# **Nature Placemaking Facilitators and Methods: Towards Interconnectedness with the Natural Environment and Enhanced Psychological Wellbeing in Singapore.**

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**The data that support the findings of this study are openly available in figshare at,** [**https://figshare.com/articles/dataset/Nature-placemaking\_at\_GUI\_in\_Singapore\_Survey\_Data/14921256**](https://figshare.com/articles/dataset/Nature-placemaking_at_GUI_in_Singapore_Survey_Data/14921256)**, reference number 14921256.**

**Abstract**

Over the last decades Singapore has reintroduced biodiverse green spaces in the city with the aim of enhancing the wellbeing of residents through nature connection. Despite the impressive urban green infrastructure built, surges in mental health related problems have questioned the efficacy of the methods applied to reconnect citizens with the natural environment. Of interest are the NGO nature-placemaking programmes introducing new social-ecological values that influence the sense of psychological wellbeing in the long-term. Nevertheless, since nature-placemaking is relatively a new practice, more knowledge on the methods implemented to connect residents to the natural environment, the values enacted, how facilitators impact or accelerate the process, and the necessary frequency of interaction and time of engagement is needed. To explore this, we conducted an in-depth analysis on the NGO ‘The Ground-Up Initiative’ in Singapore. A sequential mixed-methods study including seven focus groups and a survey was conducted with core members and volunteers. It was found that the duration of engagement and number of programmes attended are correlated to feelings of social cohesion, sense of community, self-esteem, and self-efficacy. Additionally, the role of facilitators was found to be determinant to enable new values and meanings that promote interconnectedness with the natural environment.

**Keywords:** Active engagement; Urban greening; Psychological health and wellbeing; Mixed methods; nature values.

## Introduction

Decades of exploit perpetrated to the natural environment have led contemporary societies at the edge of a ‘chaos point’ in which two pathways are envisioned: an imminent environmental global collapse or the opportunity for global renewal (Laszlo, 2014). To avoid the former, the plea echoing across all sectors is to introduce changes and alternatives to development that also reform the current value system of the natural environment as a commodity (Bakker, 2010; Norton, 2015). This shift in values could also restore the fragile relationship between the natural environment and the people residing in highly urbanized cities who often might have restricted access to biodiverse urban green spaces (Nasr, 1990). Noteworthy are the efforts to restore the human connection to the natural environment by increasing the access to urban green infrastructure which have been influenced by research in the fields of biophilia, social ecology systems and others (Tidball, 2012 (others)). A remarkable example of this can be found in the city-state of Singapore where urban policies have been introduced to increase the number of accessible urban green infrastructure today quantified in an extensive green network of connected parks and natural reserves that protect primary and secondary rainforests (Tan et al., 2013). The urban green infrastructure agenda in Singapore is threefold: 1) to introduce a new paradigm of sustainability with nature in the city; 2) to promote health and wellbeing of citizens through the exposure to natural environments; and 3) to increase inclusivity to urban green spaces across the population (Singapore Green Plan 2030).

Interestingly, increasing the number of and enhancing access to urban green spaces to help improving the health and wellbeing of citizens is not having the desired effects as indicated by recent studies. By 2019, nearly 80% of Singaporean residents reported to suffer from depression or anxiety disorders (Subramaniam et al., 2019), situation that has since been exacerbated by the Covid-19 pandemic (Teo, 2020). Considering the current scenario, we argue that increasing the number of urban green spaces in Singapore might not be sufficient to enhance the health and wellbeing benefits brought by natural environments exposure (Parosns, 1991; Kaplan, 1995; Berto, 2014) etc.). Furthermore, we concord with previous studies on nature connectedness arguing that moving beyond a superficial contact with nature and promoting a closer identification and interconnectedness with nature is necessary to bring the benefits of being exposed and connected to the natural environment (Lumber et al., 2017). Scholars assert that this problem is linked to the values system of nature that introduce an anthropocentric and extractive view of nature ‘rather than depending on and entangled with, the environment (Neo & Schneider-Mayerson, 2021).

Nevertheless, the discussion of the intrinsic value of nature as living and sentient organism is often considered an esoteric topic mostly discussed in spiritual ecology scholarship (Nasr, 1990; Becci et al., 2021). Yet, recent developments in social sciences and humanities suggest an increased awareness on the significance and meanings of biodiversity for those that interact with it (Jetzkowitz et al., 2018). This could lead to interconnectedness and self-identification with non-human life, which in turn could awake a human sensitivity as part of nature (Lumber et al., 2017). Although from this perspective, the value of nature comes from an anthropocentric view, it introduces an alternative to promote a sense of agency with the natural environment and the opportunity to recognize, attribute meaning to those experiences (Thorén & Stålhammar, 2018), and promote stewardship (Hes and Hernandez-Satin, 2020).

## Nature-Placemaking and Wellbeing Singapore Context

Studies in environmental psychology have indicated that increasing the agency of individuals in green spaces could enhance wellbeing (Bell *et al.,* 2014). The way for this to happen is to allow individuals to strengthen their human-nature connection in meaningful ways as they interact with the natural environment. For instance, Mattijssen *et al.* (2017) and Smith (2014) analysed the benefits of active engagement in activities in green places identified as placemaking in which individuals take part in the process of construction and maintenance of the green places. Such benefits include feelings of empowerment, place attachment, and wellbeing etc.

Although placemaking is not a new practice as it can be traced back to ancestral communities (Nasr, 1990; Lefebvre, 1991; Verschuuren *et al.,* 2010), it is only in 1960 that modern schools of design led by Jane Jacobs and William Whyte re-introduced the notion of placemaking. The need to design cities capable of enacting a stronger sense of connection to place (Alzahrani et al., 2016) inspired a movement that enabled citizens to have a direct engagement in the design of urban spaces (Kalandides, 2018). Interestingly, the benefits of placemaking transcend the physical changes of the space and it recognises all the aspects that characterise a place, which is something that is shaped by socio-spatial interactions over time (Goodman 1972; Relph, 1976; Tuan, 1977; Lombard, 2014). In this sense, placemaking could be understood as something that happens spontaneously and creates collective and individual meanings through interactions even after a place is designed and built (Schneekloth and Shibley, 1995; Burkner, 2006).

Placemaking not only deals with the space and its functional aspects, but also acknowledges the meaning and significance that is attained by the users. From this perspective, placemaking could be applied in different scenarios not only for the design of specific public spaces (Beza and Hernández-Garcia, 2018), but also for activities that enable new community interactions, values, and unique identities (Massey, 1991; Lippard, 1997). In fact, placemaking has been analysed as a potential catalyser of societal changes that could help resolve the current fractured human-nature relationship found in cities (Hes and Hernandez-Satin, 2020).

According to Bush and colleagues(2020), nature is fundamental to life and to the health and wellbeing of humans. When placemaking respond to a natural local context through engagement, the results are communities expressing values that are grounded in nature. Substantial evidence to this can be found in ancient Western and Eastern traditions and in autochthonous communities in North and South America who sustain(ed) a transcendental connection to the natural environment (Nasr, 1990). Although the way we sustain a connection with nature in cities has substantially changed from past civilizations and autochthonous communities (Merchant, 2006) introducing nature within urban environments still offers an opportunity to reconnect with the natural environment in a way that could enhance our subjective sense of psychological wellbeing (Hinds & Sparks, 2011; Irvine et al., 2013; Marselle et al., 2014; Bell-Williams *et al.,* 2021) and promote environmental changes (e.g., environmental awareness, pro-environmental attitudes, etc.) (Davis *et al.,* 2011; Lumber et al., 2017). Nevertheless, the presence of nature is not enough since nature is much more than green elements introduced in the urban space (Bush *et al.,* 2020). Hence the relevance of enabling a deep connection with the natural environment to enact positive emotions, meanings, and compassion in placemaking activities that could promote interconnectedness with the natural environment (Lumber et al., 2017) and offer the wellbeing benefits.

Placemaking involving nature programmes in farming and gardening activities that enable self-reflection, gratitude, and compassion for the natural environment – also known as ‘nature-placemaking’ (Bush *et al.,* 2020) – have been found to have positive impact in people’s health and wellbeing (Berto, 2014). Taking part in these activities could enhance social inclusion, positive emotions, healthy relationships with their community, and the perception of being part of a community (Berto, 2014). This direct interaction with the natural environment has also been found to be a catalyst for social cohesion and social capital, components that enhance psychological health and wellbeing (Jennings and Bamkole, 2019). The benefits of these programmes are better linked to the participative character of placemaking (e.g., enhancing sense of belonging and sense of community (Dempsey et al., 2014; Strydom, et al., 2018). However, for these activities to take place, there must be an external enabler that facilitates the emergence of such practices. The caveat of such activities is that they can fail to achieve long term involvement in the maintenance of the green space (Tan & Neo, 2009; Mattijssen *et al,* (a)2017), often turning into a superficial beautification process in which citizens have minimal engagement in the long-term (Hes *et al.,* 2020) defeating the purpose of implementing nature-placemaking activities (Schneekloth *et al.,* 1995; Dempsey & Smith, 2014; Mattijssen *et al.,* 2017).

An example is found in Singapore, where placemaking programmes are implemented by the government to increase the active engagement of individuals in the construction and maintenance of the green places. Community in Boom for instance, was part of a government initiative in 2005 aimed at promoting a nationwide gardening movement (National Parks, 2021). Technical and financial aid has supported community gardens across the country. Regrettably, the past research in Singapore suggests that extensive involvement of the government in such initiatives tend to hinder resident’s levels of engagement as reflected on the citizen’s hesitation to be associated with government-run programmes (Chua, 2000; Lee, 2002; Tan & Neo, 2009). Additionally, there is no evidence that environmental awareness and/or pro-environmental attitudes are achieved after the programmes are concluded. Interestingly, to counterpoise the government initiatives, dispersed NGO-led citizen initiatives integrating nature-placemaking activities have emerged in Singapore. Some of these initiatives aim at re-introducing social characteristics such as community bonding, environmental awareness (e.g., sustainability), meaningful nature connection and citizen agency, which in turn create opportunities for psychological restoration.

## Nature-placemaking led by NGOs and its facilitators

Nature-placemaking activities guided by NGOs enhance the psychological health and wellbeing. For instance, sense of community (Leon & Neo, 2009), behaviours grounded in environmental awareness (Fettes & Judson, 2010), and feelings that contribute to sustain long-term engagement and motivation (i.e., autonomy, competence, relatedness, self-esteem, and self-efficacy) (Ryan & Deci, 2000; Sheldon & Kasser, 1998; Gillison et al., 2019). According to Tan & Neo (2009), being involved in nature related activities led by NGOs can help increase peoples’ passion towards nature and creates a genuine and non-partisan civic activism. The socially constructed experience with nature also helps individuals to forge new connections with likeminded people (Wolsko & Lindberg, 2013), whereby confidence and empowerment are generated in individuals (Rai Singh & Rahman, 2012). The result of being part of a self-motivating environment is that individuals can sustain citizen engagement and thus build a sense of ownership towards the natural environment over time and construction of alternative values towards nature (Bruyere & Rappe, 2007).

It is known that the NGOs’ placemaking activities depend largely on the facilitators who mediate peoples’ interactions and the activities that are developed. This positions the role of the facilitators at the core of the process, since facilitators, according to Alwaer & Cooper (2019 (a)) not only promote engagement and inclusion of individuals and groups, but also create a ‘values system’ in which the participants can relate to and can feel valued (Wates, 2014; Pancholi *et al.,* 2015). Self-awareness and self-management are essential skills in facilitators as their role is to understand their relationships with groups and help others self-reflect on their practice (Mosely *et al.,* 2021). As such, the facilitation style, and the process in which it occurs are crucial to prevent the activities to be biased or over-powering (Alwaer & Cooper, 2019 (b)). Nevertheless, since nature-placemaking conducted by NGOs is a relatively new topic (Bush *et al.,* 2020) how facilitators influence the process and what are the best practices of nature-placemaking that could positively influence the health and wellbeing of city residents is a vaguely discussed topic. Hence, to contribute to this topic, in this study we analyse how an NGO in Singapore conduct nature-placemaking activities, what alternative values towards the natural environment are enacted, what frequency of interaction and time of engagement is needed to build these values, and how facilitators influence this process. Furthermore, although there are some indications that nature-placemaking could substantially provide benefits to the psychological health and wellbeing of individuals taking part in the activities, there are not enough studies that analyse how the facilitators of programmes developed by NGOs might influence the perceived sense of psychological health and wellbeing of people participating in nature-placemaking activities.

To investigate this, an in-depth case study was conducted in the volunteer-driven Ground-Up Initiative (GUI). An NGO that for over a decade has implemented a distinctive approach to nature-placemaking by introducing a values system that promotes interconnectedness with the natural environment and sustainable living through the appreciation of non-curated natural environments. The paper is structured in four sections presenting the research methods and explanation of the case study under investigation, qualitative and quantitative results, discussion, and conclusions.

## Method

Given the unique NPM approach implemented at GUI in Singapore for over a decade, a single case study was suitable (Crowe et al. 2011) to conduct an in-depth study analysis on how the NPM programs unfold and the facilitators’ influence in the health and wellbeing of volunteers. A single case study with sequential mixed-methods design (Yin, 2011; Larkin et al., 2014) was conducted from August 2019 until March 2020 at GUI integrating in-depth focus group discussions and surveys with GUI members.

### GUI Case Study

GUI campus is located at the northeast of Singapore in the residential town of Lorong Chencharu (Yisun). Access to GUI is facilitated by private or public transport less than five minutes walking distance to the nearest bus stop and ten minutes to the nearest MRT station (Figure 1). With an approximate total area of 26,000 sqm GUI is comprised of office space (headquarters), farming land, open and semi open spaces where the nature-placemaking (NPM) activities are conducted. The north limit of GUI is delimited by a water stream which helps to support the NPM. Except for the farming Map

Description automatically generatedland, GUI has a predominantly unmodified landscape and native vegetation.

**Figure 1.** GUI location

GUI was founded in 2008 by Mr Lai Hock with the aim of connecting people with nature, self, and others. The space was designed to enable nature connectedness, creativity, and risk-taking, all of these framed into the idea of re-introducing the Kampung[[1]](#footnote-2) culture or life in community to attain a happier and sustainable life (Ground-up Initiative, 2021). The core team is comprised of twelve core members in the roles of executive lead, kampung architect, craft lead, HR representative, sales, marketing, volunteer manager, farmer, earth over lead, and kitchen lead.

For over a decade, GUI has developed a variety of NPM activities aimed at connecting people with nature through the appreciation of *‘the beauty of sustainable living and nature community creativity’* (GUI executive summary, 2014 p, 2). The connection with the natural environment and community is grounded in five core principles recognised as the 5Gs: Gracious, Green, Giving, Grounded and Grateful (IBID, Figure 1) conveyed through NPM activities. Living Gracious according to GUI core members is the reminder of being empathetic and respectful with all human and non-human life bringing a spirit of cooperation and harmony with one another. Living Green stands for being conscious of the natural environment by reducing consumption and becoming environmentally aware of one’s behaviour and footprint. Giving, one of the main values at GUI introduces the idea of non-transactional relationships which are not based on gains or returns. Instead, giving at GUI teaches to create a feeling of contributing wholeheartedly with non-expectations. Living Grounded stands for strengthening the connection with the earth, the soil, food, and all wildlife species. Finally Grateful introduces the notion of appreciation towards the natural environment.

Four core activities are part of the NPM: Kampung farming, Kampung sketching, wood workshops, and earth oven (Table 1 and Figure 2). The activities involve a series of interactive workshops aimed at engaging individuals. Since 2009, approximately 25000 volunteers have engaged in GUI programmes, and it is estimated that nearly 130000 people residing and/or visiting Singapore have been in contact and benefited from GUI NPM activities (Ground-up Initiative, 2021).

**Table 1.** NPM activities at GUI

|  |  |  |  |
| --- | --- | --- | --- |
| **NPM activity** | **Description** | **5G values** | **Duration** |
| Kampung farming | Flagship programme aimed at renewing individuals’ connection with the land. Engages the individual in the process of agriculture, building and maintaining the space for this, individuals receive guidance and tutorials while engaging in the activity (e.g., seeding, mantainance, harvesting, cooking, keeping the space). | Gracious  Green  Giving Grounded Grateful | Between 2 up to 5 hours. |
| Kampung sketching | Immersion in GUI natural environment to explore and paint, draw, or sketch using nay medium. Artworks are shared and socialised with the group at the end of the session. | Gracious  Green  Giving Grounded Grateful | Between 2 up to 4 hours. |
| Wood workshops | Also known as ‘Touchwood’. These workshops contain an educational component in which theoretical and practical aspects of woodworking are taught with an emphasis on the usage of accessible, recycled, and affordable hand tools. | Gracious  Green  Giving Grounded Grateful | Between 2 up to 4 hours |
| Earth oven | A community learning activity in which groups of people are taught to bake in the GUI earth oven without gas or electricity. Examples include woodfired pizzas and assorted bread. The earth oven initially built by GUI volunteers is in a semi open space. | Gracious  Green  Giving Grounded Grateful | Between 2 up to 4 hours |

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**Figure 2**. Showing the Nature Placemaking activities in GUI, illustrating: (a) Kampung Farming: Engaging the individual in the process of farming; (b) Kampung Sketching: drawing the Kampung campus; (c) Wood workshop and art craft; (d) Earth oven: Baking and cooking.

#### *Facilitation Process:*

GUI facilitators are long-time members of the organisation with more than three months participating in the GUI NPM activities. The GUI core team usually invites senior volunteers to become facilitators or volunteers could request to assist in the NPM as facilitators. They are selected according to their commitment and contribution in the NPM programmes at GUI. For instance, facilitators will have internalised the 5Gs principles (Gracious, Green, Giving, Grounded and Grateful) and will be able to guide new volunteers that seek to learn from and connect to the natural environment. Although the facilitator does not go through a specific training to perform this role, their long-term engagement with GUI and constant participation in NPM helps them to form their own facilitation style. This flexibility reflects the ethos of the organisation in which creativity, risk taking, and self-discovery are strongly encouraged. Nevertheless, identified in this study were six underlying guiding activities performed by the facilitators as part of the NPM process 1) introduction: Volunteers are familiarised to GUI NPM activity and to each other; 2) presence with oneself: A short period of silent reflection on one’s personal motives to participate in the activity and acknowledgment of feelings and emotions at the present time; 3) immersion in the activity: Guidance by facilitators in performing the NPM activities; 4) self-reflexion after concluding the activity: Gathering of NPM participants to silently reflect on their experience; and 5) community sharing: Participants are encouraged by facilitators to share their thoughts about the experience by also reflecting to what extent they felt connected to the natural environment and other volunteers; 6) explaining the 5G: At the end of the activity the facilitators introduce the 5G values and explain how they are integrated at GUI.

### Focus Groups

The study was developed in two phases comprised of a qualitative data collection that informed the development of the quantitative exploration (i.e., survey) (Figure 2). The qualitative phase was structured to explore how NPM facilitators might influence the psychological health and wellbeing of participants in the activities, and to identify how the process of NPM unfolds. A series of focus group discussions (FGD) were conducted with GUI stakeholders. Two FGD were performed with the GUI core staff members (*n*= 12) including the executive lead, kampung architect, craft lead, HR representative, sales, marketing, volunteer manager, farmer, earth over lead, and kitchen lead. A purposive sampling strategy was followed for the second round of FGD conducted with GUI volunteers that had previously participated in NPM activities (*n*= 24 – see Table 1).

**Table 2.** Date, participant group, group number, and size (number of participants) of each FDG.

|  |  |  |  |
| --- | --- | --- | --- |
| Date of FDG | Participant group | Group number | Number of participants |
| 11 October 2019 | GUI core team | FG-1 | 5 |
| 11 October 2019 | FG-2 | 7 |
| 12 October 2019 | GUI volunteers | FG-3 | 7 |
| 19 October 2019 | FG-4 | 5 |
| 19 October 2019 | FG-5 | 6 |
| 26 October 2019 | FG-6 | 3 |
| 26 October 2019 | FG-7 | 3 |

Diagram

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**Figure 4.** Data collection phases. Phase one developed in 60 days integrating a qualitative principle. Phase two integrating a quantitative approach conducted in 130 days.

The volunteers were invited through social media and/or email, whereby participants could allocate themselves to a FGD based on their own convenience. Since it was easily accessible, private, and quiet, the main meeting room at GUI headquarters was selected as the venue of the FGD. One moderator guided the discussions according to a structured questionnaire guide that included questions aimed to identify how the facilitators might influence the sense of health and wellbeing, and how the process of NPM unfolds (i.e., *“How do you think GUI has contributed to your personal life development? If so, how?*). The discussions were voice recorded. A research assistant was invited to take notes of the discussions as well to observe interactions and reactions of participants during the sessions (Krueger & Csey, 2000). To facilitate an in-depth discussion and enable all participants to express their ideas, each FGD consisted of a minimum of three and maximum of eight individuals (Breen, 2006). The participants, moderator, and assistant were seated around a rectangular table facing each other to enhance communication and rapport (Krueger and Casey, 2000). The beginning of each session was dedicated to build rapport to create a comfortable environment. Individuals were asked to introduce themselves and share ther time of engagement with GUI. The questions were presented in a form of fluid discussion introducing basic information about the topic to help eliciting different answers that were taken in a more in-depth discussion. The moderator retained a relaxed and candid attitude to maintain human connection. In FGD there is always a risk of introducing interviewer bias, to mitigate this the moderator gave enough time to participants to reflect on their answers. The questions and probs were conducted to enact in-depth analysis instead of misleading participants into specific answers.

### Online surveys

The qualitative exploration allowed the study to understand specific factors that might influence the process of NPM in GUI. For instance, it was found that the duration of engagement in GUI (i.e., for how long they have been part of GUI), number of programmes attended, and frequency of engagement (i.e., number of times visiting GUI per year) enhanced psychological sense of well-being. These findings informed the design of the online survey conducted with the GUI members. The survey measured the psychological short-and long-term eudemonic health and well-being effects (Gallagher, *et al.,*, 2009) resulting from the engagement in GUI programmes, and a suite of questions used to establish demographic factors such as age, gender, and race. To establish the duration of commitment and frequency of attending GUI programmes of participants, three continuous variables were included to indicate: 1) the total duration of engagement (in months) from their initial involvement with GUI programmes; 2) how often they visit GUI (number of days per year); and 3) how many programmes they have attended. Six psychometric scales were selected based on earlier studies that explored the associations between perceived wellbeing, Social cohesion (SoCoh), sense of community (SoC), connectedness to nature (CNS), intrinsic motivation (IMI), self-esteem (Self-Est), and self-efficacy (Self-Eff) (Table 2)*.* The six psychometric scales reported a Cronbach’s alpha above 0.80, indicating good internal reliability. The responses were given on a 7-point Likert scale that contained labels organised in ascending order from strongly disagree to strongly agree.

**Table 3**. Psychometric scales included in the survey.

|  |  |  |
| --- | --- | --- |
| **Scale** | **Author(s)** | **Statement sample** |
| Social cohesion | Forrest & Kearns, 2001; Sampson et al., 1997 | *“People around here are willing to help the members of GUI community”* |
| Sense of community | McMillan and Chavis, 1986 | “*This community helps me fulfil my needs”* |
| Connectedness to nature | Mayer and Frantz, 2004 | *“I often feel a sense of oneness with the natural world around me”* |
| Modified version of the intrinsic motivation inventory | Ryan & Deci, 2000 | *“I believe I can choose what to do when I take part in activities in GUI”* |
| Modified version of self-esteem scale | Rosenberg, 1965 | *“On the whole, I am satisfied with myself”* |
| Self-efficacy | Bandura, 2010 | *“In general, I think that I can obtain outcomes that are important to me”* |

The online survey link was distributed by GUI through their e-newsletters to individuals that were at least 18-years old and who have been engaged in any GUI programmes for a minimum of three months within the last two years. A total of 104 responses were obtained from GUI members (see Table 4). The sample distribution revealed a larger percentage of female participating in the survey (72% of the total responses). The survey was created on the KoBoToolBox data collection platform. Confidentiality and data privacy procedures followed the protocols outlined in the approved ethics applications: S-18-184 (2018) and S-19-251 (2019) STUD IRB.

**Table 4.** Sample population survey participants survey.

|  |  |  |  |
| --- | --- | --- | --- |
| Demographic | Number (%) | Race | Number (%) |
| Age (mean)  Male  Female  Others | 37.86  28 (27)  75 (72)  1 (1) | Chinese  Malay  Indian  Other Races | 92 (88)  3 (3)  2 (2)  7 (7) |

## Data Analysis

The qualitative data was transcribed verbatim and analysed using the qualitative data software NVivo pro 12 (QSR International, 2015) following an iterative principle of data coding and analysis known as grounded theory analysis (Charmaz, 2006). Main patterns in the data were identified and grouped in codes at different stages (Figure 3). Upon saturation of the codes (i.e., new codes do not emerge) the data was clustered into final themes (Saunders *et* al, 2018; Casey & Murphy, 2009; Boyatzis, 1998). To increase the transparency and consistency of the codes and themes, two stages of data analysis were conducted independently by two researchers to compare and validate the results (Golafshani, 2003; Singh, 2014).

Different statistical tests were conducted to analyse the quantitative data. Initially, an exploratory correlation Spearman ranked test was conducted to identify any positive or negative relationships between the variables measuring the duration of engagement, number of programmes attended, frequency of engagement in GUI NPM against the six psychometric scales included in the survey. To address the significant differences in gender observed in the sample size that included 75 female and 28 male respondents a median test was conducted to find statistically significant differences between the two groups according to all the variables measured. No significant difference was observed except from variable self-efficacy p=0.04.

To further understand how NPM unfolds, two-step cluster analysis (Ibes, 2015; Song & Knaap, 2007) was conducted to divide GUI members into relevant groups according to the frequency of engagement, duration of commitment, and number of programmes attended. After the clusters were identified, a Kruskal-Wallis test was conducted to find statistically significant differences across the groups according to all the variables included in the survey. Given the uneven distribution of participants in each of the clusters, the Fligner-Killeen test was conducted to test the homogeneity of variance across the four groups against the scales measured. Except for Self-Esteem scale, an equal variance across the groups was reported by the Fligner-Killeen test.

Diagram

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**Figure 5.** Overall process of the data analysis showing: Qualitative and quantitative analyses.

## Results: The Process of Nature Placemaking and Facilitators

This section presents the final four themes identified from the qualitative data analysis: 1) The intangible values: The 5G mentality; 2) Hands on experience: Environmental awareness and nature connection; 3) Restoration and self-awareness through nature connection; and 4) Creating a safe place and sense of community.

### The Intangible Values: The 5G mentality

The process of NPM is defined by different stages that evolve over time when volunteers engage in GUI activities. Although this study did not intend to determine if the NPM process occurred in a linear manner over time, it was possible to distinguish a series of components or determinants that help unfold the NPM process in GUI. According to FGD participants, there are a set of overarching principles that help define the experiences in GUI. These set of principles were acknowledged as the 5Gs: Gracious, Green, Giving, Grounded and Grateful.Some participants asserted to have been positively affected by these values. During the discussions, it was found that these five values have been integrated in the mindset of many of the participants. For instance, Sophie, Clare, and Francy (pseudonyms) shared their views about GUI, describing how these principles are part of their personal values:

“I feel grateful. There are times when I feel inspired, but most of the time I feel grateful. I think being part of GUI has also made me a better person, like to be friendly to people, to be warm. Because you see these positive energies here at GUI then It’s more important to learn about the groundedness, be grateful, your worth in the world is all these things. Like, why we recycle? When we are green It’s also because we are grateful for the things that we receive from Earth, and from our environment. So, it’s not like a replacement kind of mindset but more of to come here and recharge and experience new things that maybe you didn’t know that you’d imagine you’d like to. By just coming here, you just get exposure. every time we come here, something unexpected will happen. I think only with an open mind and open heart to experience new things then can you appreciate your trip here. my fallback plan is always the 5Gs. being open minded and have place to explore” (Lina, FGD5).

“I think relationships here, they are not exactly transactional – when you give something, and you get something in return. But over here when we do things, and this is something that we have said across throughout this conversation, is that when we give, we don’t really expect anything in return. We do it because we actually want to contribute to the growth of this space. And that growth itself is the reward that we want, and being able to serve the people, that itself is good enough for us” (Claire, FGD 4).

“But really experiencing it throughout, like totally immerse yourself in the giving. So much so that you’re overflowing with it that you want to give yourself and people would experience it, and they start creating that multiplying effect in the community” (Francy, FGD 4).

The 5G values were recognized as part of the motivation that volunteers take when they engage in GUI nature-placemaking activities. These 5G principles are inculcated during the nature-placemaking programmes and given as references of how GUI works. Nevertheless, these principles were recognized by participants as part of a free will process, in which those that interact in GUI decide to be part of, as stated by Peter:

“I think it’s also building the intrinsic motivation to do something. So, like how we’ve been saying freewill all that quite a lot but I think it’s really coming from the heart. So how do you nurture that want to give, want to do certain things, want to be gracious, rather than, I’m supposed to be, and this is how I would be judged” (Peter, FGD 4).

As noted by FGD participants, the 5Gs are not a replacement of personal values or mindsets. On the contrary, these values complement their learning experience as human beings, since they are not offered at schools in the traditional education model:

“I think it’s learning of attributes, of virtuous values, I’d say. That this place has. Because I think if you look back at the 5G values that GUI has, I’d think that actually what this space offers that cannot be offered in a formal school setting.” (Kai Wen, FGD3).

“I think it’s learning of attributes, of virtuous values, I’d say That this place has. Because I think if you look back at the 5G values that GUI has, I’d think that actually is what this space offers that cannot be offered in a formal school setting. (Hugo, FGD4).

“But you come here, and you really walk the talk. Whatever values that you learned in school, here you automatically would do it. Because somehow the space invites you to do it. And because people are really doing it. You just feel like, yeah it’s natural. Not because someone asked me to do it. It’s just natural, everybody just walk the talk” (Tanya FGD7).

During the discussion, some participants highlighted that the quality of interactions that occur in GUI transcend the idea of ‘transactional relationships’ or to give and take, which usually occurs in different social interactions. This new form of relating to people was defined by Grace as being more human:

“It taught me a lot of things, one of which is that the community here in GUI is very much “walk the talk”. The interactions here can be truthful to the values of graciousness, like saying hi, even to strangers. It’s inspired me to live more in accordance with these values, like saying hi to the bus captain when I board the bus. I’ve learnt to be more human, instead of relationships being transactional in nature” (Grace, FGD7).

The concept of humanizing a place was defined by Freeman (2007) as a placemaking process used to appropriate a space to mirror oneself, which occurs through learning about the physical space, getting to know people, being involved in activities, etc. The 5Gs have been an integral part of the activities and programmes that GUI implements. In turn, GUI volunteers have integrated these teachings into their daily interactions, creating a unique and personalized way of understanding the place according to the 5Gs.

### Hands on experience: nature connection and environmental awareness

In addition to creating a humanized experience of place, direct interaction with the natural environment through some of the GUI NPM activities helped to promote environmental awareness. Among discussions in sessions 5 and 7, participants reported reduced waste (e.g., of plastic bottles and bags) and increased recycle:

“In GUI, when we eat lunch we don’t use disposables, and that’s when people really notice that “hey we can’t use a disposable”. And you have to really wash it afterwards. That’s when it shifted my mindset, to bring a spork and tumblr. That translates to real action, compared to when it was just information in the past. So here it really made me walk the talk” (Tanya, FGD 7).

“When I first started, I was still using plastic bags and everything. But then you keep coming back and then all these positive influence starts to change your behaviour as well. So eventually I also carry my own totebags, and when I takeaway food I try not to take the plastic spoons, things like that” (Jenny, FGD 5).

Further in the discussions it was evident that a sense of nature awareness had been enhanced through those that experience GUI. For instance, some participants claimed to have become more conscious about the cycles of nature, which before where only understood through textbooks. It was also evident that first-hand experience interacting with nature had fostered a greater connection to the natural environment, which evolves into a learning experience as expressed by participants in the FGD 5:

“But after coming here, it’s really a hands-on experience. It really deepens my understanding of what this whole nature thing is about, how the ecosystem works, what are the insects or wildlife available, what can be the indicators to inform us of the cleanliness of the water, whether are the plants doing well or not. It becomes more of, apart from admiring the beauty, now I can be part of supporting this beauty to thrive. Be part of the beauty” (Melissa, FGD 5).

“*Being aware that there’s nature, which we need and we need to keep it going. At the same time, we live together with nature. We have all these fruit trees here not just for aesthetic purposes. We need them. They provide shade, they give us oxygen in the day, they provide fruits, home for the birds. Tons of functions for every single object here”* (Luis, FGD 5).

Direct experience with nature seemed to create a greater bond and awareness with the natural environment that surrounds GUI. Becoming more conscious about nature has also been discussed in the last decades as part of a response to the ‘nature in crisis’ (i.e., heightened environmental awareness) (Halpenny & Cassey, 2003: 30). Furthermore, the experience of outdoor nature can influence the development of an individual’s concern for the environment (Liarakou, et al., 2011). This attitude of a greater concern and connection to the natural environment was explained by John and Rachel from FGDs 4, and 5 as something that has been harvested through their direct experience with nature:

“I think it’s a very simple and doable way that is translated into your own life. And then you realise that, it’s like what you said, consuming is so easy, right? So even with a vermicompost, and you’re trying to save the earth by making a loop, the vermicompost is not enough to process household waste. You still have to throw stuff away. That’s how it translates into your life. You do it, and you see it, you understand it. It’s real for you, it’s not just conceptual and that the earth is fine anymore” (John, FGD 4).

“I think it’s something about being part of your life that, because you’re physically here, you experience it, you touch it, you feel it, so the impression that you have to do something about it is deeper than just watching a video” (Rachel, FGD 5).

Some studies in pro environmental behaviour have indicated that people that have gained psychologically from cognitively restorative experiences in nature may develop environmental responsible behaviours (Whitburn et al., 2019). The participative nature of the activities in GUI could enhance positive experiences of nature and promote a deeper relationship with the natural environment thus a willingness to protect it (IBID). In other words, direct hands-on experience in nature builds greater connection and attitude/behaviour to the natural environment and could have positive influences in the long-term (Fazio & Zanna, 1981; Collado *et al.,* 2013).

### Restoration and Self-awareness through nature connection

Throughout the interviews, participants often discussed the restorative impact that GUI has had in their personal lives. Being in nature and having a direct experience with it enhanced their own personal self-awareness and connection with oneself. The activities performed in GUI would facilitate such introspection and internal quietness, which allowed them to recharge their mental energies before interacting outside of GUI. This is what the participants Lin and Sarah in FGD 7 and 6 shared:

“It’s a space where I can have my own quiet time, and here I am more conscious and reflective of myself. I hope to be able to energise myself here so that i can face the next week with more vigour” (Sarah, FG 6).

“I think GUI is a space that, offers people a space, physical space but also a mental emotional space so that they can slow down” (Facilitator: FG 1).

“I think that GUI, it’s a place that allows me to be more aware about myself and just to develop some kind of introspection in my process of being very busy everyday outside of this place” (Yvonne, FG 3)

“This place is more to serve like a mental break for people, maybe once or twice a week or however that people feel like they need to take a break from the corporate world, or whatever stress that they have in their life” (Mark, FG 3).

“You’re actually here for the purpose of contributing to something else other than yourself, this makes you feel happier, lighter, less pressure, more relaxed, and that’s what they say, healing the soul is” (Teo, FG 6)

The connection with nature that is forged when taking part in GUI programmes was also acknowledged by participants to have had an impact in their own personal experiences. Interestingly, some participants recognise the natural environment in GUI as a living classroom, in which they can connect to nature and appreciate the randomness of the natural world, as Yin in FG3 shared:

“But if you look at what nature is, it’s actually a combination of things that are very random, coming together and then bringing that synergy. Nature is like a living classroom. Learning about myself, the world around us, or other people” (Yin, FGD3).

“It’s a kampung campus. It’s a school inspired by nature. So, I think in that aspect this place has done pretty well. It fused nature with all the activities, and of course, the software: the people” (Nadhia, FG 5).

“People come here to experience unperfection. 'Cause nature is just like that. So people come here, it looks close to nature, because they are wild. Here there're many things that grow wild. So, i think, that makes people difference” (Gia, FG2).

### **Creating a safe place and sense of community**

The feeling of being in a safe place in GUI was a key component in the FGDs. This sense of safety was related to the immediate contact with other nature volunteers when taking part in the placemaking activities. This interaction forged a sense of ownership that turns into a shared effort for building the community and sustaining the natural environment. Furthermore, sense of safety often equated to feeling free to take risks and experiment in new activities, in other words, being out of the comfort zone:

So you feel a sense of ownership because you contribute to the space, and hence everyone feels part of the effort in building the community. Even though people come and go but everytime you come back you still feel welcomed and its that psychological safety that you’ll still be welcomed even when you come back (Paul, FG3).

It also helps me step out of my comfort zone, because I started out farming and craft, and then I moved on to helping the other programmes?? I would never imagine myself teaching children at all (Caroline, FG3).

“There is a lot of community spirit here. And the fact that everybody greets each other and give them a smile, really lightens up the day” (FG 4).

In the words of the core team members, time seemed to pass slower in GUI creating a sense of safety. This was formed from their interaction with nature that removes the sense of being time pressured. The perception of working at a slower pace was found to be one of the most important lessons that GUI offers to people, since the sense of psychological safety in the process of learning from nature is not affected by the social norms in Singapore: “*Nature does not hurry, but everything is accomplished. I think what GUI tries to say is that there is psychological safety in learning, everyone has their own way/pace/time in learning, and it doesn’t matter what you’re doing, but you shouldn’t be pressured to the norms of social life in Singapore”* (Luisa, FG 1).

This way of activating and connecting people through nature and community created a shared sense of place that is cultivated by each GUI member. According to the FGD, the sense of place in GUI comes from a deep belonging to the environment and a constant interaction with the physical space:

“I think that’s the key here. I think to take a step back, it’s really about the environment. Lai Hock was very big on keeping this space, it’s because this space does make a difference on people. In the ancient Chinese saying, a person who’s wise, they would live near the mountains, because it gives them that perspective, that space” (Mathew, FG4).

“Yeah, it’s a sense of belonging. And because you invested your time and energy into helping maintaining this space. So you feel in a sense you own a little bit of this” (Tim, FG5).

The feeling of sense of community was cultivated mainly by the core team, who according to the FGDs embodied the spirit of human connection in GUI. This connection was an interactive process that emerged when participants worked and spent time together:

“The sense of inclusion is cultivated by people of the core team, because the understand the human connection and the human relations. So, you work alongside with them, and you know this are the spirits you have to embody in order to fulfil that human connection” (Ning, FG 3).

“I think it’s like these breaks that allows you to come together and, you know, talk among the volunteers that kind of also helps to build up the so-called, community spirit over time. So, I would say it is like a one- or two-time thing. But if you happen to be here for a few times and if you are a part of this little bonding sessions, then I think it does help build up that community spirit thing” (Jane, FG 5).

Frequent interactions in a place for prolonged periods of time could enact new stories, shared values, and memories that permeate the social construction of the place (Brownett & Evans, 2020). These new meanings and memories influence the way in which individuals build a sense of community thus, providing an improved sense of health and well-being (Atkinson *et al*., 2017). In GUI, this was defined by FGD participants as a safe place that allows volunteers to create new memories and stories and a sense psychological restoration. The subjective sense of better psychological wellbeing could also be enhanced by the therapeutic physical characteristics of the place as well as the social interactions occurring in it (Doughty, 2018).

The enabling affective and social character of GUI and its facilitators combined with the natural resources surrounding the space, promotes experiences that foster the maintenance of wellbeing. Furthermore, it can be noted that the subjective psychological wellbeing described in GUI seemed to be influenced by the learning process occurring in the NPM activities that are guided by their facilitators. During these activities, the 5G mentality teaches a greater sense of environmental awareness and connection to the natural environment. In this process, there is a heighten awareness and connection towards nature and others. This has been shown to help to foster a sense of psychological wellbeing and restoration (Marques *et al*., 2021).

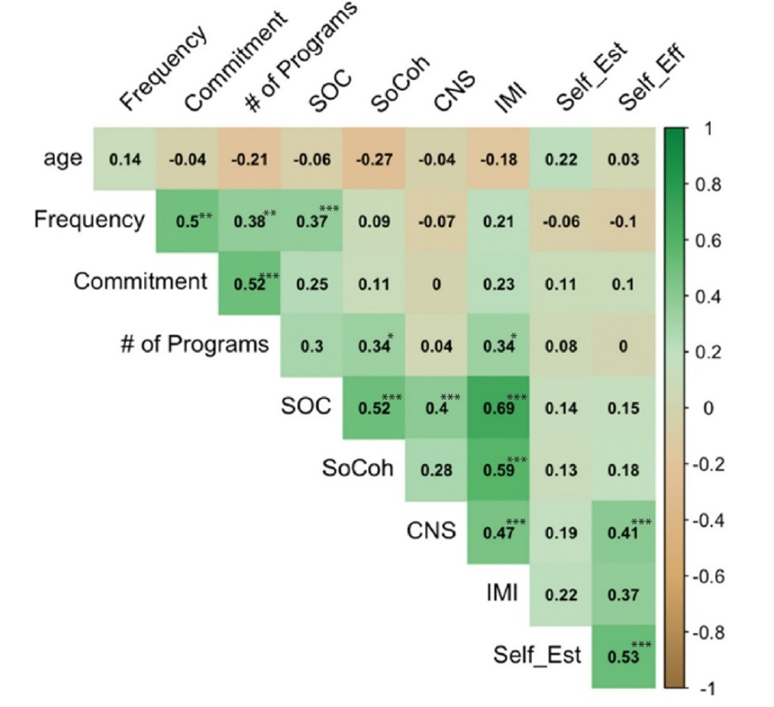
**Figure 5.** GUI outdoor spaces.



## Exploration of the factors that enhance psychological wellbeing in NPM

A two-tailed test of significance indicated a significant positive relationship between the frequency of engagement and commitment and the number of programmes attended (Figure 5). Those who have been part of GUI the longest tend to visit GUI more frequently and attend a greater number of NPM programmes. Similarly, a significant positive relationship was found between the frequency of engagement and sense of community (SoC) indicating that the more frequently individuals engage in GUI NPM programmes the more likely they will develop a sense of community. However, the test also indicated that the number of times that individuals visit GUI per year is unrelated to social cohesion (SoCoh), connection to nature (CNS), intrinsic motivation (IMI), Self-Esteem, and Self-Efficacy.

Although the test reported that SoC, SoCoh, CNS, IMI, Self-Est, and Self-Eff are not influenced by the time that individuals have been part of GUI (commitment), attendance to several NPM programmes might enhance the development of social cohesion (*r*= 0.34), this finding also concords with the qualitative results. As expected, SoC indicated a significant positive relationship with the scales of SoCoh, IMI, and CNS. This might also be an indication that individuals reporting feeling a sense of community at GUI might also develop feelings of interest, enjoyment, competence, intrinsic motivation, and likely develop a connection to nature (Pritchard *et al.,* 2020).



**Figure 6.** Correlation matrix: stronger correlations are given by values close to (±)1, p-values reported in each of the boxes \*\*\*p<0.001, \*\*p < 0.01, \* p< 0.05

#### **Duration of engagement, number of programmes and frequency**

Four main clusters were identified (Table 5). Group 1 clustered the newest volunteers that engaged with GUI for at least 8 months, visited twice per year, and attended only one programme. Group 2 clustered the most senior members that on average visited GUI 20 times a year for at least four years and attended at least three NPM programmes. Group 3 were everyday visitorsthat go to GUI more than 250 times per year with a relatively long engagement of nearly four years and have attended at least one programme and likely to have facilitated NPM programmes. Group 4 were committed frequent visitorsor long-term members that visited GUI 70 times a year for two and a half years and were in the same programme with facilitation experience.

**Table 5.** Descriptive statistics according to clustered groups.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Group | Male | Female | Age | No. GUI members | Frequency  Times visit | Commitment  Time with GUI (months) | No. of programmes |
| 1 | 17 | 49 | 36 | 67 | 2 | 8 | 1 |
| 2 | 7 | 21 | 31 | 28 | 20 | `48.5 | 3 |
| 3 | 1 | 1 | 51 | 2 | 250 | 46.5 | 1.5 |
| 4 | 3 | 4 | 55 | 7 | 70 | 31 | 1 |

Tables 6 and 7 depict the median values for each variable measured. Clusters 3 and 4 have much older members and a higher frequency of visits than those included in clusters 1 and 2. Furthermore, Connection to Nature (CNS) is highest in cluster 1, indicating that GUI tends to attract new members who have a high sense of nature connection. For the rest of the items measured in the survey, all the responses were significantly high, above 4.88 on a 5-point scale and were evenly distributed across clusters. Nevertheless, it was observed that SoC was lower in cluster 1 compared with the other clusters (Table 5 and Figure 5).

No significant differences were found across the clusters. However, the results of the Kruskal-Wallis tests comparing new and long-term members showed that there was a significant difference (*p* < .05) in SoC, indicating that the long-term engagement with GUI could enhance sense of community. No significant differences (*p* >.05) for the remaining psychometric scales were found between cluster 4 (committed frequent visitors) and cluster 3 (everyday visitors) when compared with cluster 1 (new members). Although the non-significant differences could be explained by the small group sizes, these results could be an indication that the sense of community in GUI might be generated when frequency of engagement participating in NPM activities is high – see Figure 6.

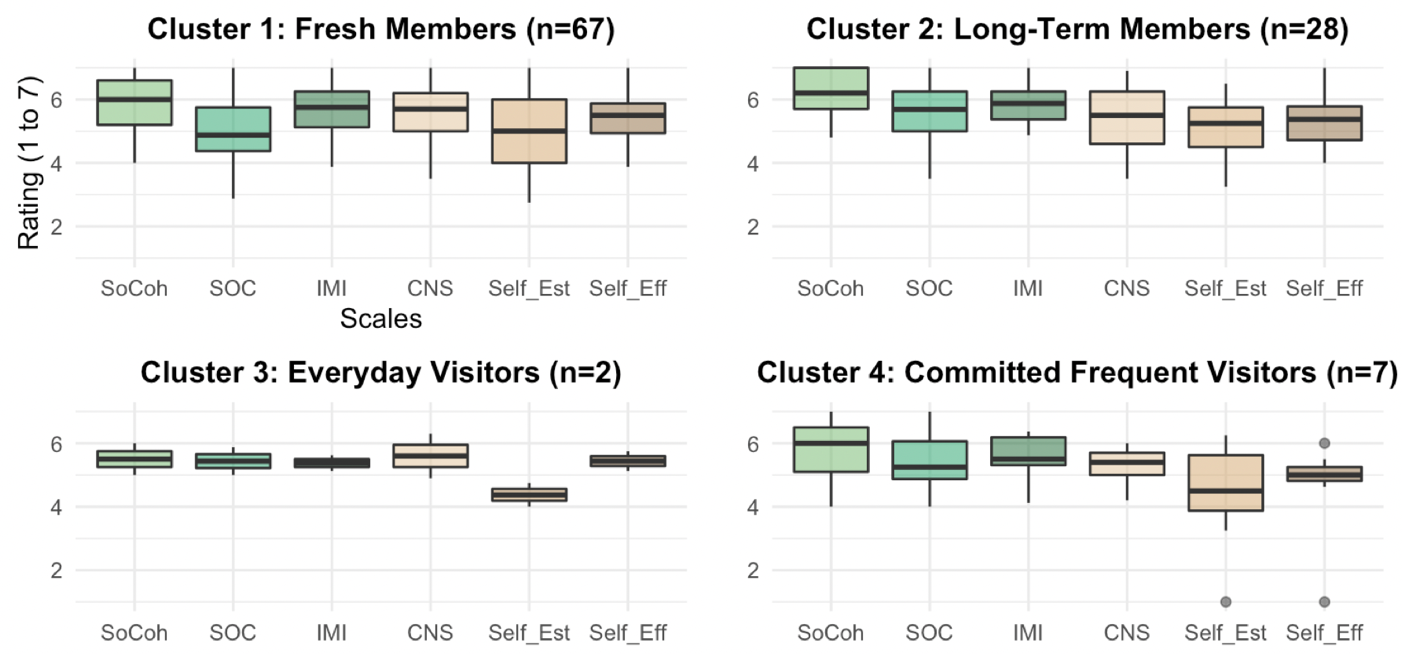
**Table 6.** Descriptive statistics median and standard deviation (in brackets) according to clustered groups

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Groups | Male | Female | Age | No. GUI members | Frequency  Times visit | Commitment  Time with GUI | No. of programmes |
| 1 | 17 | 49 | 36 (11.4) | 67 | 2 (8.57) | 8 (12.4) | 1 (0.47) |
| 2 | 7 | 21 | 31 (13.3) | 28 | 20 (23.0) | `48.5 (30.4) | 3 (1.10) |
| 3 | 1 | 1 | 51 (26.2) | 2 | 250 (70.7) | 46.5 (21.9) | 1.5 (0.70) |
| 4 | 3 | 4 | 55 (17.7) | 7 | 70 (31.8) | 31 (12.2) | 1 (0.38) |

**Table 7.** Values distribution median and standard deviation (in brackets) for the items included in SoCoh, SoC, IMI, CNS, Self-Est, Self-Eff.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Groups | So Coh | SoC | IMI | CNS | Self-Est | Self-Eff |
| 1 | 6.0 (0.89) | 4.88 (1.06) | 5.75 (0.79) | 5.7 (0.92) | 5 .00 (1.11) | 5.5 (0.84) |
| 2 | 6.2 (0.77) | 5.69 (0.96) | 5.88 (0.57) | 5.5 (0.99) | 5.25 (0.81) | 5.38 (0.82) |
| 3 | 5.5 (0.71) | 5.44 (0.62) | 5.38 (0.35) | 5.6 (0.99) | 4.38 (0.53) | 5.44 (0.44) |
| 4 | 6.0(1.09) | 5.25 (1.01) | 5.50 (0.79) | 5.4 (0.61) | 4.50 (1.81) | 5.00 (1.64) |

Where 1=Disagree; 7=Agree



**Group**

**Group**

**Group**

**Group**

**Figure 8.** Values distribution for SoCoh, SoC, IMI, CNS, Self-Est, Self-Eff.

## Discussion

In this section, results from the qualitative and quantitative exploration are discussed. This shows how both facilitators, and duration of participant engagement and commitment in GUI NPM programmes might enhance certain aspects of their sense psychological health and well-being analysed in this study as sense of community, social cohesion, intrinsic motivation, connection to nature, self-esteem, and self-efficacy. The results suggest that people interacting in GUI NPM activities undergo a self-reflective process, which enhances both their connection to the natural environment and sense of community at GUI. Constant engagement with the natural environmental, social connection with facilitators, and other volunteers promotes the emergence of pro-environmental behaviours (Whitburn et al., 2019; Collado *et al.,* 2013) in short- and long-term volunteers (emri & Melis, 2020; Haigh, 2006).

Figure 6 depicts the process of NPM at GUI and the role of facilitators according to three stages (a, b, and c). This process was informed by the length of engagement, commitment in the NPM programmes according to the data gathered in this study. Each stage explains how GUI facilitators might influence sense of well-being of NPM participants.

Diagram

Description automatically generated

**Figure 9.** Nature Place-Making Process and impact of GUI facilitators in the psychological wellbeing: (a) Constant guidance and input of facilitators transferring the 5Gs mentality. (b) Continuous interaction with facilitators 5G mentality internalised. (c) Constant presence of facilitators though less guidance.

1. *Transferring intangible values through hands on experience*

New participants (i.e., Group 1) manifested a strong connection to natural environment but seek in-depth knowledge about environmental sustainability through direct interaction with nature. This willingness to learn by doing facilitates the process of engagement that unfolds with the constant guidance and support of GUI facilitators as they create a familiar and friendly platform of social recognition between all the volunteers and facilitators. This process was found to be important as it enacts feelings of social cohesion and belonging (Dempsey *et al.,* 2014). Throughout the initial engagement, volunteers are encouraged to reflect on the GUI principles—5Gs (i.e., Gracious, Green, Giving, Grounded and Grateful)—by being aware of their actions while they interact in the activities. This stage indicates an important learning process for volunteers engaging in the NPM programmes as the GUI values are taught. Values in this context, provide motivation and guidance based on social support and cooperation ([Schwartz and Bardi](https://www.mdpi.com/2076-0760/10/2/74/htm#B113-socsci-10-00074), [2001](https://www.mdpi.com/2076-0760/10/2/74/htm#B113-socsci-10-00074)). Therefore, imparting the GUI values constitutes one of the fundamental stages since they are the core principles from which GUI functions and promotes environmental awareness, nature connection, and community cooperation. At the end of the activity, all members are invited to share in a group discussion, guided by GUI facilitators, their individual discovery and/or interpretation of the NPM experience. Creating the space for self-reflection was found to be important to enable psychological wellbeing and an immediate sense of restoration as it provides the opportunity to enact self-awarenesswith the natural environment, thus promoting future environmental responsible behaviours (Whitburn et al., 2019).

1. *Nature connection and psychological restoration*

The NPM at GUI was found to integrate three typologies of nature connection, 1) experiential i.e., direct interaction with the natural environment; 2) cognitive i.e., knowledge and awareness of the natural environment, values (5Gs), and attitudes; and 3) emotional i.e., feelings of empathy or attachment to the natural environment (Ives et al., 2018). The experiential and cognitive forms of nature connection were found to be influenced by the facilitators of NPM who provide constant guidance and mentoring. The emotional connection to the natural environment was found to be related to sense of community, which could be explained by the collective character of the NPM activities. Benefits to the health and wellbeing were reported as feelings of restoration and self-awareness provided by a greater connection to nature. This concords with several studies in environmental psychology demonstrating the effect of feelings of nature connection on the psychological wellbeing (IBID). Additionally, the interactions with facilitators and other volunteers could promote a sense of social cohesion and sense of community, factors known to enhance one’s health and wellbeing (Jennings and Bamkole, 2019).

Additionally, NPM programmes were found to unfold an alternative path to generating knowledge and self-discovery that supports societal transformations. The cultivation of collaborative learning through hands on experience, self-efficacy, intrinsic motivation (interests and enjoyment, perceived competence, and perceived choice) and appreciation of the natural environment offers new perspectives that could influence future engagement in pro-environmental behaviours (Lauren et al., 2016). For instance, volunteers in Group 2 (senior members) were found to participate in more than two NPM activities and generally have a longer commitment. Individuals in this group, have initiated a process of self-reflection and have embraced the 5G values. They reach a high degree of independence enacting feelings of enjoyment, competence, perceived choice, and greater connection to the natural environment. In this phase, the common ground set up initially by the facilitators is assimilated, shared, and expressed collectively. Ultimately, the volunteers of this group become the facilitators and guides for those in Group 1. These results align with studies in community development (Christens, 2012) showing that facilitators of placemaking provide the technical, social, and emotional support for newer participants in the process of empowerment helping them gain critical awareness, skills, and knowledge (Kieffer, 1984; Ospina & Foldy, 2010; Christens, 2012).

*c) Environmental awareness and sense of community: Enhanced psychological wellbeing*

The positive correlation between sense of community and frequency of engagement indicated that long-term interactions with GUI facilitators and NPM programmes manifested feelings of ‘safe place’. Although constant frequency and engagement in NPM programmes might not immediately influence the sense of connection to nature, individuals that developed a sense of community to GUI, generally felt more motivated and competent. These results align with studies indicating that sense of community is a key factor that enhances psychological health and well-being (Michalski, *et al.,* 2020). Furthermore, the sense of community enacted through NPM can also propel a sense of well-being that is reinforced by the connection to the natural environment (Jennings and Bamkole, 2019).

In sum, this study found that the impact of GUI NPM facilitators on the psychological wellbeing of participants depend on the stage of engagement in these activities. The longer the engagement, the more likely that a higher sense of community, social cohesion, connectedness to nature, intrinsic motivation, self-esteem, and self-efficacy will be developed. However, even if the engagement is low, an immediate feeling of sense of cohesion, restoration, and self-awareness with the natural environment might be enacted. Furthermore, as sense of community develops over time, so did place attachment. In this case study, the GUI Kampung had a therapeutic character created by its unique and organic layout. Although analysing the physical setting was outside the scope of this study, it is important to highlight that the characteristics of the GUI space might have improved the sense of psychological wellbeing experienced by participants. This could be linked to the attention given to the sensory experience with nature, the space, and the interactions with individuals through a new cultural appropriateness (Marques *et al*., 2021) that in this case seems to be grounded in the GUI 5G mentality. Alternatively, it could be that the organic almost wild-non-curated green spaces at GUI provide users a unique opportunity to connect with the vital and essential processes of nature, propelling a human and non-human relationship (Vannini P & Vannini, 2019). In this way, the non-curated natural features in GUI contain an experiential social-ecological capacity to introduce an alternative landscape experience in the city that could enhance the perceived sense of psychological health and well-being. Allowing space for these non-curated bottom-up green initiatives constitute and important finding in Singapore context where the extension of urban greenery is mostly constituted by top-down curated parks.

### Limitations and further studies

Analyses for the data showed that collinearity may have been presented among some variables in particular, duration of engagement, number of programmes attended, and frequency of engagement (Figure 6). While these variables demonstrate a direct relationship with each other (i.e., as one increased, so did the others), it is not possible to remove their collinear dependencies, thereby preventing any causal effects from being inferred from results shown in Table 6 (e.g., number of programmes increased their duration of engagement, or vice-versa). Nonetheless, the positive relationship shown could imply that when all three did increase, people had more active engagement at GUI and their NPM programmes.

The overall number of participants in each group cluster constitutes one of the limitations of the study. Although tests of variability and representativeness (Fligner-Killeen test) reported equal variances across the groups except form the Self-esteem scale, the small sample size could have affected the results of the Kruskal-Wallis tests across the six psychometric scales (i.e., clusters three (*n*= 2) and four (*n*= 7), respectively).

Further studies could explore NPM activities and strategies applied by other organisations in Singapore. For example, longitudinal studies can further examine the causal relationship between the engagement in NPM and its benefits. Such studies can examine the degree of engagement in NPM, methods of facilitation, and type of activities and their benefits on health and well-being. This information could establish how NGOs NPM activities can become alternative strategies for governments, aiming to promote environmental awareness and enhance the health and wellbeing of urban residents. Studies could further evaluate the therapeutic characteristics in GUI and other non-curated natural spaces in Singapore. This can reveal the underlying spatial characteristics that enhance sensory experience and psychological wellbeing.

## Conclusion

The study conducted at GUI in Singapore revealed that long-term engagement in NPM activities influence participant health and wellbeing as indicated by their subjective sense of community, social cohesion, connection to nature, intrinsic motivation, self-esteem, and self-efficacy. Their health and wellbeing was influenced by the nature-placemaking GUI facilitators, since they provide an alternative way of generating knowledge producing a pluralistic platform of self-discovery with nature and advocate environmental and community service – a knowledge system highly contrasting with the current educational system based on utilitarian perspectives of the nonhuman environment (Neo & Schneider-Mayerson, 2021) and offers limited opportunities of learning by interacting with the natural environment.

While the paper did not intent to generalise findings from one case study presented here, it demonstrated that the role of NGOs in nature-placemaking can contribute to new forms of public-nature space interaction in Singapore. The programmes led by NGOs in nature-placemaking activities could support the objective of increasing the number of green spaces in Singapore, while enhancing the psychological sense of health and wellbeing will transfer intangible values that promote community and environmental service.

### Geolocation information

This study was conducted in the city of Singapore in the NGO Ground-Up Initiative located at 91 Lor Chencharu, Singapore 769201, 1°24'52.3"N 103°49'40.8"E.

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1. The definition of “Kampung” varies slightly according to geographical location. In Singapore, Malaysia and Indonesia, the word Kampung means village. More recently it also comes to denote a certain kind of community life, colloquially termed as “Kampung spirit”, which often evokes a nostalgic physical atmosphere and memory. [↑](#footnote-ref-2)