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Understanding Transience and Participation in University Student-Led Food Gardens

Rebecca Laycock Pedersen [1,2,*], Zoe P. Robinson [2] and Emma Surman [3]

[1] Department of Strategic Sustainable Development, Blekinge Institute of Technology, 371 41 Karlskrona, Sweden
[2] School of Geography, Geology and the Environment, Keele University, Keele ST5 5BG, UK; z.p.robinson@keele.ac.uk
[3] Keele Management School, Keele University, Keele ST5 5BG, UK; e.l.surman@keele.ac.uk
* Correspondence: rebecca.laycock@bth.se

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Abstract: In an increasingly mobile world, transience is becoming the norm. Sustainable community food initiatives, therefore, must organise to withstand high turnover of volunteers. Using a case study of the United Kingdom's National Union of Students' food growing scheme in universities, this paper aims to map the causes and effects of short-term, irregular, and low participation using a causal loop diagram to understand how to mitigate their negative impacts and improve participation. Data was gathered through interviews, workshops, photovoice, a fishbowl discussion, and a reflective diary. We found three amplifying feedback loops increasing short-term, irregular and low participation, their causes, and their impacts. These feedback loops were precariously buffered by a continuous in-flow of new potential participants each academic year. We also found that the stakeholders of these gardens conceptualised time akin to both temporary and permanent organisations, and these differing conceptualisations were a source of tension. Furthermore, although 'organisational amnesia' was a problem, the gardens were still learningful spaces. We recommend both upstream and downstream solutions are implemented to buffer the impacts of transience and suggest that university and students' union staff could play a crucial and subtle supporting role.

Keywords: turnover; education for sustainability; higher education; students' union; community garden; volunteering; causal loop diagram; temporary organisation; organisational amnesia

1. Introduction

> ... sustainability is about passing to future generations. As students, we are, in generations, coming and leaving, and coming and leaving.
>
> Student gardener

> "All it takes," said Crake, "is the elimination of one generation. One generation of anything. Beetles, trees, microbes, scientists, speakers of French, whatever. Break the link between one generation and the next, and it's game over forever."
>
> Margaret Atwood, Oryx and Crake

The world is globalising, and people are moving and travelling at rates that are unprecedented in human history. Transience, or "passing through or by a place with only a brief stay," is a defining characteristic of our time [1]. This means that transience is a phenomenon that sustainability advocates must take into account when self-organising for alternative futures.

Students are particularly transient because they are often expected to (and approximately three quarters of British students do) go to university away from their locality and their parental home [2]. Furthermore, degrees are time-bounded, making it unusual for students to stay at university for more than three or four years. Even within their degrees, students tend to be transient members of the university community as they often spend time away from university during holiday periods and, in some cases, vocational placements.

Approximately half of all university students in England take part in at least one volunteering activity each academic year [3]. However, the transience of students results in short-term participation (when people are involved for limited periods of time) and irregular participation (when involvement is inconsistent or non-regular) in volunteer opportunities. As such, volunteer-involving organisations "face issues with the availability and reliability of student volunteers that affect how they are managed and supported" [4] (p. 175). Short-term and irregular participation also tend to cause low participation, which is when there are limited volunteer hours invested in the organisation.

A subset of organisations that involve student volunteers are student-led initiatives, which are especially plagued by the challenges brought on by transience as they require students to both lead and participate. Student-led food gardens (spaces growing edible plants mainly self-organised by undergraduate or postgraduate students) are even more impacted by the effects of transience given that food-growing is an activity that is knowledge-intensive and requires long-term, place-based engagement. Short-term, irregular, and low participation caused by transience are thought to cause problems in student-led food gardens [5–7]. For example, these modes of participation can result in inadequate upkeep of the gardens [5], and inefficiencies which can create tensions between students and non-students [7]. While students' transience is inevitable in student-led food gardens, the short-term, irregular, and low participation it causes, and their effects, can be mitigated. This being said, the ways in which students' transience impacts student-led food gardens are likely complex and may result in emergent and unpredictable outcomes. The causes and effects of short-term, irregular, and low participation, and the synergies and non-linearities these may produce are not well understood. Much of the literature about student mobilities deals with how students' transience affects individual students and the more permanent (non-university) communities that they move into [8], rather than initiatives from within the student community. Given this gap in the literature and the prevalence of student volunteering, there is a need for research to better understand participation in student-led initiatives [4,5]. Therefore, in this paper we answer the following questions:

- In addition to students' transience, what causes short-term, irregular, and low participation in student-led food gardens?
- What effects do short-term, irregular, and low participation in student-led food gardens have?
- In student-led food gardens, what feedbacks between short-term, irregular, and low participation, their causes, and effects exist (if any)?

Before turning to the methodology and our findings, we will first outline the benefits of community gardens at universities; then touch on the interplay between participation, transience and turnover in student-led food gardens; outline some of the parallels between temporary organisations and organisations with transient participants; and finally, we will explain why we will use a systems theory lens in this study.

2. Background

2.1. Benefits of Community Gardens at Universities

University community gardens, of which student-led food gardens are a subset, contribute to a wide range of benefits, including education [5], increasing pro-sustainability attitudes and behaviours [9,10] community building [11,12], and improving access to fresh foods [13,14]. This said, food provision by these gardens is often marginal, and it is the first two benefits mentioned that are especially notable.

This is because many university students are at a pivotal time in their lives where they are negotiating their core values and building habits that they may carry with them though into adulthood.

Some of the learnings that take place in university community gardens include "enabling participants to take a more active role in their education," "increasing participants' agency in their own education," and even helping students "[learn] how to learn" [5] (p. 660). It has also been found that "volunteering in a [university] garden can deepen participants' relationship with food and the environment" and generate "a sense of responsibility for" the natural world [5] (p. 663). Building competent, resilient learners that feel they have an obligation to fight for the environment is a key ambition of sustainability educators [15]. However, for these educational, attitudinal and behavioural outcomes to be realised through participation in student-led food gardens year-on-year, the gardens must remain functional over the long-term. Therefore, it is crucial to have a better understanding of how the causes, effects, and feedbacks pertaining to short-term, irregular, and low participation in student-led food gardens may pose a threat to their long-term viability.

2.2. Transience, Turnover, and Participation

Although little has been written about transience in the context of sustainability, it has been written about in studies of homelessness [16], travellers and tourists [17,18], seasonal and migrant workers [18,19], housing (in)stability and residential transience [20], prisoners [21], older people in care homes [22,23], and teachers [24,25]. The concept of transience is still immature and underdeveloped, and as such is not well-defined in the literature, however Larkin et al. [23] have made some useful attempts to do so in the context of palliative care. Their thinking of transience as a spatial phenomenon, or "passing through" a place [23] (p. 91) was the most useful conceptualization for this study because students often move away from their locality and their parental home to attend university. In this way they can be thought to be 'passing through' the university. Indeed, even if they don not leave home for university, most still 'pass through' the university community as degrees are time-bounded. As such, in this study we think of transience as being movement in and out of the university, considering the university as both a physical and social construct. However, there is also 'passing through' that happens at another level through movement in and out of the student-led food gardens themselves. The terms transience and turnover are often used synonymously in common language, but we call this latter form of transience 'turnover' to draw a distinction between the two. This is similar to how the terms have been used by Cornish et al. [25] and will enable us to be more precise in talking about these two different scales of movement (see Figure 1).

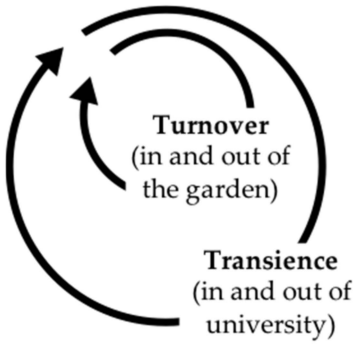

Figure 1. A depiction of how transience refers to movement in and out of the university (including on a term-to-term basis and movement determined by degree length), and turnover refers to movement in and out of the garden.

Students' transience in and out of the university community causes high turnover of participants for student-led food gardens. As such, each 'generation' of students within student-led food gardens is short-lived compared to volunteer-run gardens based in less transient communities. The set-up of student-led food gardens is also counter-intuitive because students are absent during a long vacation

period during the summer and therefore gardens risk being neglected at the time when they are in most need of care. Variability in student volunteering during the academic year due to uneven academic course loads, other holidays, and vocational placement requirements is also common.

High rates of volunteer turnover can cause issues with "organisational effectiveness and efficiency" [26] (p. 98), and this is compounded when volunteers need special skills, intensive training, to be committed over the long term, and/or there are not enough qualified volunteers [27]. Students' turnover in university gardens means there is a constant need to generate and maintain interest in the garden to ensure there is "adequate caretaker presence" [6] (p. 153).

Much of the research on short-term volunteering focuses on how to retain volunteers for longer (i.e., work by Hyde and colleagues [28]). However, the transient nature of student life means that such comings and goings are inevitable. Therefore, understanding how short-term and irregular involvement affect student-led food gardens is important.

Furthermore, the literature about student mobilities mainly deals with how transience affects students and the more permanent (non-university) communities that they move into [8]. Particularly, these tend to deal with questions of identity, agency, and cultural capital [29–31]. However, little is known about the internal realities of student-led organisations, such as the causes and effects of short-term, irregular, and low participation in student-led food gardens, let alone whether feedbacks between these are at play. Given student-led food gardens' capacity to facilitate learning about, and behaviour and attitude change for sustainability, it is important to understand how their longevity might be undermined by transience, and short-term, irregular, or low participation.

2.3. Temporary Organisations and Transience

While student-led food gardens are not temporary organisations because they are typically intended to last over the long-term, they share much in common with temporary organisations because members are usually only involved for short periods of time. There is much discussion about what temporary organisations are, but the general consensus is that they are organisations that are time-bounded [32]. Some temporary organisations may be truly ephemeral, and disperse as soon their task is complete, but often temporary organisations are connected to a more permanent organisation operating over a longer period of time [32]. Even if temporary organisations are not embedded within more permanent organisations in some capacity, they are still embedded in "enduring personal networks, epistemic communities, and industries in which their participants embedded" [32] (p. 480). In other words, regardless of whether a temporary organisation is embedded within a more formal, long-standing organisation, they are usually still embedded within wider socio-cultural milieu.

The ways in which temporary organisations might share commonalities with organisations with transient participants (like student-led food gardens) is in terms of their approach to knowledge, risk, and time (see Table 1). Temporary organisations tend to have linear understandings of time and problems with knowledge retention but are more comfortable with risk. Permanent organisations tend to have cyclical understandings of time and better-established knowledge management practices but are more risk adverse. It is not yet clear what approaches organisations with transient participants have to knowledge, risk, or time. Should organisations with transient participants, such as student-led food gardens, share approaches to knowledge, risk, or time with temporary organisations, they could learn from them in order to self-organise more strategically.

Table 1. The differences between how temporary organisations and permanent organisations approach knowledge, risk, and time. Information included comes from Bakker et al. [32], Brookes et al. [33], and Ibert [34].

Approaches to:	Temporary Organisations	Permanent Organisations
Knowledge	"Excellent domain for context-specific knowledge-creation" [33] (p. 1217) Knowledge retention is a problem The orientation towards knowledge is exploratory	Reduced reflexivity More established knowledge management practices The orientation towards knowledge is exploitative
Risk	Changes that result in risk are viewed positively as they present opportunities Undertakes high-risk activity Lacks temporal consistence and therefore is more risky	Changes that result in risk are viewed negatively as they are a threat to the longevity of the organisation Undertakes low-risk activity Has temporal consistency and therefore has less risk
Time	Linear, where tasks are oriented to "fulfil a one-off mission" [34] (p. 1530)	Cyclical, where "routines are established to deal with constantly (seasonally, monthly, daily, etc.) reoccurring tasks") [34] (p. 1530)

2.4. Systems Theory and Feedback Loops

There is a long history of understanding organisations through the lens of systems theory, including in the context of sustainability [35]. To systems theorists, the world is understood as "a complex, interacting array of systems and system processes, bumping into each other in a variety of ways. Social relationships and processes are impacted by the physical world as the physical world is transformed by social activity" [36] (p. 58). The key features of a systems lens are that parts of systems are understood to be linked up and interact in multiple, and often unpredictable ways. More conventional understandings of organisations have seen them as things that can be controlled, with problems that can be diagnosed and treated in isolation from other problems. A systems approach is different because it offers a more holistic way of thinking about organisations by looking for patterns and trends, and focusing on navigating, rather than managing or controlling, change in organisations. Thinking in this way supports more flexible and adaptive governance that makes the most of synergies and emergent success within organisations [37]. This is a useful way of thinking about student-led food gardens because their organisational structure is typically extremely fluid and messy, meaning that users of more linear or compartmentalised conceptualisations will struggle to make sense of their organisation and governance.

A contribution from systems theory that plays an important role in this study is the idea of feedback loops, which is when the output of a system is reused as input to the same system. There are two types of feedback loops: amplifying (sometimes called 'positive') feedback loops, which amplify the changes in a system, and balancing (sometimes called 'negative') feedback loops, which dampen changes in, or stabilise, a system [38]. These feedback processes can also have delays embedded within them, so consequences can be unexpected or counterintuitive [38].

A systems approach is used in this study because we seek to identify feedbacks between short-term, irregular and low participation, their causes, and effects. This is appropriate given that student-led food gardens can be characterised as self-organising systems. We will use a systems theory lens to understand interaction between different causes and effects of short-term, irregular and low participation in student-led food gardens to identify feedbacks, especially accelerating feedbacks, given that unchecked accelerating feedback loops ultimately destroy the system they are part of [39]. We understand each student-led food garden as a semi-open, complex system interacting with their host university, students' union, and national student union organisations, while operating within the sustainability of the higher education community, the higher education sector, and society at large. The focus of the paper, however, is on the internal reality of the individual gardens.

In this paper we will: (1) identify the causes and effects of short-term, irregular, and low participation in student-led food gardens; and (2) identify feedbacks between these and map them

using a causal loop diagram. After this is presented in the results, we will use the discussion to identify potential leverage points to improve participation, reflect on learning in student-led food gardens, and consider our methodology and future research directions. First, however, we will outline the methods we used.

3. Methods

This paper focuses on understanding the causes and effects of short-term, irregular, and low participation in university student-led food gardens with transient participants, and what any feedbacks might be between these causes, effects, and modes of participation. We used a descriptive single embedded case study design examining the UK's National Union of Students' sustainable food growing scheme called 'Student Eats'. A case study is defined as "an empirical inquiry that investigates a contemporary phenomenon within its real-life context" [40] (p. 23). Case studies enable the development of a rich, in-depth understanding of the phenomena by retaining their "holistic and meaningful characteristics" [41,42] (p. 2). Much of the research about student volunteering focuses on volunteering as a phenomenon (e.g., [43,44]), rather than focusing on particular initiatives, which is why we used a single case study approach. Because the case study was too big to study all initiatives, we used three embedded units of analysis to allow a more detailed inquiry [42].

Student Eats was set up by the National Union of Students in the UK in 2012 to support "institutions across the UK in cultivating their own student-led growing sites for fruit and vegetables," with the ambition to:

- "give students (and other volunteers) the chance to learn about the ethical and environmental impact of their food choices"
- "strengthen links with the local community," and
- provide free produce to dedicated students, and surplus produce to the wider student population at an affordable price [45].

Initially eighteen universities and colleges were funded to set up gardens, however the network now has over 60 institutions in the UK participating [46]. We chose to focus on the UK context because the expansion in the number of university gardens has been driven by a nation-wide initiative from the National Union of Students, meaning there was a more uniform and coordinated network to collaborate with. Three gardens located at universities in central and northern England were chosen as units of analysis. The gardens were chosen using literal replication, where units are chosen on the basis of their similarities in order to corroborate each other and enhance the credibility of the findings [42]. The chosen gardens were selected because they were the most active and 'student-led' of the NUS-funded gardens. Active gardens were chosen to minimise the risk of the gardens folding during the period of this study, while 'student-led' gardens were chosen because they would best exemplify the trait of 'transience.' The three most student-led gardens were at universities as gardens at colleges had more staff involvement, therefore the findings of the study are mainly generalisable to university contexts. 'Student-led' gardens were understood to be gardens that were mainly self-organised by undergraduate and/or postgraduate students. This meant the important decisions for the gardens were made by students and they were mainly tended by students, although there may have been some involvement from university staff or local community members. Although chosen through literal replication, there were a few discernible differences between the gardens, as outlined in Table 2.

The empirical material was gathered between October 2014 and April 2017 through semi-structured interviews, workshops, photovoice (which included the participants taking photos and a group discussion of these), and a fishbowl dialogue (a structured discussion technique for large groups). These qualitative data collection methods were chosen to allow for participants to construct meaning themselves and for spontaneous probing. The workshops and fishbowl dialogue allowed participants to debate and snowball on topics brought up by other participants, providing more well-rounded insights. A research diary was also used to enhance researcher reflexivity through reflective journaling.

In total, there were 16 interviews lasting between twenty minutes and two hours, six workshops with between four and six participants lasting between two and three hours, one photovoice group discussion lasting 45 minutes with four participants, and one fishbowl dialogue lasting 30 minutes with 17 participants. Participants included student gardeners, students' union staff and elected representatives, and staff from the National Union of Students. The fishbowl dialogue took place at a Student Eats conference and involved university/students' union staff and students from universities and colleges beyond the three gardens chosen as units of analysis. The purpose of this was to broaden the generalisability of the finding across the Student Eats scheme. All interviews, workshops, and discussions were audio-recorded and transcribed. These text documents, including the research diary, were analysed in a Computer Assisted Qualitative Data Analysis Software programme (NVivo) using eclectic coding, a coding strategy which draws on several different coding techniques [47]. A loose *a priori* frame was used to code the data into one of three categories: (1) causes of short-term, irregular, and low participation, (2) effects of short-term, irregular, and low participation; and (3) other observations (see Figure 2).

Table 2. Description of the gardens studied.

Features	Keele University	Warwick University	University of Sheffield
Size of University	Approx. 10,000 students	Approx. 25,000 students	Approx. 30,000 students
Location of University	rural	rural	urban
Extent to which the Garden was Student-Led	Mainly undergraduate participants	Mainly undergraduate participants	Mainly undergraduate participants
	Supported by a PhD student (the first author, Laycock Pedersen)	Supported by a PhD student	Limited postgraduate participation
	Negligible support from grounds staff	Some support from grounds staff (e.g., provision of compost)	Some support from grounds staff (e.g., provision of compost)
Garden Characteristics	Eleven raised beds of approx. 10 m^2, two of which run by students, the other 9 rented out to staff and campus residents	Roughly 18 raised beds (approx. 2m^2), a polytunnel (approx. 15 m^2), several of small plots and borders dug directly into the ground, and a shed	Six raised beds (approx. 3–4 m^2 each), several beds dug directly into the ground (approx. 12 m^2 total), a shed, a small glass greenhouse, and a pond
	Located within a historical Walled Garden with a locked gate	Located behind student residences in a low-traffic area on campus	Located in between other university buildings and residences, next to an open green space
	Students had access to a large greenhouse run by the biology department		

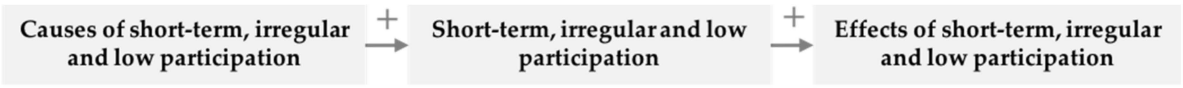

Figure 2. An assumed causal relationship between short-term, irregular, and low participation, their causes, and effects. The causal relationships are outlined using arrows to indicate the direction of the relationship, and pluses (+) to indicate that an increase in the first variable will lead to an increase in the second variable.

Once coded, the data was revisited to identify and draw out the connections between the different codes within each of the categories. These connections were then used to create a causal loop diagram, first with pen and paper, and then using The Brain visualization software. The focus of this study was not to compare between units of analyses (i.e., compare between gardens), but rather to make generalisations about Students Eats gardens in general. Therefore, the results are grouped together and presented in a single causal loop diagram. The results of the coding and the causal loop diagram will be described in the following section.

4. Results

Before presenting the results, it should first be noted that most participants in the gardens were undergraduate students, and therefore most of the results presented will pertain to them unless otherwise specified. We begin presenting and discussing the results from the data collection and analysis by outlining the causes of low, irregular, and short-term participation, and then their effects. We conclude the results with outlining a causal loop diagram illustrating relationships between each of these. Quotes from participants are in italics.

4.1. Causes of Short-Term, Irregular, and Low Participation

The causes of short-term, irregular, and low participation were categorised into either 'barriers to getting people 'though the garden gate" or 'barriers to continued engagement.' We will unpack each of these in turn.

4.1.1. Barriers to 'Getting People through the Garden Gate'

To even begin to have an adequate level of participation, people must come to the garden. However, many participants said that a cultural barrier or background cultural indifference prevented people from getting involved in the projects because students involved in the gardens had difficulty relating to the wider student body. The term "culture" was understood in a very broad sense, referring to norms, beliefs, attitudes, practices, values, etc., shared by a group of people. For example, some said that many students, particularly international students, did not find food growing appealing because of its association with poverty, colonisation, or being a relic of the past. Conversely, students also speculated that some people did not take part because it was seen as part of a subculture that they did not identify with:

> " . . . there is that kind of, like, that whole kind of coterie of dreadlocks and hippie kind of aesthetic. That people don't want to be associated with." (Student gardener)

Participants speculated that another reason more people did not get involved was because they did not like the actual practice of gardening, whether that be its physicality or getting "mud under your fingernails".

One of the most frequently mentioned barriers preventing students (and other potential volunteers) from getting involved in the gardens was that people were busy, lacked time and had competing commitments. When gardeners were busy or lacked time, it resulted in low or irregular participation. Some students said participation in their garden was not a priority compared to other activities and commitments, echoing Hustinx and colleagues' [43] findings. It was also noted that having competing commitments was not something that could be changed. Students were at university for their degrees and therefore academic work would be the top priority for most, especially since "(university) is already quite an intense experience."

A lack of external support also resulted in barriers to "getting people through the garden gate" because it meant less help with recruitment was given. Student volunteering in England is still marginalised in terms of being resourced by universities and therefore many student-led organisations are under-supported, particularly in comparison to institutions in the United States where experiential learning through volunteering is a more established tradition [4].

Student's expectations and misconceptions about what gardening entailed and/or the gardens could offer discouraged people from taking part. Quite a few participants mentioned that a lack of confidence, stemming from a lack of knowledge of food growing, prevented students from both getting involved in their garden. Other reasons the participants thought others might not want to take part was that they could not see the benefits of it. One participant said that this might be because young people are used to instant gratification and since the benefits are often not seen immediately, they might have become discouraged or bored. Some also said that cost, or perceptions of cost (i.e., for joining the student society, or paying for seeds or tools), could prevent people from wanting to get

involved. On top of this, some students did not know that such an initiative existed at their university which prevented them from getting involved. This was compounded by the fact that the gardens themselves could be hard to find. All three gardens were located off the beaten track and, in some cases, there was limited advertising.

4.1.2. Barriers to Continued Engagement

After participants came through the garden gate, the next challenge was to encourage them to return. The barriers to continued engagement included specific barriers related to students and student life, and some wider barriers relating to the organisation of the gardens, as well as participants missing an internal drive or competence. In addition to being a barrier to "getting people through the garden gate," misconceptions and unrealistic expectations also adversely impacted students' continued engagement.

Possibly the most defining feature of students and student life is transience. However, students' transience meant that eventually nearly all students involved in the gardens at the beginning of this study stopped coming back by the time data collection drew to a close. As such, students' transience increased short-term participation which resulted in a number of issues that will be picked up on in Section 4.2.

Some students said they were unwilling to commit to regular participation or to taking on positions of responsibility for fear that they would not be able to follow through. One student also said that the types of students that their garden attracted tended to be people who were less willing to commit to defined roles or plans because they joined their garden specifically for its easy-going atmosphere. However, students' lack of commitment was often recognised as being a natural thing, because being at university is an opportunity to experiment, learn, and try new things, so naturally, students would realise there are some activities they enjoy more than others.

Unsurprisingly, given students' varying schedules and that student-led food gardens were often one of many academic and social activities on students' plates, students did not always remember to come to gardening sessions even if they would want to. Poor weather also dampened participation. This was especially problematic given that summer, the most enjoyable season for gardening weather-wise, was ones most undergraduate students tended to be away for. One garden did not have access to a sheltered space (such as a greenhouse, shed, or polytunnel) big enough for the group to be inside and this especially challenging during the winter months, whereas in the gardens with sheltered space, gardening sessions could run regardless of weather. A different weather-related issue was that the seasonal participation of students affected students' ability to learn about growing food holistically because they experienced the growing year in a fragmented way because of the way holidays were placed in the academic calendar.

The way the gardens were organised also presented some barriers to continued engagement. Students expressed differences in the degree of organisational structure they preferred. Some student gardeners said they appreciated and/or wanted a high degree of autonomy that a formalised structure would inhibit, whereas others struggled with the "messiness" as they "(came to the garden) expecting someone to tell you what to do." There is an increasing professionalisation of volunteering in the volunteer sector at large [48], and volunteers want more formalised support than they used to [49]. Most student volunteers in England take part in unstructured volunteering opportunities [44], though students involved in the gardens expressed an interest in both types of opportunities.

The degree of organisational structure played a role in fostering students' 'psychological ownership' (a feeling that something is yours) of the garden. Psychological ownership made people feel connected to the space, accountable for what happened to it, and encouraged them to keep coming back. Of this, one student said:

> " . . . you can make [the garden] yours and you can decorate it. You can make it look nice. But you also have to clean it up. Like, there is some ownership. Some responsibility. [. . .] I think that that's super vital and that's really powerful . . . " (Student gardener)

This is in line with previous research that found that psychological ownership in community gardens is closely entwined with a sense of responsibility and concern for the space [50], and that gardeners' sense of ownership is an important contributor to knowledge- and skill-sharing in community gardens [51] (these will be picked up on below). Some of the main issues related to ownership over the gardens were a tension between the need for individual or collective ownership over tasks, people claiming ownership without contributing to the garden, and long-term and/or highly involved participants having too much control compared to short-term or less involved participants.

Students being able to self-determine or have control over the garden and the tasks they we involved in was seen to help build a sense of ownership and responsibility over the space, echoing similar findings about community gardens [50]. Universities owned the land the gardens were built on, but this did not seem to have limited students' self-determination of the space in two of the gardens. However, students from the other garden repeatedly expressed that they felt they had been limited by the grounds team of the university because they were not allowed to 'break ground' outside of their raised beds without scanning the ground for high-voltage cables first (see Figure 3). Participants also said that students' union-run growing spaces with concrete plans helped provide the consistency to keep it going, but that plans also prevented development of students' psychological ownership and self-determination over the space.

Figure 3. Signage from university grounds staff issuing a blanket ban on digging in the soil. Grounds staff appealed repeatedly to student gardeners to request the grounds team scan the ground for cables before digging. Students broke ground on numerous occasions without requesting scans, after which this sign was erected (censoring covers the university logo and contact information).

The desire to self-determine was often tied to students' political views. One student felt that people exercising their agency over a public place was a form of resistance in a world where there is increasing privatisation of the commons:

> "(The garden is) a powerful form of resistance. I think sometimes people forget that. The tidal forces of the food system are so strong and so toxic. It's just amazing that there's anything that can withstand that. That's important to me. You know, because, you watch something like Tomorrow's Food and I think yeah, all the kind of tidal forces within the development of

> the food system are so counter to this (garden). And yet, these things still exist. A thorn in the side of people who are triumphantly, kind of, modernist." (Student gardener) (Note: A television programme about food innovations for 'the future of food' (BBC, n.d.), examining, for example, the future role of vertical farming in food production and robots in food service.)

However, they also said that sometimes it could be a substantial challenge to actually encourage people to exercise their agency over the space. Whether intentionally or unintentionally, longer-term participants tended to exert more control over the space and prevent newcomers from feeling a sense of psychological ownership over the garden. It's also important to note that not all students expressed a desire to exercise their agency over the space.

As found in previous studies [52,53], cohesion within the gardening group was an important determinant of continued engagement, however cliquey-ness within the core gardening group prevented some students from wanting to come back. Conflict and internal politics within the group also prevented continued engagement. Some of the issues that conflict centred around included students having different ambitions for the garden space (e.g., what it should grow, how to grow it), and differences in ideas of how the project should be managed (e.g., how and whether money should be spent or saved). Internal politics and conflict were sometimes related to the group being too 'clique-y' or expecting others involved in the garden to share their politics. For example, one former student gardener spoke about groupthink within the group that made it difficult for people with different opinions to take part:

- Student gardener: " . . . everyone had to be vegetarian. Or vegan (. . .) I mean, obviously they want outsiders to join, but they don't want outsiders to join at the same time."
- Interviewer: "It's almost like they want people to join, but they also want them to take on their values as well."
- (Sound of agreement)

There was a strong relationship between internal politics/conflict and ownership issues because conflict often resulted in "power grabs" and more authoritarian approaches to managing the gardens.

A lack of a shared vision caused conflicts within the membership of gardens because it meant students invested their time (and money) in activities that moved the garden in different, and sometimes incompatible directions. Furthermore, without a vision, students felt loss of direction and motivation to continue to take part. One student said:

> "How do you define this project? You know, like, where is it going? What's the goal and stuff? I don't know." (Student gardener)

Some students also speculated that one of the reasons why their garden might not continue in future would be because the university wanted to develop the land, indicating that a shared vision, not only between students, but between all stakeholders was important.

It was also thought that some students were missing an internal drive or competence that would have otherwise meant they would have continued to participate. A lack of responsibility was one of these missing pieces. There was a relationship with the extent of ownership participants felt over the space and the degree to which they felt responsible, which was also thought to be mutually reinforcing. However, active gardeners found it challenging to distribute the workload among volunteers because it was difficult to maintain a balance between delegating too much and too little responsibility. This was because, when new participants took on too much responsibility, it caused them to become overwhelmed, overburdened, and burned out, and this ultimately reduced participation. This will be discussed in greater detail in Section 4.2 below. It should also be noted that some students deliberately avoided taking on a higher degree of responsibility because they knew they did not have the capacity to be more involved.

Participants also reported that some gardeners lacked initiative or struggled to make decisions independently. This may have been caused by a lack of confidence or inexperience which meant they

had difficulty understanding the level of initiative and independent decision-making needed for such initiatives to run effectively. In Laycock Pedersen's research diary, she reflected that "part of the reason these gardening projects can struggle with participation/transience is because most students have not been involved in projects that require this much initiative, particularly in a consistent way over a long period of time." This may also have been exacerbated by a lack of support and encouragement from long-term stakeholders for students to take initiative and be confident in their decision-making capacity.

Many students said they lacked motivation to take part more actively and that they did not know what to do to motivate themselves. One student called this the "black box of motivation" and said that their motivation to take part had dwindled because they were "leaving soon anyway" and therefore did not see "what good [it would] do" for the garden to continue taking part. This indicates that it was not just the physical impacts of transience that limited participation (i.e., the students were in a different geographic location from the university and the garden), but the psychological impacts of transience did as well (i.e., lack of attachment to and responsibility for the garden). The students were quite hard on themselves and their peers for what they perceived as "laziness." However, Holdsworth [44] has suggested that scholars have focused too much on individualised motivations to explain student involvement in volunteering. She asserts that student volunteering is a complex phenomenon and many students volunteer "without a clearly defined purpose" [44] (p. 435). A number of the students who took part in this study seemed to have internalised a preoccupation with motivation rather than thinking about taking part in their garden as just something they do incidentally or habitually. This could have been because, in some cases, they were asked about why they (or others) chose to take part. However, in many cases participants brought up motivation on their own accord when being asked about transience and improving participation more generally.

One student did go beyond discussing motivation and said their habits prevented them from having more consistent involvement. They explained that their "irregular lifestyle" was one of their "bad habits" that prevented them from being more regularly involved (see Figure 4). It appeared that when students were not participating at the level they wanted to they blamed it on bad habits or a lack of motivation, but did not seem to consider developing more positive habits (such as having a more consistent schedule) to change their participation behaviour.

Student's misconceptions and (unmet) expectations about what the gardens could offer also prevented continued participation. Students said their gardens were not sustainable enough, producing enough, big enough, and/or organised enough. Some also believed that there was not enough freedom for students to decide what to do (though, in some cases, this was actually true, as illustrated in Figure 3) and that they would do a different type of work than they expected (especially with regards to gardening vs administrative work). Students' unrealistic expectations and misconceptions also meant that sometimes their ambitions were bigger than their capacity to actually act on them, resulting in frustration and demotivation. One of the misconceptions that was widespread and caused a great deal of frustration and disappointment was that recruitment activities would yield more new recruits than they actually did.

In addition to all the barriers to participation outlined, a number of participants said they just "don't know" why people did not participate. Of this, one student said that they "wouldn't even know where to begin in terms of … prioritising what those (barriers) are (…) Because they are quite different for each person that's approaching the garden." The complexity of factors influencing participation and the resulting uncertainty about what the best strategies to improve participation made it challenging and frustrating to try to improve participation. These barriers to participation caused short-term, irregular, and low participation, which then resulted in problems in the gardens.

4.2. Effects of Low, Irregular and Short-term Participation

There were many problems caused by short-term, irregular, and low participation, and some of these amplified short-term, irregular and low participation, as well as the barriers to participation. Many of these problems had to do with the temporal impacts of transience. There were, however,

also knowledge retention and deficit issues, and some more general knock-on effects of short-term, irregular and low participation.

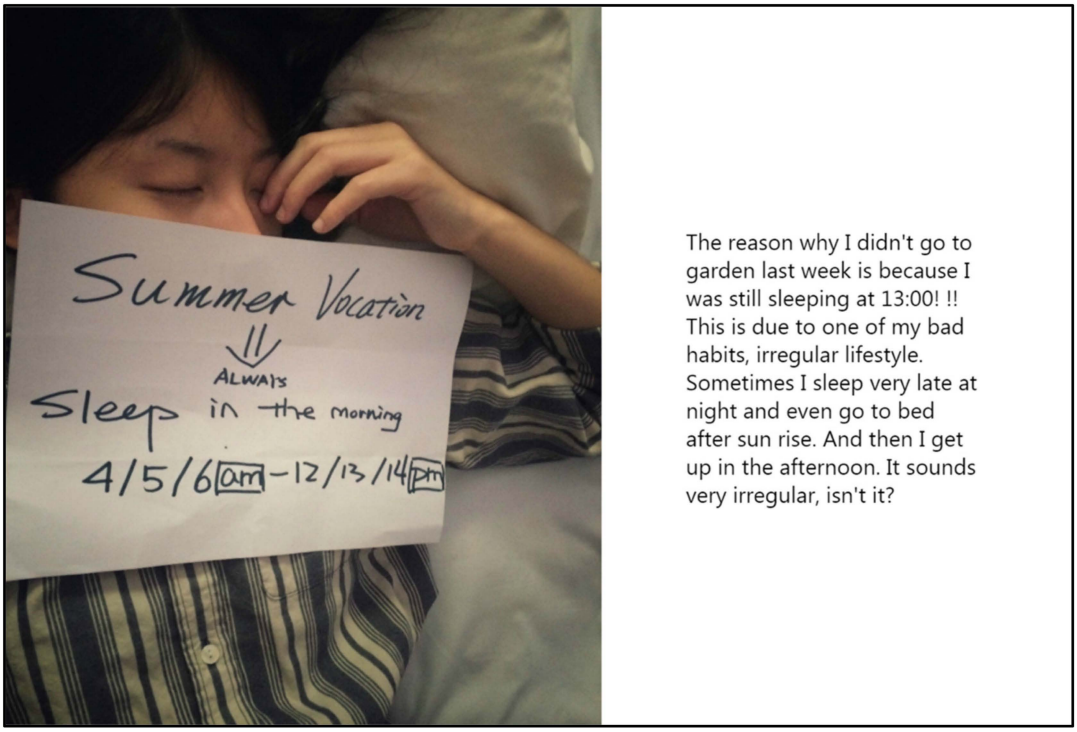

Figure 4. One student's photovoice submission explaining why they missed so many gardening sessions during the summer.

Because of the speed of turnover in the gardens, the constant need to recruit was the most immediately felt problem. Participants found themselves mostly organising and facilitating "rather than just participating." Some found it hard to appreciate the good things about being part of their garden because they spent so much time focused on recruitment rather than the gardening activities they had hoped they would be doing. The constant need to recruit caused friction within friendship groups as well. One student said they repeatedly asked friends to take part in their garden and "when (their friends) didn't want to," it brought "tension to their friendships and negatively impacted (their) circle of friends." The constant need to recruit also resulted in what one former student gardener called an "existential crisis" for their garden. They said that:

> " . . . (maintaining participation was) their number one priority (. . .) but also something that is also taken for granted. And it's kind of an existential crisis if they actually identify surviving as an aim." (Former student gardener)

When the gardens struggled with participation, their main aim became making sure they did not fold (i.e., the initiative was successful if it continued to exist), and this led students to question the purpose and value of their garden. Why bother recruiting people to take part if their main task will be to recruit more people?

We also observed that the 'feel' of the garden group changed rapidly. We attributed this to the fast-changing and unpredictable social network, and therefore organisational structure, that was caused by the high turnover of students through the garden. The short time that students were involved in the gardens was not enough for them to settle comfortably into a role, with students having 'formal' roles (such as president or secretary) which did not correspond with the roles they actually played within the group. This affected the continuity, retention of knowledge, recruitment of new participants, and running of activities.

In some cases, there was friction between short-term stakeholders (typically students) and long-term stakeholders (such as university or Students' Union staff members). In one garden, the friction stemmed from a lack of trust between students and staff members. When students were involved in the initiative for a limited period of time, it was difficult for university staff and the initiative's other long-term stakeholders to trust them, especially when they felt that past students had not been trustworthy. This problem was reinforced by stereotypes about students, such as students being lazy.

In temporary organisations, 'swift trust' is reported to develop between participants, rather than more conventional types of trust that take longer to develop [54]. 'Swift trust' is trust that is taken as a given upfront, and then verified or adjusted in time [54]. There was evidence of this between short-term stakeholders (typically students) but was not any evidence of this between short-term and long-term stakeholders in the student-led gardens. This may be because long-term stakeholders did not see the gardens as temporary organisations, in spite of the fact that they might have felt that way for students. Trust was also complicated by unequal power relations between long-term and short-term stakeholders.

The gardens also had varying degrees of discontinuity that affected their longevity. Observing these projects over several years, we witnessed substantial turnover in volunteers which resulted in the 'reinvention' of the projects when a new generation of students arrived, sometimes as often as once a year, with a redefinition of aims, activities, planting plans, and so on. This was especially true of the garden run entirely by undergraduate students (without PhD student input). Discontinuity resulted in a lack of strategic planning and waste of resources, volunteer energy, and potential. Given the high turnover of students, it was hard to ensure the project's longevity. Long-term thinking is especially important for food-growing projects because their success is cumulative. For example, improving soil health requires work over the course of many years, and mismanagement resulting in, for example, potato blight, can take years to rectify.

Participants also reported not seeing the results of their work given their often seasonal/short-term engagement. This included both gardening work and administrative/strategic work done on the project. For example, some students took action to increase the visibility of the project and never saw whether increased participation resulted from it. Furthermore, because students knew they would not see the results of certain types of strategic work, they did not prioritise it. For example, one student said their group decided not to prioritise planting asparagus because by the time it would be possible to harvest it, the students who planted it would be gone.

Given that students' engagement in the gardens was usually time-bounded, their thinking about them was often limited temporally, though there were exceptions to this, particularly in PhD and mature students. Students thinking and operating on such short timescales led them to become frustrated with how long it took to make plans a reality. One of the implications of this short-term thinking was that students involved in a short-term capacity lacked insight into how their own transience caused problems in their garden. Some students, for example, saw their garden as more permanent than it actually was and did not express concerns about who would lead it the following year. Others had expectations for the initiative that were not always realistic, for example creating much more elaborate growing plans than was achievable. In other words, students had fragmented understandings of how to cope with transience because they did not grasp the ways in which participants' transience impacted their garden.

The lack of insight into transience as a problem may indicate that long-term and short-term stakeholders in student-led food gardens have different conceptions of time pertaining to their garden, akin to the different perceptions of time in temporary and permanent organisations. Ibert [34] has argued that a linear understanding of time is more applicable to temporary organisations, rather than a cyclical understanding of time. This is because temporary organisations are intended as 'one-off missions,' while an organisation operating over a longer period of time will usually have reoccurring routines (e.g., regular meetings). Therefore, it makes sense that shorter-term participants of student-led food gardens exhibited linear understandings of the time (as in Figure 5a) while longer-term participants exhibited cyclical understandings (as in Figure 5b).

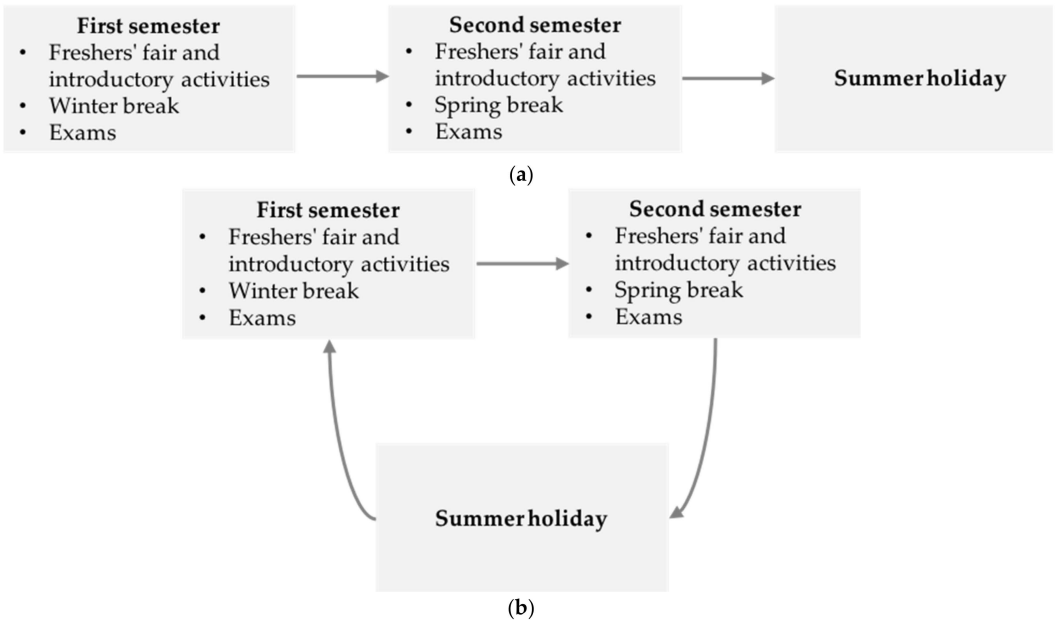

Figure 5. (**a**) A linear conceptualisation of time in a student-led food garden that would be typical of participants who have had short-term engagement with the garden; (**b**) A cyclical conceptualisation of time in a student-led food garden that would be typical of participants who have had long-term engagement with the garden.

Understanding that long-term and short-term stakeholders had different conceptions of time helps to explain why there were tensions between these stakeholders. "New students (were) coming in every year who (had) no idea who these (long-term stakeholders were)," and they were encountering the challenge of approaching people which they found intimidating (such as university staff) anew every year. For staff, however, it was increasingly routine to engage with students asking similar questions year-on-year. The incongruence between the time scales staff and students were working on meant that students and staff had different expectations for how long it takes, for example, to respond to emails and follow through on requests. These different expectations led ambivalence from staff and frustration for students.

It is also this linear conceptualisation of time that caused problems in retaining knowledge within student-led food gardens, because of the interruption of learning processes [34]. In other words, students "had to give up learning in the moment in which they have gained the deepest insight into the task at hand" and this inhibited the development of organisational memory [34] (p. 1534). While most students appeared to conceptualise time in their gardens in a linear way, some seemed to develop a more cyclical understanding of time through prolonged engagement. For example, students often entered the gardens with unrealistic expectations and misconceptions and what they could have expected to get out of the garden or achieved within it. By the time many left, they had much more realistic ambitions for the garden, though readjustment of expectations did not tend to benefit the gardens.

Food growing is a knowledge intensive practice, as is running a student-led organisation, and therefore it was important that gardeners had or could develop their knowledge about food growing and running a voluntary organisation. Participants reported a skill and knowledge deficit in these areas, and this was exacerbated, and in some cases caused, by a lack of knowledge transfer within the garden as an organisation. In the study of temporary organisations, this failure to retain knowledge within an organisation is called "organisational amnesia" [33].

There were four main types of knowledge and/or skills that were necessary for the gardens be sustained. There was basic horticultural know-how, or a set of generalisable skills and knowledge about food growing. There were also place-based knowledge and skills specific to gardening, for example,

what has been planted where in previous years. Administrative and interpersonal knowledge and skills, on the other hand, were not related to food growing specifically, but rather to do with sustaining the garden as an organisation. There were also generalisable and place-based versions of these type of knowledge and skills (see Table 3). Gardeners learned about other things (as in Section 2.1), but these are not discussed here as the focus is on the instrumental knowledge/skills that directly contributed to the gardens sustaining themselves.

Table 3. Types of instrumental knowledge and skills needed by participants of student-led food gardens to sustain their garden.

Types of Knowledge/Skills	Generalisable	Place-Based
Horticultural	e.g., how far apart to plant kale, how much sun tomatoes need	e.g., potato blight has recently affected one of the beds and therefore potatoes cannot be planted there, one of the beds drains faster than the other and therefore needs more water
Administrative/Interpersonal	e.g., the most strategic ways to recruit new participants, how to manage voluntary workload to avoid burnout	e.g., who to contact if you need compost delivered

The lack of knowledge- and skill-sharing between "generations" of students resulted in inefficiencies, duplication of work, and reduced students' confidence and willingness to take initiative. Some said that inadequate participation, or having participants without the necessary skills and knowledge, prevented them from accessing funding they needed. Furthermore, when students with less know-how did not get support, it discouraged them from taking part in future.

Paradoxically, temporary organisations are thought to be excellent places for learning, however, because of their temporary nature, knowledge sharing and retention within the organisation tends to be much less successful [33,55]. This appears to also be true of organisations with transient participants, like student-led food gardens.

In addition to the temporal impacts of transience and knowledge retention/deficit issues, there were some more general knock-on effects of short-term, irregular and low participation. The most common one that was brought up by the participants was feeling overburdened, overwhelmed, or just burned out. Those that were regularly involved tended to get burdened with more responsibilities than they'd like. To compound this, those coordinating the gardens were sometimes reluctant to delegate responsibility for fear that they would overburden new recruits and scare them away. However, this often resulted in the coordinators becoming overburdened instead. Furthermore, because these longer-term participants shielded the new recruits from some of the work, which was often the administrative work rather than the horticultural work, the new recruits did not appreciate all that the longer-term participants were doing to keep the garden afloat. For some, the responsibility was too much to take, which would cause highly active participants to abandon the project entirely. As such, burnout accelerated an already high turnover rate. Of this, one student said:

> "It seems like, in my experience, (active students) get fed up after a year, because it's too much responsibility. And then they never come again, after they're no longer on the committee. Even though they did it all the time before. Sort of, like, overload. It goes both ways. You can get too much, like, involvement, just out of, like necessity, and get just not involvement because people won't come back." (Student gardener)

On top of this, low or inconsistent participation, compounded by the constant need to recruit, led to inadequate maintenance of the physical gardening space. There was therefore wasted food-growing potential as the gardens became overgrown and harder to maintain, forcing gardeners to play catch-up with the tasks.

Having lower and more irregular participation also meant there was less social interaction between gardeners—a widely reported benefit of the initiatives, and a reason why people continued to

come back. Short-term, irregular, and low participation also caused negative emotional responses. The uncertainty of how many people would turn up on a week-to-week basis and how the project would be maintained made participants feel worried. Participants felt annoyed at others for not showing up, a PhD student was disappointed that undergraduates did not get to enjoy the joys of summer gardening, while some judged others for "not pulling their weight," and generally felt "fed up" with trying to keep the project alive without much result. Frustration was the main negative emotional response reported. Some felt frustrated by the gardens' unfulfilled potential and that others were not taking a more active role. One of the staff members from the National Union of Students said that sometimes it took a long time to set up a university garden, and this caused frustration and lost initial momentum from students. On top of feeling negative emotions, some felt they could not share their feelings without alienating others, and therefore had to keep them to themselves:

> "I don't want to tell them (the other gardeners) that I'm annoyed because then that will make them even less likely to come." (Student gardener)

4.3. A Causal Loop Diagram to Understand Transience and Participation

There were numerous causal connections identified by participants, many of which were outlined in the above sections. Therefore, the assumed causal relationships outlined in Figure 2 were elaborated on by introducing new causal links, creating feedbacks. Two additional variables were also added. These new variables and causal connections are depicted in a simplified causal loop diagram in Figure 6, and a more detailed diagram in Figure 7. The new variables that were introduced were that: (1) every year there was a new pool of potential recruits; and that (2) some of these potential new recruits would become new participants. The other notable change from Figure 2, other than the new causal connections, is that transience was disaggregated from causes of short-term, irregular, and low participation because students' transience was found to have special role in both directly increasing and indirectly decreasing them.

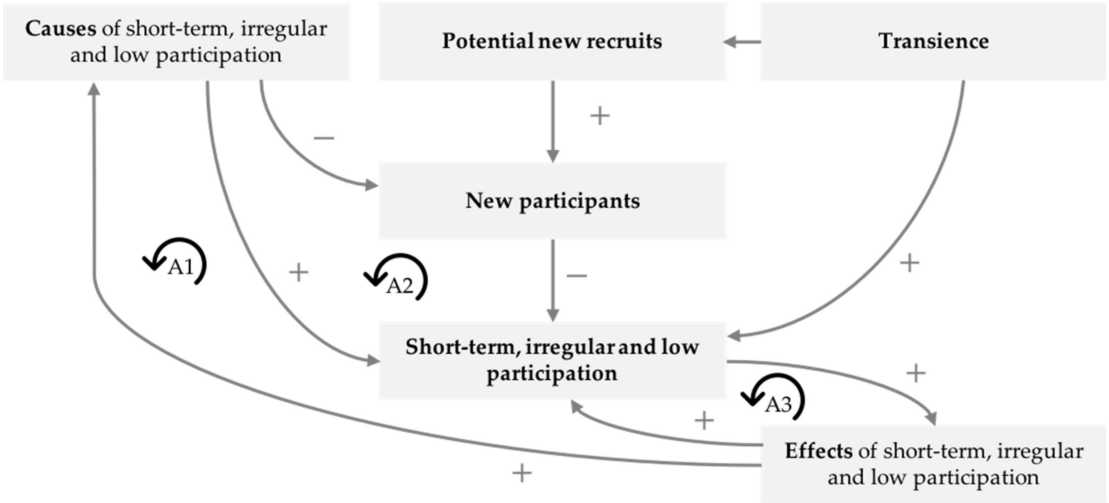

Figure 6. A causal loop diagram outlining the relationships between causes and effects of short-term, irregular, and low participation. Plus (+) signs on an arrow indicate that an increase in one variable leads to an increase in the other in the direction of the arrow. Minus (−) signs indicate that an increase in one variable leads to a decrease in the other in the direction of the arrow. A1, A2, and A3 mark the three accelerating feedback loops in the system and are described in the text in greater detail. Note: transience is a cause of short-term, irregular, and low participation, however because of its special role in both directly increasing and indirectly decreasing short-term, irregular, and low participation, it is depicted as its own entity.

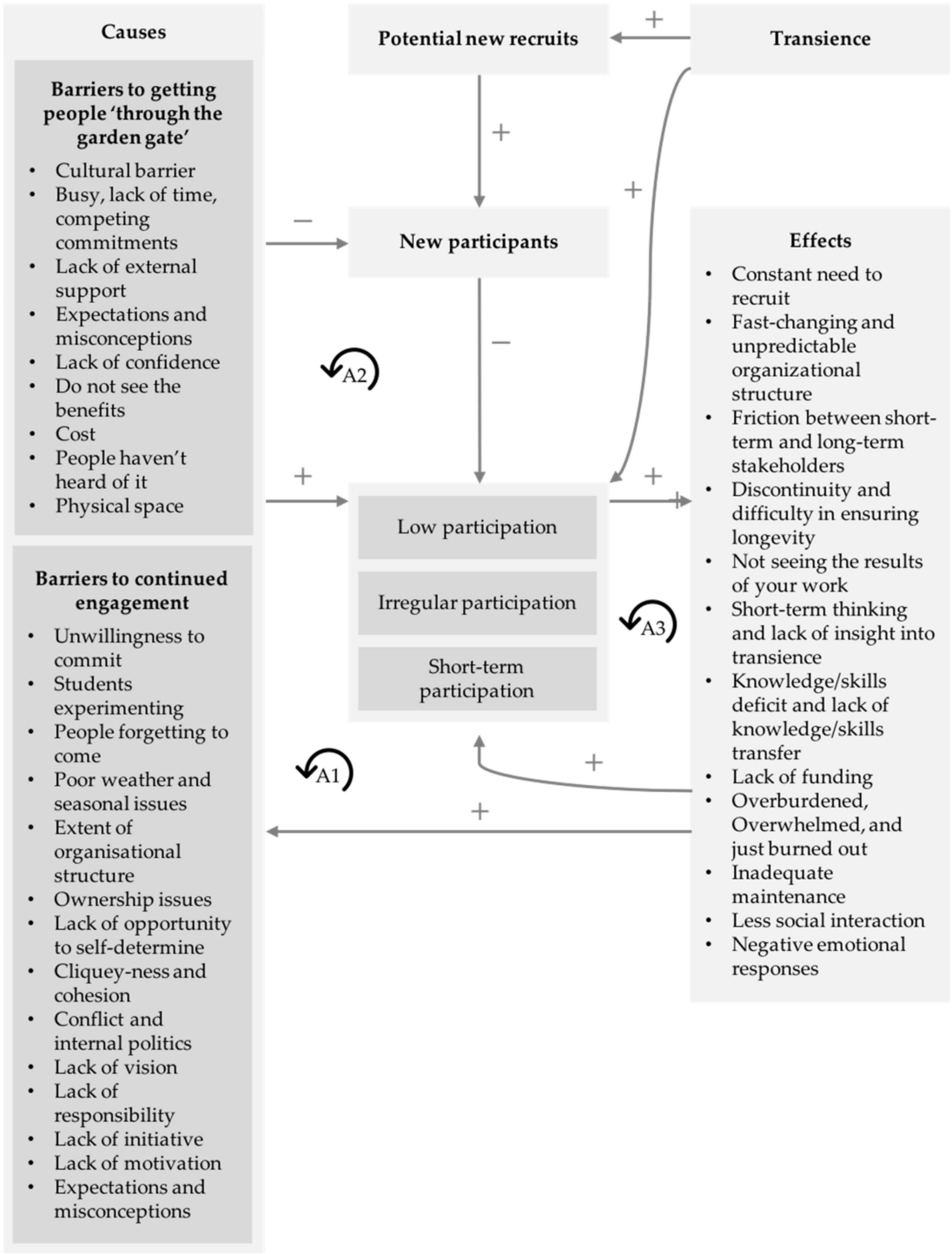

Figure 7. An expanded causal loop diagram outlining the causes and effects of short-term, irregular, and low participation, based on Figure 6. Plus (+) signs on an arrow indicate that an increase in one variable leads to an increase in the other in the direction of the arrow. Minus (−) signs indicate that an increase in one variable leads to a decrease in the other in the direction of the arrow. A1, A2, and A3 mark the three accelerating feedback loops in the system.

There were three accelerating feedback loops identified. In the first feedback loop (A1), the effects of short-term, irregular, and low participation indirectly increased these modes of participation by increasing the phenomena that cause them. An example of this (depicted in Figure 8a) was that when there was low participation in the garden, it resulted in a constant need to recruit to try to increase the

number of gardeners. However, this meant that students who joined the garden with the expectation that they would be able to spend most of their time gardening found their expectations unmet. As a result, those students dropped out, decreasing participation levels further.

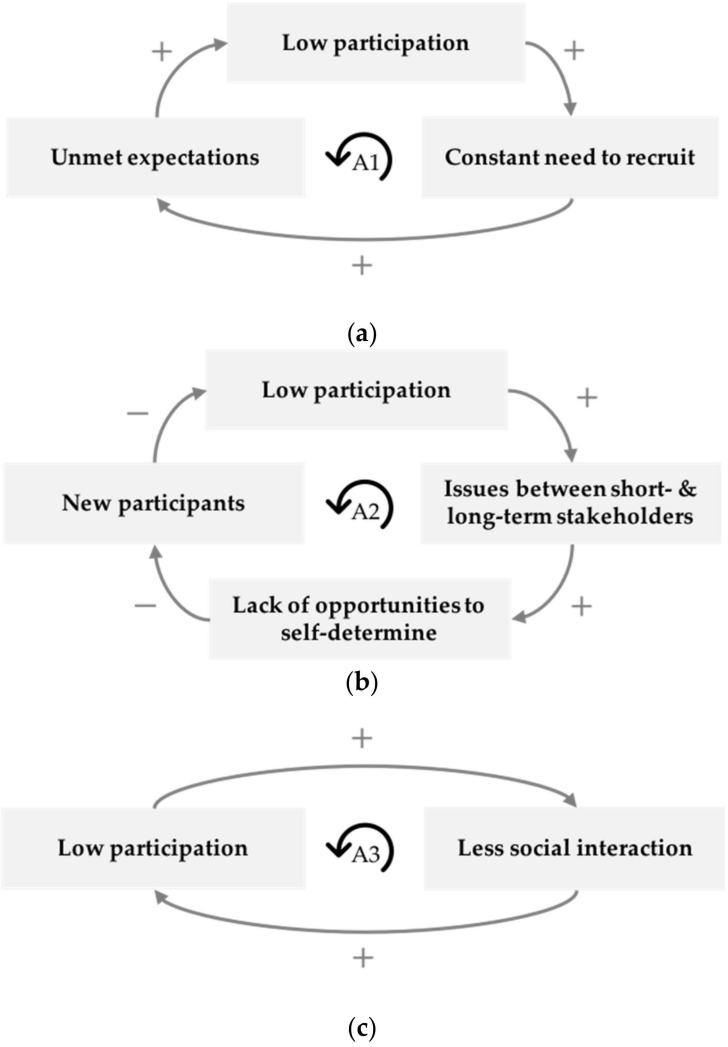

Figure 8. A series of causal loop diagrams illustrating examples of each of the accelerating feedbacks from Figures 6 and 7: (**a**) A vicious cycle in which low participation causes a constant need to recruit new participants which results in unmet expectations, further decreasing participation; (**b**) A vicious cycle in which lack of opportunities for students to self-determine leads fewer new participants. This then leads to low participation, causing issues between short- and long-term stakeholders, which then reduces the opportunities to self-determine; and (**c**) A vicious cycle in which low participation as less social interaction are mutually reinforcing. Plus (+) signs on an arrow indicate that an increase in one variable leads to an increase in the other in the direction of the arrow. Minus (−) signs indicate that an increase in one variable leads to a decrease in the other in the direction of the arrow.

In the second feedback loop (A2), causes of short-term, irregular, and low participation reduced the number of new participants in the garden. Having fewer new participants lowered participation, which resulted in effects that then increased the causes of short-term, irregular, and low participation. This is illustrated in the example in Figure 8b: if participation was low this created mistrust of students (short-term stakeholders) and university staff (long-term stakeholders) about their ability to maintain the space. This made the university staff reluctant to give students more control of it, which resulted in even fewer opportunities for students to self-determine, disincentivising new participants from taking part. In the third feedback loop (A3), short-term, irregular, and low participation and their resulting

effects were mutually reinforcing. For example, low participation lowered social interaction in the garden, which then decreased participation further, as in Figure 8c.

Unchecked accelerating feedback loops, like the ones outlined above, ultimately destroy the system they are a part of [39]. The check within this system was students' transience. Students' transience provided a buffer to the accelerating and self-destructive feedbacks loops by providing a regular and predictable inflow of potential new recruits, which increased the number of new participants. This reduced low participation, and in some cases, also short-term and irregular participation. Yet, at the same time, transience also was the most important contributor to increasing short-term participation, often thereby resulting in low participation.

Given the three accelerating feedbacks and the fact that the buffer to these feedbacks (students' transience) increased the very same phenomena it buffered (short-term, irregular, and low participation), it is clear that the student-led food gardens operated in perpetually precarious states. It is therefore unsurprising that participants expressed that there was no hope in moving away from the precarity:

> "I, personally, find it difficult to see how [the maintenance of the garden] is ever going to be a sustainable situation." (Student gardener)

This uncertainty, precarity, and, in some cases, hopelessness characterised the internal reality of student-led food gardens. The discussion in the following section, however, will begin on a more optimistic note by outlining where and how the system can be most strategically intervened in to reduce short-term, irregular, and low participation.

5. Discussion

The internal realities of student-led organisations at universities have not yet been well-explored in the literature, therefore this study has taken an initial step towards filling this gap by examining the causes and effects of short-term, irregular, and low participation in student-led food gardens, and the feedbacks between these. This discussion will offer some insights about how organisations with inevitably transient participants manage the challenges associated with short-term participation, rather than focusing on reducing transience itself, as has been done previously [28]. We also consider how some of the challenges associated with students' transience might also have positive outcomes through contributing to student learning.

Since student-led food gardens have both long-term and short-term stakeholders, they seem to be not-quite-temporary, yet not-quite-permanent in terms of how trust-building manifests and how their stakeholders conceptualise time, as highlighted in Section 4.3. This indicates that student-led food gardens, as organisations with transient participants, might actually have an organisational form unique from temporary and permanent organisations. This is because they appear to have dual approaches to and conceptions of time and knowledge, which produce challenges with managing these different and, at times, conflicting approaches and conceptions. In Section 5.1, we will also draw on the literature about temporary organisations to suggest that student-led food gardens can capitalise on having both long-term and short-term stakeholders in order to both retain knowledge within the garden as well as maximise student learning. First, however, we will explore some strategic points for intervention to address negative impacts associated with short-term, irregular, and low participation.

5.1. Strategic Points for Intervention

In spite of the precarity of the student-led food gardens, knowing what the accelerating feedback loops are means that stakeholders can intervene at strategic points to slow the feedbacks. Because feedbacks are present, both 'upstream' (focusing on mitigating the problem) and 'downstream' (focusing on adapting to the problem) solutions are relevant. We therefore advocate a holistic approach to addressing the impacts of transience and short-term, irregular and low participation. This includes addressing barriers to "getting people through the garden gate", barriers to continued engagement, and effects of short-term, irregular and low participation simultaneously. The gardens studied each

had different issues that dominated their gardening group. As such, the decision to intervene on a particular issue should be made at the level of the individual garden in question. However, the causal loop diagrams in Figures 6 and 7 could still be used practically by stakeholders of student-led food gardens to plan action to reduce the negative impacts of short-term, irregular and low participation. This could be done by identifying the issues from the causal loop diagram that dominate in their garden and then using this prioritisation to determine the most strategic actions to take. The causal loop diagrams could also be used to assess how holistic the current menu of actions that are being taken to decrease the negative impacts of short-term, irregular and low participation are. Stakeholders could do this by mapping actions onto the causal loop diagrams to assess if both upstream and downstream interventions are being taken.

Another key consideration for improving participation and mitigating the causes and effects of short-term, irregular, and low participation in student-led food gardens is examining the role of university and students' union staff. Because the focus of this study was on participation in student-led food gardens with transient participants, we studied Student Eats' most student-led food gardens as exemplars of transience. But should student food gardens on university campuses actually be led by students? While many students wanted to have control over and autonomy in the decisions made about the space their garden occupied, there were also some students that expressed that they would have liked more guidance from university or students' union staff. This echoes [4] findings that students appreciate support in their volunteering activities, and that "students who are supported by their university to volunteer report better experiences of volunteering than volunteers who are non-supported" (p. 174). Indeed, in Bakker et al.'s [55] study of project knowledge transfer in temporary organisations, they asserted that "there is a clear and unambiguous responsibility of the project owner (the permanent parent organisation) in project knowledge transfer" (p. 502). The responsibility for knowledge transfer was taken on by long-term stakeholders in two of the gardens studied. However, the fact that many students felt that their knowledge/skills were inadequate, and they lacked adequate mentorship indicates that 'organisational amnesia' was still a problem. This was likely compounded by students' absence during over the summer, which meant that they missed out on learning about an important part of the growing calendar.

While many students wanted to self-determine, self-determination does not necessarily preclude support and guidance from university or students' union staff if the support and guidance is on the students' terms. However, ensuring staff input into the space is supportive without being overbearing is a fine line to walk. Experienced or skilled staff may be able to manage this intuitively, however others might need clearer models to offer the right level of support. One model of how staff could support in student-led food gardens is to create a 'hybrid' management structure. This might involve splitting the garden into two different parts; one with more staff support and structured volunteering opportunities, and another with less staff involvement and a higher degree of student self-determination. Another model could involve staff at key periods, temporally. For example, staff could limit involvement during term-time, and offer hands-on support during holidays and recruitment at the beginning of term.

Having more staff involvement in the space, assuming it does not infringe on students' creativity or self-determination, could provide other positive benefits beyond catering to students' different management preferences. For example, regular interaction between long-term and short-term stakeholders could help staff and students see each other as human beings rather than sources of frustration, developing understanding and trust. Also, staff members being on the garden site more regularly means they would be more likely to notice when the gardens need outside support to restore student engagement. Long-term stakeholders of student-led food gardens could, therefore, have a subtle but crucial role in mitigating the causes and effects of short-term, irregular, and low participation, whilst navigating a more stable and long-lasting path for these gardens.

5.2. Learning in Student-Led Food Gardens

One of the aims of Student Eats was "to give students (and other volunteers) the chance to learn about the ethical and environmental impact of their food choices" [45]. However, many students involved in the gardens appeared to be 'sustainability converts' already. Indeed, one of the barriers to participation that was highlighted by many students was that students involved in the gardens had difficulty relating to the wider student body because they already had such strong sustainability sensibilities. This meant that the alienating sustainability sensibilities espoused by some existing gardeners, in conjunction the wider student population's apathy or indifference towards gardening/sustainability issues, was preventing the students who would be candidates for learning about ethical and environmental food choices from taking part in the gardens. If student-led food gardens are intended to help students learn about the ethical and environmental impact of their food choices, but most students involved in these initiatives are already sympathetic to sustainability issues, a crucial question must then be raised: Are student-led food gardens preaching to the converted?

We contend that, while most of the students involved in the gardens studied could be considered 'sustainability converts,' there was still much for the 'converts' to learn by taking part in these spaces. Most undergraduate students are in a liminal state, where they are not-quite-children, yet not-quite-adults either [44]. The learning that these students are doing at this stage therefore might have more to do with their "negotiation of the transition to adulthood" [44] (p. 431) than, perhaps, the ethical and environmental impact of their food choices or how to grow food. This might include negotiating their place in the sustainability movement, understanding what realistic tasks for part-time volunteers are, and learning about the types of tasks voluntary (and, indeed, professional) organisations need to undertake to be successful.

In much of the literature about temporary organisations, "organisational amnesia" is seen as a problem [56]. However, one of the main aims of student-led food gardens is that students learn, regardless of whether this learning is reinvested in their garden. Therefore, short-term, irregular, and low participation, and their associated causes and effects, might not only cause difficulties for student-led food gardens, but also provide learningful moments for students. For example, if students have unrealistic expectations and misconceptions of what a student-led food garden can do, taking part in one can help them better understand what a voluntary, self-organising initiative can offer. Another example of such an opportunity in disguise was the conflict and mistrust between short-term and long-term stakeholders. One student said that it could be "intimidating to approach people who are in supposed positions of power," like university staff. Indeed, the power relations between staff and students, whether actual or perceived, complicated trust building. However, Holdsworth and Quinn [57] have suggested that "the most valuable form of volunteering" is that which "provides learning opportunities which enable volunteers to deconstruct and resist power structures and inequalities" (p. 393). Students interacting with university staff were faced with such opportunities. However, this would be worth examining further to understand the extent to which students grappling with and resisting power structures within the university actually contributes learning, and if so, what type of learning. Therefore, while some barriers or issues could prevent students from engaging in student-led food gardens, students who continue to take part may learn important lessons and skills to take with them into their post-university lives. However, further exploration is needed to assess more definitively what students learn from student-led food gardens and other student-led sustainability initiatives, and what conditions facilitate different learning. We outline further opportunities for future research and some reflections on the methodology of this study in the following section.

5.3. Methodological Reflections and Further Research Directions

We have two main methodological reflections on this study. The first is to do with our overall methodology being relatively inductive. Our inductive methodology meant that the decision to create a causal loop diagram came about after the data was collected. Because of this, it is possible that we missed opportunities for probing and interrogating the connections between the different

codes, meaning the causal loop diagram may be incomplete. We chose to reduce the number of connections depicted in the causal loop diagram in order to illustrate only the most robust and important connections so as not to overstate our contribution to knowledge.

Another methodological reflection is about the fact that this study addresses a pragmatic research question. There is an emerging body of literature that is adopting a critical stance towards the community food-growing movement, suggesting that some of the benefits of these initiatives may be overstated, or are perhaps not as clear as they are made out to be [53,58–61]. Important work is being done in this area to clarify and tease out nuances in the purported benefits. However, as of yet the literature about university gardens has benefitted much less from this critical turn [5]. We feel there is a need to further problematise the aforementioned benefits in this emerging area of research through critical engagements. For example, it would be worthwhile to ask, are the learning outcomes of these initiatives worth the time and monetary investment they require? Who are benefitting most from these gardens (and, perhaps more importantly, who are not)? How can these gardens be designed and run to maximise their positive outcomes? In addition to these questions, future research could also inquire into whether it is possible to identify interventions to improve participation that are more specific than those outlined in Section 5.1, but that still can be generalised across student-led food gardens. Further inquiry about the what could be learned from temporary organisations [32–34,55] for the management of organisations with transient participants would also be worthwhile. This may include further examination of the similarities between the roles of what we have termed "long-term stakeholders," and Bakker et al. [55] calls "parent organisations," or looking into how risk is approached, avoided, or exploited in student-led food gardens.

6. Conclusions

In this study we have mapped the causes and effects of short-term, irregular, and low participation in student-led food gardens, and the feedbacks between these. There were two main causes of short-term, irregular, and low participation, which were barriers to "getting people through the garden gate" and keeping participants coming back. Students' transience played an important role in preventing students from coming back because of the time-limited nature of university degrees, and this caused short-term participation. However, students' transience also had an important role in increasing participation overall by refreshing the pool of new recruits on an annual basis. Short-term, irregular, and low participation caused a range of subsequent problems, and in a number of which students' transience played a central role. We mapped how the causes and effects of short-term, irregular, and low participation influenced each other and identified three accelerating feedbacks, which were buffered only by an annual refreshment of the pool of potential new recruits. This mapping illustrated the precarity that the gardens' participants described and felt acutely. Within the diagram we can also find the beginnings of how to intervene to de-accelerate the feedbacks. We recommended that both upstream and downstream solutions should be implemented, and that university and students' union staff could play a crucial and subtle role in supporting students. This could be through creating a hybrid management structure where staff input into specific parts of the garden or at particular times of the year, such as during holidays. Towards the end of the paper, we also drew into question what participants of student-led food gardens learn by taking part, and suggested that the learning might be less to do with ethical and sustainable food choices or food growing, and more to do with, for example, students negotiating their place in large scale transitions towards sustainable food systems as they move into adulthood. We also reflected that student-led food gardens have features that are akin to both temporary and permanent organisations. Short-term stakeholders experienced the gardens through linear conceptions of time, while long-term stakeholders experienced them through cyclical conceptions of time. These dual approaches to and conceptions of time indicated that student-led food gardens, as organisations with transient participants, might actually have an organisational form unique from temporary and permanent organisations. These conflicting understandings of time were

a source of friction, and because the dominating stakeholders were students, "organisational amnesia" was also prevalent, which exacerbated the gardens' precarity.

There is, however, much more that needs to be understood about student-led food gardens, and student-led organisations in general. Therefore, future research could investigate what students learn from these organisations, how they learn what they learn, and whether they are worth the investment they require. Another avenue of further research includes taking a critical perspective on student-led food gardens: who do they benefit, and how great are the benefits? Furthermore, the literature about temporary organisations may also be able to offer further insights into the role of long-term stakeholders in maintaining continuity and retaining knowledge in organisations with transient participants. Examining these questions and issues will help to provide a better understanding of how we can navigate a more stable and long-lasting path for pro-sustainability organisations in an increasingly transient world.

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