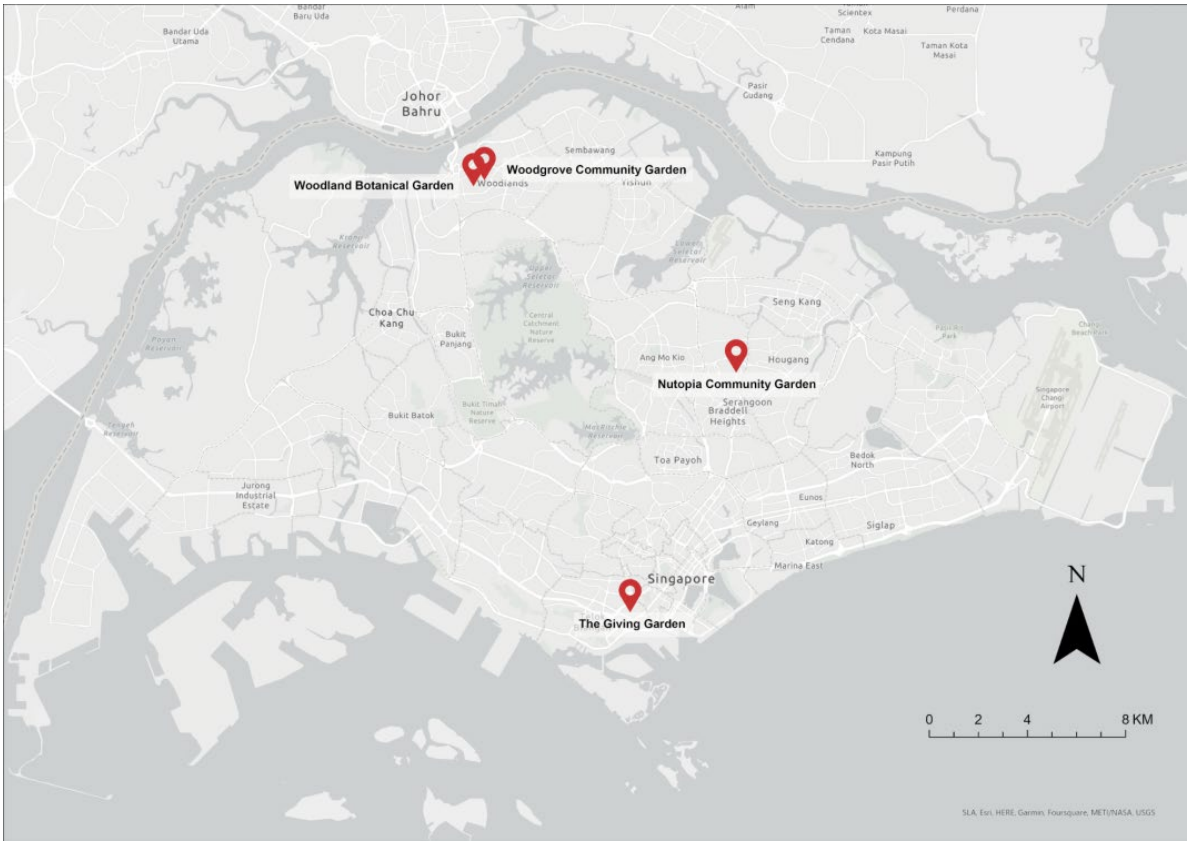

Figure 4. location of four gardens in Singapore. (Edited by author)

We received a total of 162 valid responses from the communities where the four gardens are located. Ten residents were recruited and interviewed prior to conducting the survey to clarify the various meanings their peers may have assigned to the questions and answers in the questionnaire. The information obtained from the interviews helped to improve the questionnaire. The data collected were analyzed by structural equation modeling as well as comparative analysis.

3.2. Structural Equation Modelling (SEM)

Structural Equation Modelling (SEM) is a multivariate statistical technique that can analyze the relationships between multiple dependent and independent variables simultaneously, allowing for measurement error and accurate estimation of complex relationships between variables (Mokhtarian and Bagley, 2002). Because of its flexibility and accuracy, SEM is widely used for theoretical validation and empirical research in fields such as social sciences and psychology (Yang and Cao, 2018).

4. Results

4.1. Configurations of 4 CGs

To achieve the first research goal, I conducted in-depth interviews with four garden leaders and summarized basic information about each of the four gardens in a combination of site research transcripts and photography. Afterwards, the configuration, operation, and activities of the four gardens were entered into the same table for comparative analysis (Figure 5-Figure 12).

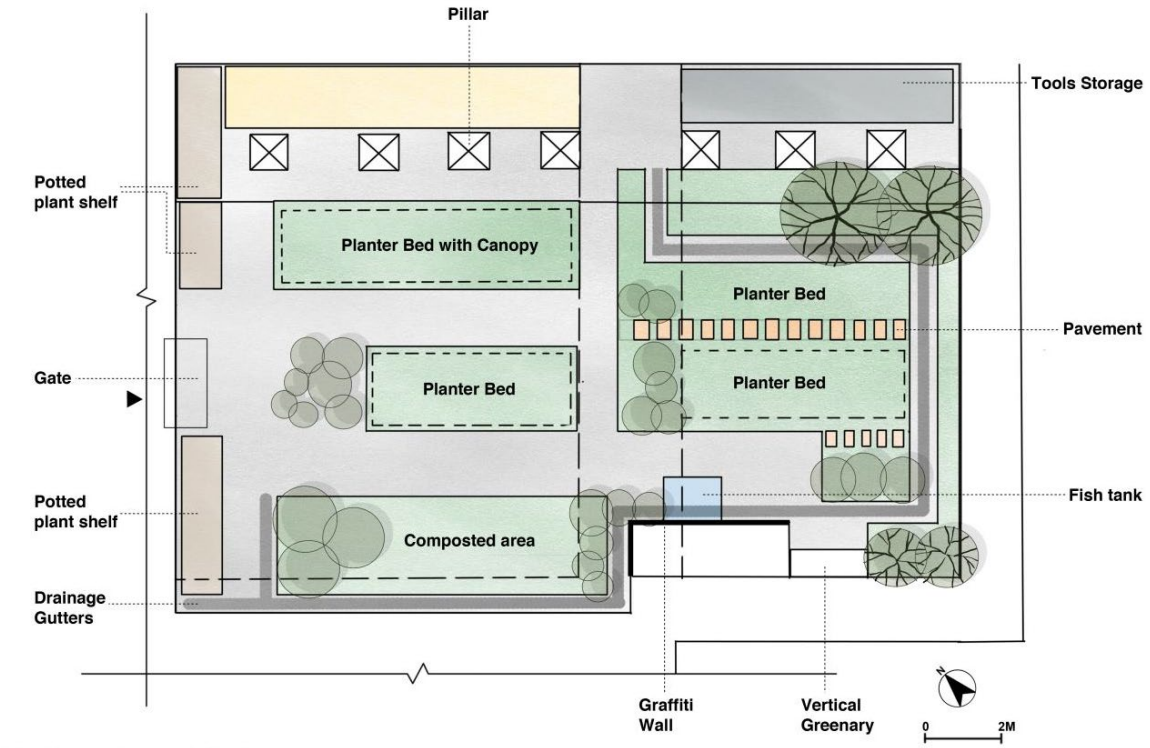

Figure 5. Master plan of WCG (Hand-drawn by author)

Figure 6. Configuration of WCG (Author's own photograph)

Woodland Botanic Garden
@ Marsiling Zone 3

Figure 7. Master plan of WBG (Hand-drawn by author)

Figure 8. Configuration of WBG (Author's own photograph)

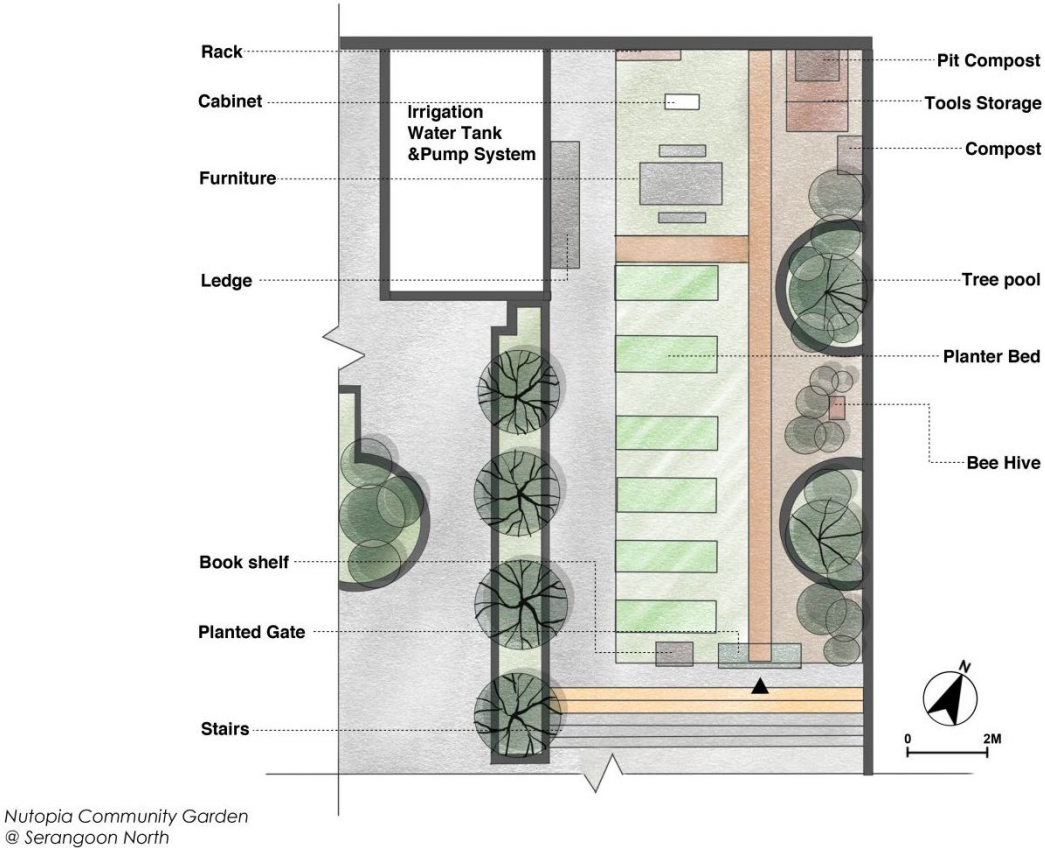

Figure 9. Master plan of NCG (Hand-drawn by author)

Figure 10. Configuration of NCG (Author 's own photograph)

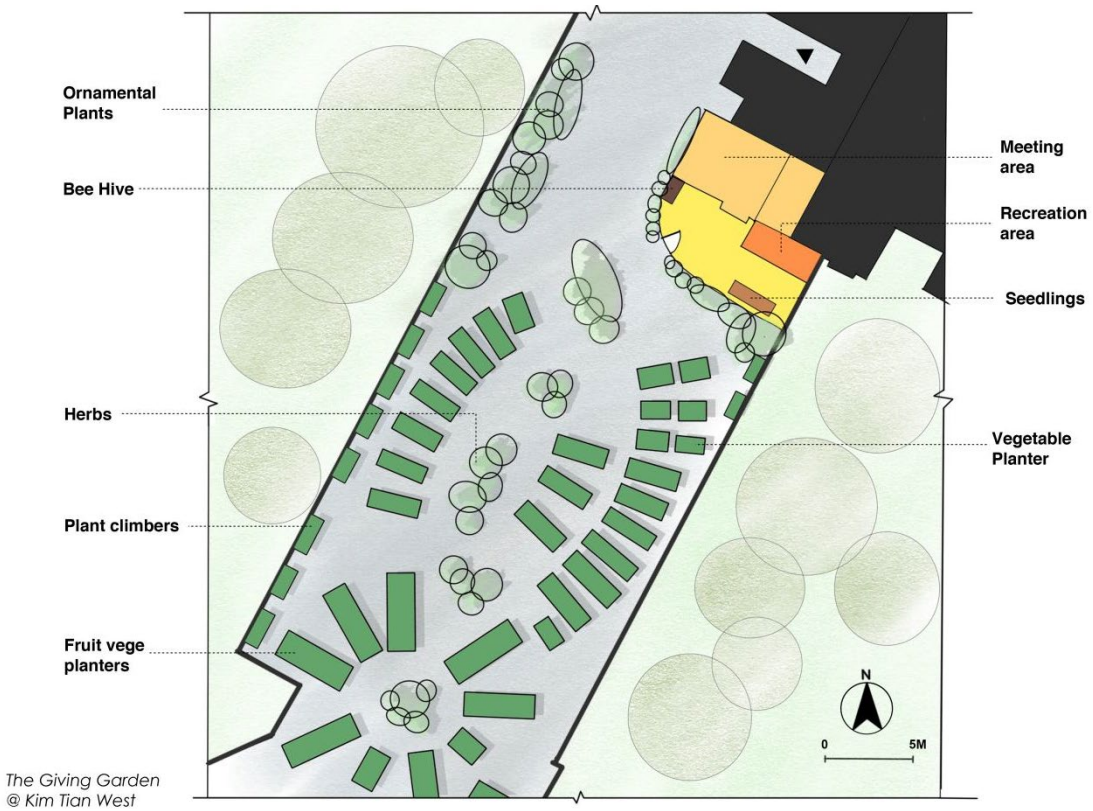

Figure 11. Master plan of TGG (Hand-drawn by author)

Figure 12. Configuration of TGG (Author 's own photograph)

The basic information, configuration, and activities of the four gardens are put into the same table for comparison: WCG was established as early as 2018. NCG and WBG have the longest opening hours and are not gated, while WCG is only open for certain hours on weekends. Of the four gardens, only WBG is themed around healing gardens and ornamental plantings, while the other three are edible gardens. So, in terms of configuration the other three gardens are more or less the same, while WBG is mainly ornamental decoration.

Table 2. General information on 4 CGs

Garden	Woodgrove Community Garden @ Marsiling Zone 6	Woodlands Botanic Garden @ Marsiling Zone 3	Nutopia Community Garden @ Serangoon North	The Giving Garden @ Kim Tian West
Establishment time	2018.11	2020.07	2021.04	2021.11
Area (㎡)	270	3000	60	1100
Stuffing	6 core members up to 30 volunteers	6 core members up to 30 volunteers	4 core members up to 15 volunteers	20 core members up to 60 volunteers
Organization	-	Gardening group; Events holding group; Equipment Maintenance group;	-	Maintenance Team, Store-Room Management Team; Compost Management Team; Leader-In-Charge; Program Organization Team; Education & Learning Team; Garden Landscape Team; Vegetable Section; Herb Section Leader; Ornamental Section Leader;

				Fruit Section Leader; Recycle Theme Section Leader; Therapeutic Garden
Configuration	5 planter beds, 3 potted plant shelves, drainage ditches, 1 fish tank, and 2 plant climbing frames. a sofa, a coffee table, a refrigerator and several chairs，tool storage，Rain harvesting system	wood chip paving paths, bamboo birdhouses, solar panels, fountain ponds, wooden arches, Gazebo	6 planter beds, 2 flower beds, composting a group of furniture, tool storage, a beehive, a bookshelf, an irrigation system	42 planter bed, 1 seeds cultivation, composting, tool storage, meeting area, 2 swings, a handmade beehive, 6 flower beds
Space Type	Between 2 blocks with half shelter.	A corner of town park	Roof top of parking lot	Roof top of parking lot
Opening time	Sat & Sun, 9am - 11am	24 hrs.	24 hrs.	Mon - Sun, 7:30 - 21:00
Theme	Edible Garden Healing Garden (In plan）	Ornamental plants Healing Garden Enriching species diversity	Edible Garden	Edible Garden Healing Garden (In plan）
Activities/ Events	-	Volunteers' sessions Open house	-	Gardeners meeting Harvesting sharing Gardening skills training

4.2. Community attachment and community garden

A structural equation model was developed after the data collected from the questionnaire passed the reliability and validity tests. The model also passed chi-square and degrees of freedom tests. We analyzed the dependence between the four sub-dimensions of community attachment - cognitive, dependency, identity and affective - and residents' valuation of community gardens (CGI) using structural equation modelling (SEM)（Figure 13）. Firstly, engagement was positively correlated with cognitive, dependency, identity and affective were supported by statistically significant positive correlational dependence. Specifically, the path coefficient of involvement on cognitive was 1.296, with a standard error of 0.278, a critical ratio (C.R.) of 4.666, and a significance level (P) of less than 0.001, indicating that increased involvement significantly and positively predicted cognitive. Similarly, the path coefficient of involvement on dependence was 1.104, with a standard error of 0. 292, C.R. of 3.785, $p < 0.001$; for identity, the path coefficient was 1.319, with a standard error of 0.036, C.R. of 3.667, $p < 0.001$; and for identity, the path coefficient was 1.605, with a standard error of 0.506, C.R. of 3.169, $p < 0.001$. These results consistently suggest that as engagement increases, individuals' experiences of cognition, dependence, identity, and affect increase accordingly (Table 3).

The path coefficients of CGI for cognition, dependency and identity were -0.205, -0.241 and -0.289 with standard errors of 0.176, 0.191 and 0.239 and C.R.s of -1.165, -1.261 and -1.21 with p-values of 0.244, 0.207 and 0.226 respectively, none of which reached the level of statistical significance. This suggests that the effect of CGI on cognition, dependency and identity is not significant in the sample of this study. Notably, the path coefficient of CGI on AFFECTIVE was -0.599 with a standard error of 0.346, a C.R. of -1.73, and a p-value of 0.084, which is close to a statistically significant level, suggesting that CGI may have a slightly negative effect on AFFECTIVE (Table 3).

In addition, we found significant positive correlations dependence between a number of sub-dimensions and commitment, cognitive, dependency, and affective. These results further confirm that commitment

plays a central role in shaping an individual's cognitive, dependency, identity, and affective experiences. (Table 3).

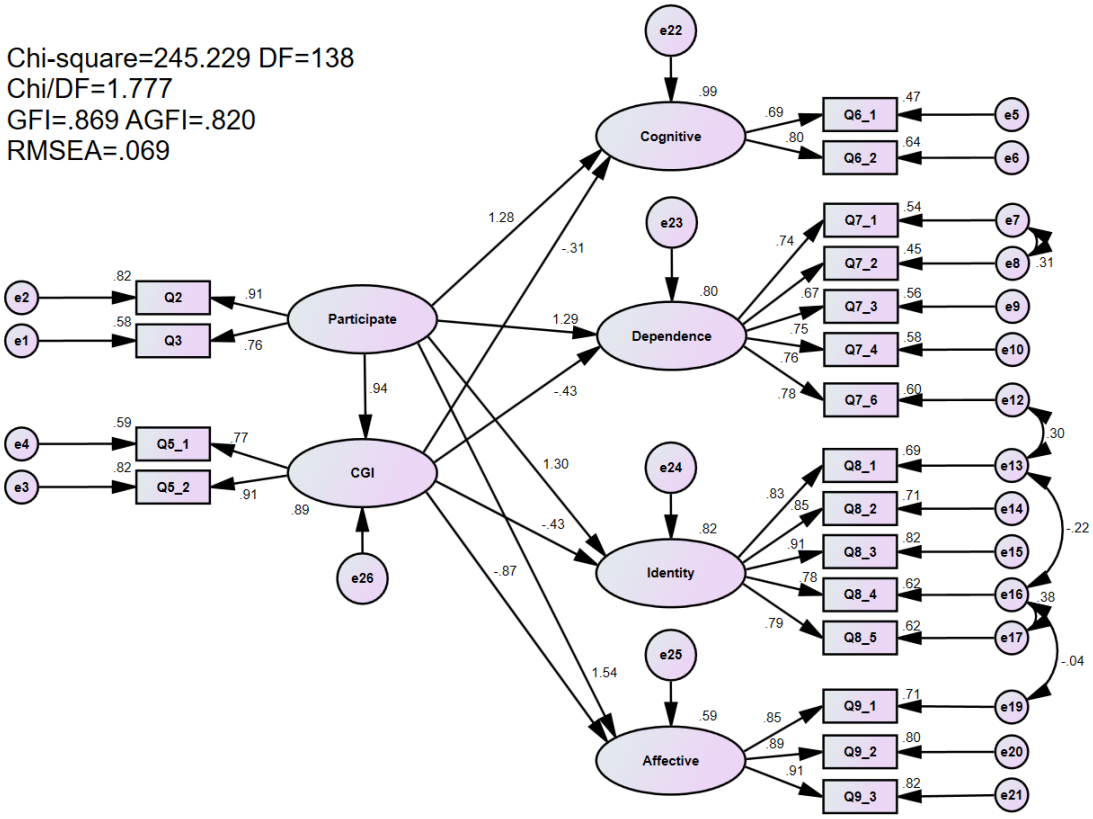

Figure 13. Structural equation model of community gardens and community attachment

Table 3. Parameter estimation results

			Estimate	S.E.	C.R.	P	Label
CGI	<---	Participate	1.437	0.121	11.866	***	par_22
Cognitive	<---	Participate	1.296	0.278	4.666	***	par_14
Dependence	<---	Participate	1.104	0.292	3.785	***	par_15
Identity	<---	Participate	1.319	0.36	3.667	***	par_16
Affective	<---	Participate	1.605	0.506	3.169	***	par_17
Satisfaction	<---	CGI	-0.205	0.176	-1.165	0.244	par_18
Dependence	<---	CGI	-0.241	0.191	-1.261	0.207	par_19
Identity	<---	CGI	-0.289	0.239	-1.21	0.226	par_20
Affective	<---	CGI	-0.599	0.346	-1.73	0.084	par_21
Q3	<---	Participate	1				
Q2	<---	Participate	1.553	0.123	12.583	***	par_1
Q5_2	<---	CGI	1				
Q5_1	<---	CGI	0.787	0.067	11.755	***	par_2
Q6_1	<---	Cognitive	1				
Q6_2	<---	Cognitive	1.159	0.124	9.325	***	par_3
Q7_1	<---	Cognitive	1				
Q7_2	<---	Dependence	0.951	0.096	9.888	***	par_4

Q7_3	<---	Dependence	1.056	0.114	9.258	***	par_5
Q7_4	<---	Dependence	1.009	0.108	9.333	***	par_6
Q7_6	<---	Dependence	1.156	0.123	9.376	***	par_7
Q8_1	<---	Identity	1				
Q8_2	<---	Identity	0.946	0.074	12.836	***	par_8
Q8_3	<---	Identity	1.005	0.068	14.69	***	par_9
Q8_4	<---	Identity	0.833	0.079	10.51	***	par_10
Q8_5	<---	Identity	0.788	0.068	11.657	***	par_11
Q9_1	<---	Affective	1				
Q9_2	<---	Affective	1.08	0.075	14.337	***	par_12
Q9_3	<---	Affective	1.01	0.068	14.82	***	par_13

4.3. Comparison of four gardens

Finally, we compared the level of community attachment across the four sites via cross-sections. Residents of NCG and its communities had the highest mean current community satisfaction score of 4.4 (0.5 std. dev.). Residents of WBG and its communities had the lowest mean score of 3.9 (0.9 std. dev.).WCG and its communities had the highest mean initial community satisfaction score of 2.9 (1.3 std. dev.), while the TGG community had the lowest average initial community satisfaction score of 2.5 (0.9 std. dev.). All four sites showed an upward trend in satisfaction change. NCG had the largest increase in satisfaction, from 2.5 to 4.4, an increase of 1.9, and WBG had the lowest change in satisfaction, from 2.8 to 3.9, an increase of 1.1.In terms of community attachment, WCG and NCG had the highest mean scores of 4.0 (0.7 std. dev.), while WBG had the lowest mean score of 3.8 (0.7 std. dev.) (Annex 1).

5. Conclusion

In conclusion, participation in community gardening can positively influence the formation of community attachment among residents. The size of the garden, the organizational division of labor, and the organization of activities are the key to its influence on community attachment. These factors relate to the influence of the garden on the community and even beyond the community. A community garden with enough space to host daily activities and with a clear staff structure can better engage residents in community gardening and further enhance community attachment. This finding answers the first research question posed previously.

Furthermore, by comparing the different attributes of gardeners and non-gardeners in community attachment one can determine in what ways community gardening affects community attachment. Also, gardeners scored higher on neighborhood relations, community perceptions, and community feelings than non-gardeners. This indirectly indicates that participation in community gardening can help residents improve the way they treat others and strengthen the construction of friendly relationships in their neighborhoods. A garden may become a community signifier and a place of emotional attachment. This is a response to the second research question.

This paper examines the effect of community gardens on the formation of community attachment in HDB neighborhoods in Singapore. This is a direction that has not been adequately studied in the Asian context. These findings can fill some gaps in the research on community garden construction in Asia. They can help subsequent community gardens to consider more influences on community attachment as well as form a better living environment in the process of establishing and developing them.

Although this study still has limitations in terms of pathway establishment and data collection, I think it has broader implications. For instance: the promotion of social inclusion and community integration, the promotion of environmental awareness and sustainability among residents, the positive impact on the urban environment, and the support of local food systems, among others.

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