Graduate Program in Sustainability Science
Global Leadership Initiative
Graduate School of Frontier Sciences
THE UNIVERSITY OF TOKYO

2022

Master's Thesis

Ecological Homemaking: Houseplants in University Students' Homemaking Practices During the COVID-19 Pandemic

Submitted 20 July 2022

Adviser: Professor Makoto Yokohari

Benjamin C. Effinger

1.0 Introduction

Assemblages and their composite relationships—fluid and perpetually in flux—react, often in unexpected ways, to even the smallest stimuli. They bend, break, shift, and emerge in response to activities and agencies within and outside their networks. Indeed, heterogeneous indeterminacy is perhaps the defining characteristic of the assemblage (Tsing, 2015). It is for this reason that putting a definition on the term proves elusive and, at times, constraining as detail is replaced with diluted characteristics. With this problem in mind, Marcus & Saka (2006) broadly define the assemblage as "a material, structure-like formation, a describable product of emergent social conditions, a configuration of relationships among diverse sites and things" (p. 102). It is important to highlight, here, the temporal instability of assemblages: they "coalesce, change, and dissolve" in relatively short timescales (Tsing, 2015, p. 126). Transience should not be misconstrued as insignificance, however. On the contrary, assemblages are, in their abundance and scales, world-making. From this, I turn to one of the most consequential assemblages of the twenty-first century: the coronavirus pandemic.

The ongoing coronavirus pandemic (henceforth, the pandemic) is self-evidently an assemblage. Moreover, it is a multispecies assemblage composed of a diversity of bound beings, places, systems, and histories through a complicated density of cross-species interconnection (Kirksey, 2020). A zoonotic virus, termed severe acute respiratory syndrome coronavirus 2 (henceforth, SARS-CoV-2), made the leap to humans—potentially from a species of bat (see Carvalho et al., 2021)—as a consequence of the historically-embedded interactions between humans and nonhumans in large-scale animal agriculture. SARS-CoV-2 was then transported across the world by their human companions, going on to confine billions, infect over five hundred million, and kill over six million people at the time of writing in July 2022 (Coronavirus Resource Center, 2022). As with many of the Anthropocene's events, the pandemic emerged as a result of complicated socio-ecological relationships between humans and nonhumans. One should anticipate that such a far-reaching, world-remaking multispecies assemblage, with its tentacles embedded in nearly every part of the social world, would reshape other assemblages in rather unexpected ways.

In all their mundane and other-worldly wonder, houseplants are changing. Or, to be more precise, domestic multispecies assemblages between humans and houseplants *have been* changing. Domestic multispecies assemblages between humans and houseplants were never static nor monolithic; they have, historically, been quite the opposite. Confining houseplants to a specific definition is problematic, not for the diversity of flora that can be

housed, but for the very places which houseplants dwell within: the home. Homes are as diverse as the individuals who live and (home)make; they are defined not by their physical structure, but by the interplay between the material and the imaginary, constituted primarily on the basis of a homemaker's identity (Blunt & Dowling, 2006). Mallet (2004) considers the home to be a place shaped primarily by the socio-cultural relationships a homemaker experiences with myriad peoples, places, spaces, and things. Houseplant are thus entangled in a co-constitutive relationship with the home, explaining the dynamic and ever-evolving nature of both houseplant and home (see Walker, 2002). Although this messy relationship confounds a strict definition on what might be termed a houseplant, for the purposes of this thesis, a houseplant will be considered any plant located within the indoor homespaces or indoor-outdoor intermediary spaces like balconies or porches. Plants found in outdoor homespaces like that of the garden or the lawn embody a divergent relationship than those in indoor homespaces because of the interaction between outdoor plants, homemaker, and those naturally occuring ecological processes that are not necessarily present indoors.

Houseplants emerged across the world in ancient societies such as Sumeria, China, and Greece. The houseplant industry in its contemporary form, however, has its roots in Renaissance Europe where the upper classes in countries like the Netherlands would pay exorbitant amounts of money for the transportation of tropical plants from their native ecosystems back to Europe (Chen et al., 2010). It would not be until the advent of the wardian case—the predecessor of the modern glass terrarium—in Victorian England that the importation of tropical plants would become financially accessible to the middle classes and thus enter the mainstream of European homemaking (Chen et al., 2010; Horwood, 2020a). The availability of houseplants dramatically reshaped middle class homes in England and other parts of Europe; decorations such as foliage-filled fireplaces and rooms such as the greenhouse became commonplace (Horwood, 2020a). Houseplants remained in fashion for centuries until the late 20th century. Decline in the houseplant industry in the late 20th century can be attributed to a variety of factors, although houseplant historian Horwood (2020a) argues that the entering of women into the workforce meant houseplants an unnecessary form of additional domestic work. It would not be until the 2010s that societal changes like social media and the exclusion of young people in garden ownership would push houseplants back into the mainstream in an unprecedented way (Horwood, 2020a). Houseplants were back and in more homes than ever by the end of the 2010s.

However, since the beginning of the pandemic, the trajectory of said relations has adjusted yet further, this time in an even more dramatic way. Several cities throughout the

world have experienced a rapid expansion in houseplant sales during the early months of the pandemic compared to previous years: Australian indoor plant sales grew 9% during the first year of the pandemic (Carter, 2021), British houseplant retailer Patch saw a sales increase of 500% during the first lockdown in 2020 (Horwood, 2020b), the growth in houseplant sales in Tokyo's Wholesale Market significantly outpaced the growth of aggregated plant sales throughout the 2020 portion of the pandemic (see Figure 1). Journalists and academics began to notice and report on these changes during the middle to latter half of 2020, terming this surge in demand for and changing relationships with houseplants the 'plant boom' (Taylor, 2020) amongst others. These articles' motifs on the causes of the plant boom have included the movement towards self-perceptions of plant parenthood (see Carabelli, 2020; Lasco, 2020), the importance of perceived mental health benefits of indoor plants (see Taylor, 2020; Lee, 2021), and the impact of social media 'plantfluencers' (see Carabelli, 2020; Horwood, 2020b; Sullivan, 2021). Scholarly articles have sometimes supported and at other times provided rebuttals to the suppositions of early commentaries. An international survey of 4,205 individuals finds that 73.5% of household respondents have indoor plants, with 12.1% of household respondents reporting that they have more than ten indoor plants, but that outdoor plants were preferred to indoor plants (Pérez-Urrestarazu et al., 2021). Carabelli's (2021) qualitative study of human-houseplant relationships during the pandemic through a series of interviews highlights the intimate acts of caring *with* houseplants through the period of social isolation and how such activities are shifting the discourse around plant ownership on social media. Sunga & Advincula (2021) describe the changing language used to describe relationships between human and houseplant during the pandemic in the Philippines wherein the terms '*plantito*' (literally, plant uncle) and '*plantita*' (literally, plant aunt) have become mainstream during the pandemic, paralleling the use of the terms 'plant parent' and 'plant baby' in some English-speaking societies. Focusing further, it is important to note that this interaction between human-houseplant assemblages and the coronavirus pandemic is primarily emerging in the homespaces of young adults. Pérez-Urrestarazu et al. (2021) find that respondents' reported preference for having an increased number of houseplants during the coronavirus pandemic decreases with age. Despite the diversity of settings and stories from this body of scholarly and non-scholarly work, a theme has emerged: human-houseplant assemblages and the coronavirus pandemic have become deeply entwined in the lived experiences of many people and plants.

It's essential to understand the pandemic and the plant boom in the context of a wider social and public health trend: widespread chronic loneliness. The pandemic acts as an acute

stressor, wherein social isolation strengthens feelings of loneliness and can disconnect lonely individuals from their already inadequate social networks. First year university students in Japan have reported higher rates of detachment with reality, potentially caused by the increased use of distance-learning in the face of the pandemic (Horita et al., 2021). However, the issue of loneliness has often been overlooked in the context of economic and political issues of the pandemic. An article published in *The Lancet* in 2018 starkly frames the importance of this public health crisis:

> Imagine a condition that makes a person irritable, depressed, and self-centred, and is associated with a 26% increase in the risk of premature mortality. Imagine too that in industrialised countries around a third of people are affected by this condition, with one person in 12 affected severely, and that these proportions are increasing. [...] Such a condition exists—loneliness (Cacioppo & Cacioppo, 2018, p. 426).

An epidemic of loneliness is quickly threatening the wellbeing of both individuals and societies across industrialised countries with several countries making concrete policy responses. In 2018, then British Prime Minister Theresa May launched the Loneliness Strategy, bringing together the National Health Service, private enterprise, local governments, and communities together to tackle the loneliness epidemic (Prime Minister's Office et al., 2018). Then Japanese Prime Minister Yoshihide Suga established the Ministry of Loneliness in 2021 in direct response to the first rise in suicide rates in 11 years during 2020 (Kodama, 2021). Amongst university students in Japan, the number of suicide victims increased between October 2020 and October 2021 with the increase reporeted to be 39.9% in male students and 82.6% in female students (Fushimi, 2021). Such policy measures align to the magnitude of the threat. Isolation markedly affects the neurobiology in both children and adults with adverse effects for both individuals and societies (Bzdok & Dunbar, 2020). How to combat loneliness is a difficult issue, made even more difficult within the timeframe of the pandemic.

An intriguing intersection arises between the plant boom, loneliness, and the pandemic: young people. This interest in houseplants amongst young people is not a new phenomenon (see Horwood, 2020a); young people's affinity for houseplants during and before the pandemic speaks to the continuation of a wider socio-economic inequality. Knuth et al. (2021) attributes the 'high appreciation' of houseplants amongst 18-34 year-olds to the plants' ability to be grown in urban environments without the need of a garden. Horwood (2020) points to the generational divide of access to shapeable outdoor space, whereby the

millennial generation—and, by extension, generation Z—do not have those outdoor spaces such as gardens or lawns that they are able to actively shape and make their own in comparison to older generations. This is especially concerning in the context of the body of literature showing the physical and mental health benefits of greenspace access and use (see Twohig-Bennett & Jones, 2018; Zhang et al., 2021). The pandemic further exacerbated this generational inequality by limiting access to public outdoor spaces (Reis et al., 2020; Bulgari et al., 2021) and increasing social isolation and stress (Pietrabissa & Simpson, 2020; Bezerra et al., 2020; Horita et al., 2021). Bezerra et al.'s (2020) survey of over sixteen thousand individuals in Brazil finds that a majority of people with access to private, open spaces thought that such spaces significantly helped them during pandemic-related periods of isolation. Pérez-Urrestarazu et al. (2021), furthermore, report that 73.7% of respondents were of the opinion that the presence of vegetation at home during periods of isolation in the pandemic benefited their mood. Periods of social isolation during the pandemic disproportionately affected young people due to the generational inequality in access to private and/or accessible greenspace. It's possible that factors such as this contributed to the worsening of widespread loneliness during the coronavirus pandemic, although large, longitudinal studies would be required to confirm this.

Pietrabissa & Simpson (2020) emphasise that the coronavirus pandemic "will inevitably lead to redefining our relationship styles" (p. 3), however, the manner(s) in which relationships are changing and will continue to change are yet unclear. What is nevertheless clear is that it is not only those human-human social relationships that are changing. Indeed, our relationships with nonhumans and the natural world are also shifting. On the back of this understanding and amongst the context of the plant boom, this thesis posits: *What is the social phenomenon underpinning the utilisation of houseplants in some university students' homemaking practices, particularly during the COVID-19 pandemic?* This thesis makes use of several qualitative methodologies including interviews and an online mixed survey to gather data and utilises thematic narrative analysis and statistical analysis to analyse the collected data and report findings. In answering the central research question, this thesis finds that living alone is a statistically significant factor in the purchase and care of houseplants amongst some university students in Japan. Furthermore, this thesis proposes the social theory of ecological homemaking, which can be defined as the praxis of crafting belonging through intimate care between human inhabitant(s) and a network of nonhuman cohabitants. Ecological homemaking can be illustrated through three themes: mutual care, making kin,

and rooting. Findings of this thesis are then positioned in the context of widespread chronic loneliness in and outside of Japan.

2.0 Research Framework

2.1 Central Research Question, Aims, and Objectives

As stated above, this thesis seeks to understand the social phenomenon underpinning the utilisation of houseplants in some university students' homemaking practices, particularly during the COVID-19 pandemic. Several words and phrases within this question require further specificity as they ultimately guide the nature of this research. The term 'social phenomenon' may refer to any number of processes or happenings in the social realm. Phenomenology as a philosophical discipline characteristically concerns itself with phenomena as lived experience: the primal, relational existence through which meaning is given. "The phenomenological gesture is to lift up and bring into focus with language any such raw moment of lived experience and orient to the living meanings that arise in the experience" (Manen, 2017, p. 812). If phenomena are raw, lived experiences providing meaning, then social phenomena are the lived experiences and happenings at the scale of society. The 'social phenomenon underpinning the utilisation of houseplants' is thus that collection of lived experiences of which the plant boom is composed; it is a series of narratives. The use of 'some' in the phrase 'in some university students' specifically denotes the limitations of an ontology which argues for attention to detail and an epistemology which seeks to give attention to detail by analysing the lived experience of a specific population. It would be disingenuous to argue that the findings of this research project could be applied widely given the philosophical bases on which the conclusions will be drawn. Using the term 'homemaking practices' serves to orient the question onto the home. Homemaking is a spatial performance of crafting "a particular type of attachment to place, community and belonging" (Sandu, 2013, p. 500). By using the term 'homemaking' to describe the utilisation of houseplants, this research project presumes that houseplant ownership during the coronavirus pandemic necessarily has a basis in place attachment and belonging. This assumption is made based upon the existing literature (see Section 1.0) and findings from the unstructured interviews (see Section 3.1).

The central aim of this thesis is to propose a theory explaining the phenomenon underpinning the use of houseplants by some university students in Japan. To meet this aim, this thesis has three central objectives:

1. To describe the common themes from university students' lived experiences and stories surrounding houseplants in the coronavirus pandemic.
2. To identify those factors which drove some university students in Japan to purchase houseplants during the coronavirus pandemic.
3. To apply the perspective of homemaking to the care of houseplants during the coronavirus pandemic.

Themes are useful to understanding social phenomena in that they describe a narrative; they embody multiple lived experiences by describing commonalities in various sequences of events that single stories are unable to necessarily provide. The first objective is primarily responsible for meeting the central aim of this thesis as themes which emerge from analysis will be able to elucidate and communicate the social phenomenon underpinning houseplant use. The factors which the second objective seeks to identify are not meant to be representative of the stories of all university students. These factors are, instead, a method of gaining understanding of the material, social, and psychological dimensions of houseplant ownership during the pandemic. Lastly, utilising the perspective of homemaking to understand and describe the care of houseplants serves to ground the research in a theoretical perspective. Such a perspective aids the researcher in constructing and conducting the research.

2.1 Ontology and Epistemology

Transdisciplinary research necessitates a methodology grounded in a well defined ontology and epistemology. Without one or both of these bases, the interdisciplinary research process can easily find itself with a set of competing or contradictory fundamental assumptions, undermining its overall academic value.

Although 'university students' are the primary human participant, they are not the primary unit of study that this thesis seeks to understand. The primary unit of study is instead the interactions between university student and houseplant—in other words, domestic multispecies assemblages. Assemblages are characterised by their constant state of happening and interwoven relations. They are phenomena with a particularly emphasised perspective on the interwoven flow. Researching assemblages is, to say plainly, dazing. Assemblage thinking requires "looking for relationships more than looking at things; seeking to understand how synergies and flows work" (Dovey et al., 2018, p. 265). Despite justified critiques of assemblage thinking's prolific use of "jargon and neologism", Dovey et al. (2018) argue that assemblage thinking as a tool of wider research is necessary for innovation and

transformation (p. 266). Assemblage thinking enables the researcher to observe and engage with complex social and political phenomena and consequent world-(re)making relations between the material, the human, and the nonhuman (Maalsen, 2020). In line with other studies in the field of home studies, and given that the primary unit of study is domestic multispecies assemblages, this methodology from the perspective of assemblage thinking: prioritising the observation and understanding of relationships, flows, and phenomena.

Some primary peer-reviewed papers have been published on the subject of indoor houseplant use during the coronavirus pandemic since its onset. These papers have been published from several different disciplines and have utilised radically different methodologies. An international online survey of 4,205 individuals by Pérez-Urrestarazu et al. (2021) provided several insights and discoveries for urban engineering from the quantitative data collected. A collection of interviews conducted by the cultural sociologist Carabelli (2021) provides valuable first-hand experiences and opinions from indoor houseplant owners during the pandemic from which affect becomes central. The former paper's methodology seeks out categorical explanations (e.g. explanations which make reference to measurable factors such as demographic data) while the latter prioritises contextual explanations, rendering the former applicable to several contexts and the latter a more precise, in-depth understanding. By situating a phenomenon within a temporal and social context, a richer and more thorough meaning is created at the price of scalability. While both categorical and contextual explanations offer valuable information with their own ontological caveats, it is the job of the researcher to prioritise one over the other in light of the research question. This research question is primarily studying a social phenomenon in the form of a domestic multispecies assemblage using the perspective of assemblage thinking. Assemblage thinking demands a methodology which prioritises closeness with those sites and things from which the assemblage emerges (Tsing, 2015), and, therefore, this research project has chosen to prioritise contextual explanations over categorical explanations for the purposes of achieving said closeness.

Social science and humanities research has often been criticised for lacking academic rigour because of a comparative vulnerability to the biases of researchers and participants. One methodological scaffolding tool to limit the effects of bias on one's conclusion is the aim of triangulation. Triangulation can be subdivided into several different types based on the two units being concurrently used within the process of research. This research makes use of two types of triangulation: theoretical triangulation and methodological triangulation. Theoretical triangulation can be defined as the use of multiple theories in a single study for the purpose of

increasing research credibility by providing several lenses to support or refute findings, while methodological triangulation refers to the use of two or more methodologies, often both qualitative and quantitative, for the purposes of increasing the study's credibility (Hussein, 2009). Theoretical triangulation is primarily used in the early and later stages of the research process when drafting hypotheses, creating a research framework, and for analysing findings. Methodological triangulation is primarily used during the processes of data collection and data analysis. From an epistemological sense, including triangulation in the research process can be difficult because different theories and methodologies have sometimes wholly divergent and contradictory foundations.

2.2 Research Participants

University students in Japan present an exceptional opportunity to examine the phenomenon of the plant boom during the pandemic. The lack of English academic attention devoted to the relationships between human and houseplant in non-Western contexts is concerning in light of the epidemic of loneliness. Because loneliness plagues Western and non-Western countries alike and because of the potential of houseplants to mitigate isolation and other mental health issues, it is critical that discourse include non-Western contexts. Furthermore, it is clear that university students in Japan have been especially affected by the pandemic. The number of part time jobs held by university students in Japan fell by 45% between 2019 and 2020, compared with only a 9.5% decrease of all part-time jobs in Japan, significantly impacting the financial security and wellbeing of nearly half of working university students (Tsurugano et al., 2021). Furthermore, as discussed above, suicide rates and experiences of isolation amongst university students in Japan became untenably worrisome during the early stages of the pandemic (Fushimi, 2021; Horita et al., 2021). The pre-pandemic relationships between primarily young people and houseplants were also in the midst of change (Horwood, 2020a), suggesting that the plant boom might be a continuation of this change more than an event confined to the early 2020s. For these reasons, this research project will primarily investigate those interactions between houseplant and university students within the context of Japan.

3.0 Methodology

This research project utilises a three step method in the process of data collection: 1) unstructured interviews, 2) online mixed survey, and 3) in-depth semi-structured interviews. Each step provides different insights and were conducted for different purposes while also

limiting the potential effects of bias through methodological triangulation. Furthermore, the findings of each step in the methodology would cascade

3.1 Unstructured Interviews

The first method this research project utilised was that of unstructured interviews. Although the form of unstructured interviews are quite diverse, unstructured interviews are primarily used in the early stages of a research project in an ethnographic fashion. Without a set research and theoretical framework, the researcher conducts the interview without a predefined set of questions or hypotheses; rather, the researcher generates questions and assumptions *in response* to the narration and dialogue between the participant and the researcher (Zhang & Wildemuth, 2016). Unstructured interviews differ from other forms of qualitative inquiry in that they do not limit or predefine the experiences of participants, allowing the participant to freely define and articulate their own social reality (Punch, 1998). Although a researcher will most likely conduct the interview with a specific topic or research question in mind, unstructured interviews are commonly used to help focus and guide the construction of such research framework components as the central research question and hypotheses.

Unstructured interviews were conducted in early 2021 during which Tokyo was placed under a state of emergency due to rapidly rising cases of SARS-CoV-2 in its jurisdiction. The health and safety of participants and the researcher was given high priority in the early processes of this research. Many researchers were forced to adopt socially-distanced methods during the pandemic. Many anthropologists turned to the pre-pandemic method of ethnography-at-a-distance. Ethnography-at-a-distance, first appearing as a method of understanding North Korean society through interviews with North Korean immigrants to the United States, is a method wherein the researcher observes individuals, materials, etc. from a physically or temporally distant context when direct observation is impossible (Eriksen, 2001). Unstructured interviews have often been called ‘ethnographic interviews’ because of the fact that they tend to accompany and mirror observation. In response to the COVID-19 pandemic, this research has chosen to adopt some of the techniques of ethnography-at-a-distance during the unstructured interviews. The interviews were conducted using video call software (e.g. Zoom, Skype) in English. Participants were encouraged to turn on their video camera, but not required. During the interview, if participants talked about specific plants or spaces, the interviewer would encourage the participant to show or submit pictures of the material. With the informed

consent of the participant, recordings of the video call were conducted. Using the software Descript, interviews were then transcribed and coded.

Gathering participants is an exceptionally difficult and resource-intensive process. Sample sizes tend to vary greatly from project to project depending on the length of interviews, the diversity of responses, and other factors. Traditionally, the sample size of unstructured interviews is determined in the midst of interviewing. Because the quality of data does not change with an increase in unstructured interviews' sample size, the researcher stops conducting interviews when interviews stop contributing to the researcher's understanding of the phenomenon—in other words, once saturation is reached (Bihu, 2020). This difficulty is only exacerbated by the pandemic where socially-distancing made gathering participants in-person difficult if not impossible. As a result, the method of sampling can best be described as convenience sampling, whereby a researcher identifies participants through any means necessary to achieve an adequate sample size (Emerson, 2015). Gathering participants was limited to online means and those made accessible through the researcher's informal network. The former was composed of an online group of Japanese adults, both university students and non-students, with the primary purpose of maintaining their English language skills and learning about various international topics like religion, politics, etc. This group had no previous interaction with the researcher and was targeted for its size, its diversity of regions represented across Japan, and the presence of familiarity of participants with video call software. The latter was a diverse group of university students studying at various Japanese universities in the Tokyo Metropolitan Area, Chiba Prefecture, and Ibaraki Prefecture who had either had contact with the researcher outside of the sampling process beforehand or was connected to the researcher by a mutually known individual. Gaining access through these means inevitably leads to sampling bias, specifically undercoverage bias; by choosing to include participants on the basis of connection to the researcher, a variable is introduced that further pulls the sample away from the true population, potentially leading to a misrepresentative sample and conclusion. This is not to say that research reliant on this form of sampling is worthless. Rather, conclusions made using these sampling methods necessitate a clear, accurate, and specific assertion of applicability and scalability. Alone, these unstructured interviews would hold little academic rigour. However, because their primary purpose was to support the construction of the research framework by refining the research question and generating a hypothesis (e.g. ecological homemaking).

3.2 Online Mixed Survey

Although interviews provide a significant amount of data, the information from said data is characteristically high in relative depth and low in relative breadth. This inequality arises as a result of the high amount of resources that conducting an interview requires per participant. To supplement the depth of data provided by both the unstructured and semistructured interviews, this research makes use of an online mixed survey to achieve a greater breadth without creating undue burden. Whereas unstructured interviews were conducted early in the research process to form a basis for the framework, specifically the construction of the hypothesis (i.e. ecological homemaking), the online mixed surveys functioned to test and refine this hypothesis.

Online mixed surveys are characterised, as the name suggests, by the medium through which they are disseminated (i.e. online) and the type of data which they yield (i.e. both qualitative and quantitative). The penultimate reason for conducting an online survey rather than a physically-disseminated survey was for the health and safety of respondents as the survey was conducted in August 2021. Additionally, any survey which was conducted purely in-person would also likely exclude those that were the most vulnerable to the effects of the pandemic (e.g. those with underlying health issues that may limit them to their home and those that were forced to leave university and return home due to the effects of the pandemic). A potential issue with online-based data collection methods is the potential undercoverage bias resulting from the exclusion of those who do not have access or who do not use the internet. Japan, however, has an internet usage rate of around 90% compared with the world average of 60% (World Bank, 2020). Furthermore, access to the internet is even higher amongst young populations such as university students. Given these two factors, the potential impact of undercoverage bias was judged to be relatively insignificant. Speaking on the mixed nature of the survey, the survey undoubtedly prioritised qualitative over quantitative data, although both were collected and analysed. Online surveys have primarily been utilised in various social sciences for their ability to compile large amounts of quantitative data, but Braun et al. (2020) emphasise the potential of qualitative online surveys in the collection of a breadth of experience, generating a more rich and representative understanding than other qualitative methods such as interviews. Because scalable, categorical explanations are not the primary aim of this research project, qualitative data collection was emphasised in the construction of the survey.

The way that a survey is constructed can dramatically affect the results of said survey (see Chan et al., 2015). In all, this survey included 31 questions divided into one section on

informed consent, three sections on survey questions, and one section on participant notes on/opinions of the survey (see Table 1). Not including questions related to informed consent, demographic questions, and respondent opinion on the survey, five questions collected quantitative data and fourteen questions collected qualitative data. Two questions at the beginning of the survey related to informed consent. Participants were provided with some context and the purpose of the survey, contact information of the researcher, a brief description of the target group, basic information on the survey contents and instructions, and information on the data and privacy rights of the respondent. Respondents were informed that they may withdraw from the survey at any time by either not submitting the survey or by contacting the researcher after submission of the survey, that their survey submission would be anonymous unless they chose to leave their email in *Q*#4.2 or used their real name in the survey responses, and that they were able to submit the survey partially or with answers left blank excluding those questions relating to informed consent and *Q*#1.8. As recommended by Braun et al. (2020), a personal introduction and statement of appreciation was provided in the introduction to encourage full and honest responses. Seven questions asked for various demographic information relating to gender, living situation during the pandemic, age, etc. Two questions directly following demographic questions related to whether the respondent had any houseplants at any point during the pandemic (*Q*#1.8) and the numerical number of houseplants that the respondent had before the onset of the pandemic (*Q*#1.9). A specific definition of 'houseplant' was provided to avoid confusion, but a temporally fluid definition of 'COVID-19 pandemic' was provided in line with the diversity of timescales that the pandemic embodied throughout both Japan and the world. Depending on the the answer to *Q*#1.8, the respondent would be directed to one of two pages. If the respondent either answered that they did not have houseplants during the pandemic or that they prefer not to respond, they would be directed to section two. Section two posed questions related to the respondents' opinions on houseplant ownership, specifically the reasons that they did not have houseplants during the pandemic. If the respondent answered that they did have houseplants during the pandemic, they would be directed to section three. Section three posed questions related to respondents' experiences and opinions of houseplant ownership during the pandemic. Section three primarily made use of multiple-choice questions or Likert-scale response questions accompanied with open-ended response questions. This two-form response pairing placed an explicit answer (i.e. 'yes' or 'no') within a wider story that the respondent could then articulate and use to contextualise their earlier answer. Long-answer questions explicitly emphasised the importance of detail by writing '*Please explain your*

answer to question X in detail' in the description box directly below the question. *Q*#3.8 and *Q*#3.9 both pose questions related to the respondent's mental wellbeing, with the former using a Likert scale and the latter requesting a long-answer expanding on the previous answer. Survey questions which ask respondents to measure their subjective mental wellbeing are susceptible to social desirability bias, a form of bias wherein levels of mental wellbeing are inflated as result of the societal pressure to only communicate positive emotions (Caputo, 2017). By asking for a long-answer response in detail, the researcher is able to more accurately evaluate the perceived effects of houseplants on respondents' mental wellbeing. After completing either section two or three, the respondent would be directed to section four. Section four was composed of two questions: *Q*#4.1 was an open-ended space where the respondent was able to leave a note, comment, question for the researcher or expand on the answers in the survey and *Q*#4.2 was a non-compulsory space where the respondent was able to leave their email if they would be open to taking part in later stages of the research process.

In a similar way to the unstructured interviews, accessing research participants was exceptionally difficult during this stage of the research process as the number of infected individuals and infection rates were concerningly high. The snowball sampling method was accordingly used whereby the researcher asks known individuals (e.g. friends, colleagues, social media followers) to disseminate the material to other known individuals (Emerson, 2015). In comparison to the convenience sampling used in the collection of participants for unstructured interviews, snowball sampling enables the researcher to more easily gather a larger sample size without having to directly know and contact the potential respondent. Nevertheless, snowball sampling may also lead to undercoverage bias by allowing the overrepresentation of a certain socioeconomic group, ethnicity, etc. and self-selection bias by including only those who are willing to voluntarily participate in the survey. The dissemination of this survey was conducted by providing a digital flyer with a QR code students at the University of Tokyo, students at the University of Tsukuba, and via several posts on the social media platforms Instagram and Twitter. Additionally, in the survey information, respondents were asked to send the survey to any person that they believe the survey applied to given the summary of the target group. Because the researcher does not have control over who responds to the survey, this method of sampling requires post-collection selection of respondents. For example, respondents who indicate that they were not university students during the pandemic or who did not live in Japan during the pandemic would not be included within the analysis. The survey was constructed and

conducted using the Google Forms interface. The survey was carried out in English only. Although English proficiency in Japan is low in comparison to other wealthy nations in Asia, Japanese university students tend to have high levels of proficiency in written English (Fukuzawa, 2016). A native Japanese speaker assisted in the English wording of the survey to ensure ease of comprehension and response for non-native English speakers in Japan, and the survey was trialled a total of three times on 26 native and non-native English speakers before being conducted.

3.3 Semi-structured Interviews

The final step of this research's methodology is that of semi-structured interviews. In contrast to unstructured interviews, semi-structured interviews are more focused and are primarily shaped by the frame of the interviewer (McIntosh & Morse, 2015). Semi-structured interviews are commonly based upon a phenomenological ontology and epistemology and, consequently, look to gather subjective understanding about a topic where the objective information is already known. The interviewer sets a detailed schedule with specific questions to ask in order to meet specific goals. Questions tend to be open-ended and interviewees are welcome to respond in the way they see fit, the answers of which the interviewer may probe if more detail is required. Semi-structured interviews can be divided into several types dependent upon the specific goal and accompanying schedule of the interview. This research made use of confirmative semi-structured interviews which centres the theoretical frame and assumptions of the researcher in the interview in a test against the interviewee's perspectives and experiences (McIntosh & Morse, 2015).

Semi-structured interviews were conducted in English following the analysis of the results of the online mixed survey and the set interview schedule reflected the findings of said survey. Semi-structured interviews were conducted using English, although Japanese words and phrases were accepted as well (e.g. the names of plants). Unlike the unstructured interviews, the semi-structured interviews were conducted in February to April of 2022 when the coronavirus pandemic was significantly less threatening due to the roll out of the vaccination program in Japan. Semi-structured interviews were thus offered to be conducted in-person or online with the decision left to the preference of the interviewee, of which two requested an in-person interview and one requested an online interview. Online interviews were conducted in the same way as unstructured interviews, via Zoom. In-person interviews were conducted in outdoor public spaces to reduce the chance of infection.

The primary purpose of these semi-structured interviews, as alluded to above, was the confirmation of the theory of ecological homemaking constructed during the unstructured

interviews and refined and tested during the online mixed survey. Several themes emerged in both the unstructured interview and online mixed survey stages that required additional probing and questioning to ensure that the researcher's understanding of these themes were accurate and shaped primarily by the stories of participants rather than by the researcher's own biases. Additionally, semi-structured interviews functioned to check the saturation level of the research process. A significant amount of qualitative interview and survey data had already been collected prior to conducting semi-structured interviews. As Francis et al. (2010) explain, once a researcher believes saturation has been reached, a qualitative study should include approximately three additional participants to confirm that saturation has been reached. Unless those participants' stories were to contradict the unstructured interviews and survey findings or introduce new themes not already identified, the sample size of the semi-structured interviews were set at three. Using a snowball sampling method, the researcher contacted those who had previously taken part in the research and voluntarily left their contact information and asked them to send a flyer to their contacts looking for semi-structured interview participants. The researcher then randomly selected three participants from those who made contact and conducted the interviews using a random number generator.

3.4 Analysis

3.4.1 Thematic Narrative Analysis

Qualitative analysis is necessarily flexible and is designed in-line with various aspects of the research framework and the data-collection method. Because both the central research question and aim emphasise the study of phenomena; because the method of data collection yields a significant amount of long, open-ended response-based qualitative data; and because phenomenological and assemblage thinking form the philosophical bases of this research project, the method of analysis used is thematic narrative analysis.

Narrative analysis is a loosely bound group of methodologies which, in the social sciences, can be vaguely identified for its choice to attend to the narrative structure—that is to say, those sequences of events and interjections that compose the story—of interview or other qualitative data (Kleres, 2011). Narrative analysis, unlike other modes of study, notices how narration is employed by participants in order to make sense of their own lived experiences, not only for the purposes of communication but also for the purpose of self-understanding (Burck, 2005). Thematic narrative analysis is a type of narrative analysis which focuses on those narrative constructions which reflect social meaning; it examines narrative(s) from one or more participants and extracts patterns (i.e. themes) that overarch said narratives (Raine,

2020). When taken from a medium to large sample size, these themes can illustrate social phenomena from participants' perspectives. There are several advantages to centering the perspectives of participants in researching assemblages. Assemblages, in their scale-transcending nature, are difficult to ground. By conjuring the scale of the global assemblage, one can lose the local patterns of world-making that the assemblage undertakes (Tsing, 2004). Assemblage thinkers have thus tended to study assemblages with a bottom-up perspective: creating upper-scale meaning from lower-scale perspectives and lived experiences (see Tsing, 2015; Swanson, 2015). The interaction between multispecies domestic assemblages and the global assemblage of the coronavirus pandemic—if one can even divide the two—present the need for bottom-up analysis. Understanding can be generated from the lived experiences of individuals within those assemblages. Thematic narrative analysis pulls themes from the lower-scales of individual homemakers to generate a communicable sequence of events that the assemblages undertake.

There is no one accepted method for conducting thematic narrative analysis. Both qualitative and quantitative methods exist for extracting themes. While quantitative thematic narrative analysis is useful for generating themes from large amounts of narrative data that would otherwise be pragmatically impossible given the time resources for analysis, qualitative thematic narrative analysis generates a deeper understanding of the sequences and meanings within the various processes at play. This research employs a relatively normal method of qualitative thematic narrative analysis whereby the narratives are coded for repeating words, phrases, and sequences of events and then compared and contrasted. One limitation of this form of qualitative analysis is that it can quickly eliminate participation in the knowledge-making process by replacing emotional narration with emotion-less themes (Kleres, 2011; Raine, 2020). In light of this issue, this research will make use of participant stories to communicate and illustrate the lived experiences that inform the themes generated from thematic analysis. This method of sharing findings restructures the power dynamic in favour of the research subject, making participants active in the process of knowledge-making (Simons, 2009).

3.4.2 Quantitative Analysis

A small amount of quantitative data was collected during the online mixed survey. Although this data was not the focus of the survey, it is still analysed for the purpose of generating and communicating small findings about the population being studied. Several basic statistical tests (e.g. two-tailed t-tests, ANOVA tests, etc.) were conducted depending on the specific data collected. For hypotheses analysed using a statistical test resulting in a

p-value, the α-value was set to 0.05, meaning that any *p*-value less than 0.05 would be considered to have statistical significance.

4.0 Results

4.1 Factors Driving Houseplant Purchases

Prior to listening to and analysing unstructured interviewees' stories and lived experience of adopting, dwelling with, and caring for their botanical companions, no clear predictions or hypotheses were yet constructed (see Section 3.1). The recorded stories of learning about houseplants, making the choice to purchase one or more houseplants, and the act of caring with plants were as diverse as the participants and their houseplants. Unstructured interviews were coded to identify repeating factors. Five recurring factors were identified from this analysis: 1) participant perceptions that houseplants are beneficial to human mental well-being; 2) attachment to individuals, species, families, or non-scientific groupings of plants; 3) preference for homes with houseplants due to their aesthetic value; 4) consuming or interacting with houseplant-related social media; and 5) living alone. These factors were then tested, both qualitatively and quantitatively, in the online mixed survey. Participant quotes are provided to contextualise data with participant lived experiences.

4.1.1 Effect of Perceived Benefits to Mental Well-being

Interactions with nature were not confined or necessarily found within the homespace during the pandemic. Domestic multispecies assemblages represent only a portion of human interaction with nature during the pandemic. Urban greenspace, particularly nature parks, usage increased in Hong Kong, Singapore, Tokyo, and Seoul during the pandemic (Lu et al., 2021). In Tokyo, a survey of 1,423 urban greenspace users in June 2020 found that 61% of respondents report that urban greenspace contributed to relieving anxiety and stress and that 26% of respondents reported decreased feelings of loneliness despite refraining from communication during the emergency period (Yamazaki et al., 2021). Many of the unstructured interview participants discussed how they intentionally or unintentionally spent more time outdoors during the 2020 pandemic period:

> "I got back into doing a walk every afternoon. I'd go out for at least an hour and just walk around. We've got a business park just behind where we live. It's got a really nice lake with a really nice path with green grass. [...] I'd walk up there and read my book. [...] I did that a lot over lockdown [...] because it was the only thing we could do outside of the house." (Unstructured Interview Participant, May 2021).

For this interviewee, social restrictions and feelings of personal responsibility to spend minimal time in populated public spaces drove them to reconnect with their local greenspace. Similar stories littered the unstructured interviews as participants discussed the importance of including natural elements in their daily routines, particularly during the months of March through August in 2020. Previous studies have found parallels between the beneficial effects of outdoor greenspace and indoor plants on mental wellbeing. Dzhambov et al. (2021) report that houseplants were associated with lower levels of anxiety amongst university students who spent more time at home driven by the perception of being away from home while confined. The quantitative results from the online mixed survey, due to low power resulting from a small sample size, neither refute nor support the findings of Dzhambov et al. (2021) or Pérez-Urrestarazu et al. (2021) (see Table 2; Table 3). Responses from *Q*#3.8 (see Table 1) were nearly divided in half between those who were of the opinion that houseplants did and did not have an effect on their mental well-being during the pandemic with a mean of 3.1818 on a 1 - 5 Likert scale question (see Table 2). To avoid confusion, a definition of mental well-being was provided in the description of the question (see Table 1). Long-answer responses to *Q*#3.9 showed a further divide in respondents' opinions between those who believed that houseplants had no effect on their mental wellbeing, those who believed houseplants had a positive effect on their mental wellbeing, and those who believed houseplants had a negative effect on their mental wellbeing. One respondent writes:

> "[Houseplants] were something to look after and focus [my attention] away from other issues in the house (decoration/happiness with the general state of repair of my house). It was pleasing to see them grow with little input from me." (Online Mixed Survey Participant, August 2021).

This characterisation of houseplants as a form of distraction from other stressors reflects the well-documented ability of houseplants to reduce feelings of anxiety and stress on observers and caretakers during the COVID-19 pandemic (see Reis et al., 2020; Dzhambov et al., 2021; Pérez-Urrestarazu et al., 2021). The respondent's choice to mention the ability of houseplant 'grow with little input' might point to the restorative qualities of soft fascination, wherein seeing change in an individual's surroundings can generate a feeling of being away while being confined to the home (Dzhambov et al., 2021). This opinion is in direct contrast to the opinions of other respondents.

> "[Houseplants] do not have any greater significance to me than their simple existence. The garden, park and the open countryside nearby, in terms of plants, have helped my mental well-being much more." (Online Mixed Survey Participant, August 2021).

It is clear that the perceived impacts of houseplants on university students' mental wellbeing during the COVID-19 pandemic is highly individualised. Some individuals describe ambivalence towards their houseplants while others describe a significant, noticeable relationship between their houseplants and their mental well-being.

4.1.2 Effect of Attachment to Houseplants

During the unstructured interview, several participants weaved stories of specific individuals, species, families, or non-scientific groupings of houseplants that they had, through various life-stories, developed an affection for. Specifically, twelve interviewees (57%) described an attachment to their houseplants. Antonsich (2010) describes the interplay between belonging and place attachment, and that finding feelings of 'home' necessitate feelings of belonging that arise from place attachment. In Sjoholm's (2004) narrative of her Cleopatra begonia, she writes "I'd had it longer than any pair of shoes, any set of opinions, certainly any lover. I had this begonia before my hair was streaked with white, before my right knee began to creak, when I was young and full of dreams about writing and publishing. Surely that shared history should count for something" (p. 9). She found belonging in attachment to a time and place through her begonia, a feeling which helped to ground her despite her traveller lifestyle. One participant, in describing the reason for having houseplants, told the life-story of her deceased avocado plant:

> "When I was growing up, we had an avocado tree that was bigger than our house. [...] So, I thought, I really like avocados so maybe I can have my own little tree. [...] Yeah, it was a fun little project. I bought an avocado, I ate it, then I put it in the water. And, you know, I'm in Japan. Maybe I have the time… Little did I know, little did I know." (Unstructured Interview Participant, April 2021).

As an international student from South America, this respondent described a lacking sense of home during her time in Japan. They decorated their home with pieces from their home country and their past social relationships to generate feelings of belonging. Sandu (2013) describes transnational homemaking as "practices of remembering: books, 'ornaments', furniture, pictures, textiles, ceramics, plants in different forms and shapes represent childhood memories and memories from a previous lived experience" (p. 502). An avocado plant fit

nicely into their transnational homemaking practice as it was an interactive piece of her remembered concept of home readily available at many Japanese supermarkets. In *Q*#3.4 of the online mixed survey (see Table 1), respondents were nearly evenly divided between those who reported placing significance on houseplants (47.6% of respondents) and those who did not place significance on houseplants (52.4% of respondents) (see Table 2). One respondent expanded on their attachment to the the family Lamiaceae (i.e. the mint family):

> "Yes. I take care of them all but I prefer one the most, because it has a very nice smell. The plant [is] called 'Basil.' If I don't have 'Basil', I take care of Mint instead. It has a nice smell as well." (Online Mixed Survey Respondent, August 2021).

This is one of the few responses which directly made reference to the sensory interaction between homemaker and houseplant. The olfactory sense drove a specific kind of attachment between this individual and the houseplant. For other responses which related their attachment to specific plants, they all noted the impact of the visual aesthetic of specific houseplants on their attachment to said houseplants. Mirroring the interplay between the material and imaginary notions of the home (see Blunt & Dowling, 2006), houseplants are both an imagined construction of their being-ness and the material reality perceived and given meaning through the senses. Attachment to individuals or groups of houseplants appear to impact the choice to buy and/or raise those specific plants, although it is still unclear if attachment to plants actually influences the choice to purchase a houseplant or not.

4.1.3 Effect of Preference for the Aesthetic Qualities of Houseplants

The presence of greenery within the homespace has been a staple in homes for decades if not centuries (see Horwood, 2020a). Interior spaces which include plants in their design are preferred to interior spaces which do not include plants, further dependent on the visual and olfactory stimuli of the plants (Qin et al., 2013). Acknowledgement of the aesthetic value of indoor plants in interior design has even contributed to a new wave of interior design principles inspired by landscape design (Qiu, 2018). Pérez-Urrestarazu et al. (2021) reports that there is a clear preference towards indoor plants in the home during the COVID-19 pandemic, however this only remained the case insofar as those participants who did not actively have access to outdoor spaces like gardens or lawns during the pandemic. During unstructured interviews, 54% of interviewees mentioned or discussed in-depth their opinion of the aesthetic value of houseplants during the pandemic. One interviewee compared her perception of houses with and without houseplants:

> "[Houseplants] literally symbolise life. If you enter a house that has plants you feel 'wow, nice.' It's welcoming. There is life. There is care. There is love." (Unstructured Interview Participant, April 2021).

This participant explicitly draws a connection between the visual presence of houseplants with a set of constructed ideas of the home (i.e. 'welcoming', 'life', 'care', 'love'). Although, in terms of design, houseplants might be understood to occupy a similar place as decorations or furniture, homes with houseplants are constructed, for this participant, as something more. A respondent from the online mixed survey expands on this idea:

> "[Houseplants] can definitely bring some much needed greenery to the room, which makes a space feel more homey and inviting. But there is a fine balance between having a good amount of plants, and having so many that your home turns into a jungle." (Online Mixed Survey Respondent, August 2021).

This statement is in line with the findings of Pérez-Urrestarazu et al. (2021) where a few, well-placed houseplants are preferred to many houseplants. Despite an opinion that there is a happy medium between too few and too many houseplants, this respondent maintains a similar opinion to other respondents in that they make a space 'feel more homey and inviting'. In response to *Q*#3.6 (see Table 1), all respondents agreed that houseplants make a home look better (i.e. gave a response of 4 or 5 on a 1 to 5 Likert scale). When long-answer responses from *Q*#3.7 were coded using words associated with belonging (specifically, 'feel at home'/'feel at-home', 'feel like home', and 'homey'/'homely'), 33% of responses explicitly associated the presence of houseplants inside a home with feelings of homelieness. However, there was not a statistically significant difference between the number of houseplants purchased during the pandemic between those respondents who selected 4 and those that selected 5 on the Likert scale in response to *Q*#3.6 (see Table 3). There is nevertheless a clear agreement among this sample that houseplants are preferred to no houseplants in interior design, but this does not appear to be a factor driving the purchasing of houseplants during the COVID-19 pandemic compared to pre-pandemic levels.

4.1.4 Effect of Social Media

The indoor plant market experienced a revival in the 2010s (see Section 1.0). Horticultural historian Catherine Horwood (2020a) argues that this revival was due in-part to the proliferation of houseplants on social media via 'plantfluencers'. Other scholars have noted the impact of social media on perceptions of houseplants and the indoor plant market

during the coronavirus pandemic (see Carabelli, 2021; Sunga & Advincula, 2021). Several participants in the unstructured interviews described their involvement in social media spaces centred on plant care:

> "There's this girl in Brazil that has made a lot of [posts on social media]. […] She explained why she likes cactus so much. She comes from a very dry area of Brazil and the most typical and only plants existing there are cactus. So people often use it as a derogative thing, saying "you only have cactus" as a way of [insulting her]. […] We often appreciate things just on their outside beauty […] and we don't often appreciating the ones that are enduring, resisting, you know, have their essence hidden inside. So this had stuck with me. […] You know? I actually like these plants. Their cool. You know? They're actually nice. So, you know, yeah. Cactus from now on." (Unstructured Interview Participant, April 2021).

Although this participant had never been to South America, the socio-political issues expressed through stories about plants moved them to grow a fondness for cacti. In fact, this participant had developed this fondness during the pandemic because of their ability to spend more time on social media instead of socialising in-person. Their newfound appreciation for the socially imagined organismal biology of cacti drove them to purchase a houseplant for the first time, which quickly became a community of cacti and succulents littered along windowsills. This story of social media is markedly uni-polar: the participant consumed posts made on social media but did not necessarily make their own or interact with the posts. A participant in the semi-structured interview describes their involvement with a online community of university students in Tokyo:

> "[The coronavirus pandemic] was hard. I did not see friends. I did not see family. My friends [in the online community] were the only people I talked to every day. If I saw a plant online that I liked, I would try to find it at [a local home goods store]. […] It became very important to me—spending time talking to them. I spent too much money on plants, way too much money. But now I have all of these [plants] and I feel knowledgeable." (Semi-structured Interview Participant, March 2022).

The online community began during the early months of 2020 in response to the pandemic. It was started by a small group of gardeners from a university in central Tokyo, but it quickly grew to include over three hundred participants. The primary purpose of the group was to connect university students in Tokyo with one another over houseplants and gardening. From

the perspective of this interviewee, the online community supplemented their need to interact and socialise, curbing many of the symptoms of pandemic-induced loneliness and isolation. These stories were not the average and, in fact, were a minority experience throughout the unstructured interviews, online mixed survey, and semi-structured interviews. Responses to *Q*#3.10 were nearly evenly split between those who responded that posts, images, and videos do and do not impact their choice to purchase houseplants with a mean response of 3.05 on a 1 to 5 Likert scale. When tested using an ANOVA test, it was found that no statistically significant association was present between the responses to *Q*#3.10 and the number of houseplants (see Table 3). Given these findings, social media does not appear to be a significant factor in the increased purchasing activities during the plant boom, although there are cases where involvement and consumption of social media do impact purchasing habits.

4.1.5 Effect of Living Alone

Houseplants have been shown to reduce the stressors of pandemic-related isolation (Dzhambov et al., 2021), although the potential association between living alone and purchasing habits of houseplants have not yet been tested. Unlike other factors which pulled from Section 3 of the online mixed survey and was thus limited to those respondents who reported having cared for one or more houseplants during the coronavirus pandemic, the influence of living companions on the number of houseplants pulled from responses in Section 1 of the online mixed survey and consequently enjoyed a larger pool of responses. *Q*#1.8 asked in a multiple-choice format whether the respondent had cared for houseplants at any time during the pandemic. If the response was ‘Yes’, the respondent was then directed to *Q*#3.1 to provide the approximate number of houseplants. More respondents reported having houseplants (n = 42) than those that reported having none (n = 11). The number of houseplants for the true population is most likely not normally distributed. Instead, it is more likely skewed to the right in a similar distribution to the sample distribution (see Figure 2). Z-scores were calculated to identify outliers in the data for the number of houseplants. Two responses had z-scores greater than three. Because these outliers are likely true outliers, two t-tests were performed: one including the outliers and one not including the outliers. *Q*#1.7 asked respondents to select all that apply in respect to their living situation (i.e. ‘living alone’, ‘living with family’, ‘living with spouse or partner’, ‘living with children’, ‘living with a pet’, ‘living with friends or housemates’, ‘homeless’, and ‘other’). The largest response was ‘living alone’ at 46.9% followed by ‘living with family’ at 25% and ‘living with friends’ at 15.6% (see Figure 3). When an independent, one-tailed t-test was conducted on the outlier-exclusive sample (see Table 3), the average number of houseplants of those who

reported living alone (n = 21; $\bar{x}$ = 9.67; SD = 12.47) was statistically significantly higher (p = 0.0184) than the average number of houseplants that reported living with family, living with spouse or partner, living with children, living with pet, or living with friends or housemates (n = 30; $\bar{x}$ = 4.13; SD = 5.60). When an independent, one-tailed t-test was conducted on the outlier-inclusive sample (see Table 3), the average number of houseplants of those who reported living alone (n = 23; $\bar{x}$ = 13.34; SD = 17.04) was also statistically significantly higher (p = 0.0038) than the average number of houseplants that reported living with family, living with spouse or partner, living with children, living with pet, or living with friends or housemates (n = 30; $\bar{x}$ = 4.13; SD = 5.60). It is therefore concluded that living alone is associated with a higher number of houseplants amongst univeristy students in Japan. This finding is even more interesting when contextualised by the interviews and long-answer responses. When asked about feeling isolated during the pandemic, one interviewee described their relationship with a specific plant:

> "It was hard, right? Not seeing friends. […] I have one [houseplant] that my [partner] gave me. If I miss him, I come home and talk to it. […] It helped me feel together with him, even if we could not be in the same room." (Semi-structured Interview Participant, March 2022).

This participant gave personhood to their houseplant and established a significant social relationship with it. Place-belongingness—sometimes referred to feeling 'at home' in and outside of academic spaces—is generated in relation to places, groups of people, cultures, and things, and a lack of place belongingness is characterised by loneliness and/or isolation (Antonsich, 2010). Houseplants are able to fill or supplement these relations during the pandemic: contributing to the making of a place that may elicit memories or feelings of home and supplementing those in-person, reliable relationships made impossible by social distancing measures. For this participant, a houseplant became something to interact with socially when feelings of isolation became particularly acute. Similar stories of forming social relationships with houseplants in direct response to isolation was a common theme throughout the research process. Pulling both from the qualitative and quantitative findings, living alone is concluded to be a driving factor of purchasing houseplants during the pandemic.

4.2 Ecological Homemaking

Unstructured interviews were conducted not only to identify factors driving the plant boom, but also to help construct a hypothesis for testing in later stages of research.

Unstructured interviewees recounted their experiences over the past year (April 2020 to mid 2021) and told stories of isolation, regeneration, and new forms of living. From these dialogues and participant-constructed narratives, a clear image began to emerge: multispecies social relationships were pivotal for many during the pandemic. According to Dooren et al. (2016), multispecies studies is chiefly concerned with developing 'arts of attentiveness'—or, in more descriptive terms, "a practice of getting to know another in their intimate particularity […] and, at the same time, a practice of learning how one might better respond to another, might work to cultivate worlds of mutual flourishing" (p. 17). Arts of attentiveness urges one to notice the relationships between a multitude of living and nonliving beings and systems for the purposes of reimaging more just, equitable, and sustainable relations. Arts of attentiveness are deeply inspired by assemblage thinking and, if one dares, might even be declared a utilitarian branch of assemblage thinking. Using assemblage thinking with a distinctly multispecies and homemaking perspective, a hypothesis was constructed which attempts to explain the plant boom through the phenomenon that might be termed *ecological homemaking*.

Ecological homemaking is the praxis of crafting belonging through intimate care between human inhabitant(s) and a network of nonhuman cohabitants. The use of the term 'homemaking' within this proposed theory refers to two connected yet different meanings of homemaking. Bhatti & Church (2000) conceptualise homemaking to be the "the daily routines and activities rooted in time and space that contribute towards […] creating the domestic sphere" (p. 187). This definition contrasts the more contemporary definition of homemaking as a place-making process that weaves the imagined with the material world to find belonging (Antonsich, 2010; Sandu, 2013). Both are useful tools for understanding the process of ecological homemaking as both a routine activity and one that is bound up in a desire to make a place within which one can belong. Ecological homemaking requires an act of caring, although this act can be neglectful. A homemaker must provide some care for the nonhuman, whether that care be the provision of basic needs or having long-winded conversations with one another. Ecological homemaking necessitates that there be more than one player. At its most basic network, it is a human and a nonhuman, although it often includes many more nonhumans than nonhumans. This network does not necessarily include houseplants and, in fact, it often makes use of animals or other nonhumans. Dogs, for example, have been given significant consideration as to their agency and material and social roles in the lives of humans and the making of worlds (see Haraway, 2003). Cudworth (2021) describes the co-production of homes by humans and their canine companions which she

playfully terms ‘muddied living’ owing to the muddying of species boundaries through cohabitation and the mud that dogs can track into the home. Although these studies rightly notice the agency of animal companion species in the lives of humans and the process of homemaking, both are incomplete as multispecies theory. Botanical companions, both constrained and freed by their evolution into relatively static yet still dynamic beings, require consideration in a different way to animals. Cudworth (2021) poses her theory of muddied living in response to interviews where dogs would independently change or necessitate the change of the material house. Plants do not have such power to move furniture. The homemaker is the space-maker; human inhabitants will, with respect given to their preferences and to the biological needs of the plant, shape the home in such a way that makes space for both the human and nonhuman lifestyles. 22% of online mixed survey respondents reported stressful or otherwise unpleasant emotions from caring for plants:

> “I sometimes think about if [my houseplant] is still alive when I leave it when I travel, or when I leave it with a friend because these are circumstances outside my control. So its health affects my worry a little bit.” (Online Mixed Survey Respondent, August 2021).

Attuning themselves to the lifestyles of plants and making space was quite stressful for this respondent. One participant illustrated their experience of caring for their houseplants as a “constant battle” to understand what the plants needed; move them around the house, give them more or less water or fertiliser, or refrain from over-caring; and arrive back at a stressed plant. By constantly demanding new spatial and routine practices, houseplants passively shape the material home through the homemaker. Houseplants are therefore involved in the homemaking process or, more aptly, houseplants are involved in the domestic multispecies assemblage that coproduces the home. Although similar in its rationale, the focus on animal companion species shaped Cudworth’s (2021) theory of muddied living. The observed, recorded, and analysed phenomenon of houseplant adoption and care during the pandemic consequently is not fully explained by the theory of muddied living. Ecological homemaking attempts to use the framework of muddied living, but expand it to include nonhumans other than canines and refine it to explain the phenomenon at hand.

Approximately 65.6% of participants who took care of houseplants during the pandemic were identified as those who were engaging in ecological homemaking. These individuals were identified by the presence of two or more themes. Ecological homemaking can be illustrated by three recurring themes in the lived experiences of those who adopted and

cared for houseplants during the pandemic: 1) mutual care, 2) making kin, and 3) rooting. These three themes were identified by coding qualitative data from the unstructured interviews, online mixed survey, and semi-structured interviews and analysing said data using thematic narrative analysis.

4.2.1 Mutual Care

In examining the multispecies assemblage of the coronavirus pandemic, independent and perhaps systemic acts of care are made urgent to understanding the relationships between individuals, groups, and societies (Neely & Lopez, 2020). Care is an "everyday interaction, manifested in the form of affirmative micro-politics and affective transmissions, which inject kindness, welfare and integration, generating in turn a shift of values" (Martínez, 2017, p. 348). These values, when in the context of nonhumans, are what West et al. (2018) refer to as relational values—that "normative human sense of connection or kinship with other living things, reflective and expressive of care, identity, belonging and responsibility" (p. 30). Bringing houseplants into the home requires varying levels of care as their biological needs are now required to be met by the homemaker. This relationship is necessary in every home that a houseplant inhabits. Such relationships, however, are unipolar: the act of care is extended from the human to the houseplant. Do houseplants enact care onto their human cohabitants? What might such care look like?

During unstructured interviews, several participants would refer to the emotions that caring for houseplants would generate within them: 'proud', 'happy', 'worry', 'fulfilling' continued to pop-up as participants described their practice of caring for their houseplants. *Q*#3.12 was posed in the online mixed survey to gather a breadth of responses on the feelings that caring for plants generated (see Table 1). The most highly reported emotions were that of 1) 'Calm', 2) 'Happy', and 3) 'Belonging' (see Table 4). Respondents were encouraged to add their own thoughts, feelings, or emotions and expand on them in detail in *Q*#3.12. Of the twelve long-answer responses, two expressed feelings of pride in their achievement of caring for plants successfully and three expressed feelings of stewardship:

> "When I take care of houseplants, I feel like I'm producing O2 and erasing CO2, I use a diesel car but I don't use it much for the environment, I feel like the CO2 that I produce I erase it with my small plants, I know they aren't enough but I do my best to grow more plants up as soon as possible." (Online Mixed Survey Respondent, August 2021).

> "Stewardship - looking after something, or restoring it to health through action." (Online Mixed Survey Respondent, August 2021).

> "Seeing how they grow healthily brings me a sense of fulfilment. There's this sense of responsibility inside of me to take care of my plants." (Online Mixed Survey Respondent, August 2021).

West et al. (2018) defines stewardship, in the field of sustainability science, as "the active shaping of trajectories of social-ecological resilience and change, in ways that are cognizant of complexity and support of social-ecological resilience and human wellbeing" (p. 30). Furthermore, they emphasise the importance of care—specifically "the desire to 'look after' something"—in stewardship (West et al., 2018, p. 30). These three responses demonstrate the connection between houseplants and a wider view of environmental responsibility, specifically the responsibility to look after or care for nonhuman beings. This duty of care to houseplants was a commonality across all three methods and participants. In talking about their reasons for having houseplants, one semi-structured interview participant explains:

> "[Plants more generally] do a lot for us. They keep us cool from the sun, they give us oxygen, they look pretty. I want to give something back for them. [...] When I water [my houseplants] or talk to them, it's like I'm saying 'Thank you'." (Semi-structured Interview Participant, April 2022).

This story illustrates a clear opinion of a bipolar relationship between plant and human. Interestingly, this participant constructs houseplants as a branch of the natural environment. When coded with stewardship-related words and phrases (e.g. 'stewardship', 'responsible'/'responsibility', etc.), discussion of a responsibility to take care of houseplants appeared in approximately 42.5% of all survey respondents and interviewees who had houseplants during the pandemic (see Table 5). Of these participants who demonstrated feelings of stewardship, eleven out of the seventeen (64.5%) described feelings of responsibility in response to the care enacted upon them by the environment, by plants, or by houseplants more specifically. As one online mixed survey respondent describes:

> "I feel appreciated. During Covid when everyone is going through [a] tough time, I'm grateful that I have a lovely house with beautiful plants that need me." (Online Mixed Survey Respondent, August 2021).

This story encapsulates the first identified theme of *mutual care*. This theme is best understood through the lens of stewardship. It is a desire or a feeling of responsibility to take care of another living being arising from knowledge or values primarily concerned with the

interactions between humans and the nonhuman world. Mutual care involved two stages, although the order of events varied: the homemaker would feel cared for by houseplants or nonhuman nature and would feel responsible or otherwise motivated to provide care for houseplants or nonhuman nature. For some, the choice to care for houseplants was in combination with other nonhumans (e.g. dogs, cats, etc.). For others, plants embodied a specific view of nature: a view of slow change, of greenery, and of unruliness. When asked if houseplants were apart of nature, one semi-structured participant responded:

> "I think so. [Houseplants] grow up like kids or puppies, but it's hard to notice. [...] It's like forests. You only notice it [changing] because you see it everyday. "
> (Semi-structured Interview Participant, February 2022).

The way that participants felt cared for by nature or houseplants differed widely between respondents. Some referred specifically to the mental well-being benefits like stress relief, some referred to more physical or scientific benefits like oxygen production, and one referred to feeling at-home through plants. The theme of mutual care does not hold that houseplants have a measurable benefit to their owners, but it does hold that perceived or constructed benefits impact the choice to purchase and care for houseplants. Additionally, mutual care did not always result in the continuation of houseplant care. One respondent describes how responsibility to care for a houseplant led to their removal of their only houseplant:

> "I cared very much for the plant as it gave me a sense of caring for something up until the point of becoming too depressed to care for it and gave it away to a more responsible home." (Online Mixed Survey Respondent, August 2021).

From these commonalities, the theme of mutual care was thus identified as a major theme illustrating the practice of ecological homemaking in the homes of university students in Japan during the coronavirus pandemic.

4.2.2 Making Kin

European perspectives on kinship have historically privileged familial relations between humans in domestic spaces. Several societies have, however, contradict this narrow view of kinship through a set of wider relations with nonhuman beings and the natural world (Campbell, 2009). Recent decades has seen the inclusion of non-Western perspectives of kinship in anthropology to disavow the anthropocentric and engage with the varied and entangled kin relations between human and nonhuman. A common phenomenon across many of the world's cultures and societies is the convention of naming. This social act of giving

familiarity and personhood on a foreign body is deeply rooted in the idea of kin (Benson, 2006). Humans have been naming nonhumans for centuries (e.g. dogs). Some nonhumans are purposefully *not* given names to avoid the moral and/or emotional ramifications that come with harming social beings (e.g. the naming of livestock).

Intriguingly, houseplants have become the subject of naming and explicit kinship in recent years. Sunga & Advincula (2021) report on the proliferation of the terms '*plantita*' and '*plantito*' in the Philippines, and Lasco (2020) notes how many of his interviewees describe themselves as 'plant parents' or their houseplants as 'plant babies'. Naming or constructing houseplants as kin is not necessarily a new phenomenon; many cultures across the world have conceived of plants in or around the home as family members and/or have given names to plants of significance. The novelty arises from the scale of the phenomenon in recent years and the language used to depict such relationships.

Through thematic narrative analysis, a theme of *making kin* was identified. Making kin can be understood as the formation of familial ties with nonhumans and the generation of feelings of affection between human and nonhuman. A prose to illustrate the theme of making kin might order a sequence of events as 1) the naming of a plant or the ascription of personality to a houseplant, 2) development of affection and/or attachment to said houseplant, and 3) the conceptualisation that the human and houseplant are bound by familial ties. When coded for words relating to kinship or naming (e.g. 'name', 'baby'/'babies', 'child'/'children', 'parent', 'mom'/'mother', 'pet'), 40% of all participants who reported having houseplants at some time during the coronavirus pandemic demonstrated making kin with their houseplants (see Table 5). The most common word was 'baby'/'babies', used by seven out of the sixteen (43.8%) who demonstrated making kin:

> "I have a strong connection to all of [my houseplants], especially to those I grew myself. They're like my 'babies'." (Online Mixed Survey Participant, August 2021).

> "I cared for my plants and felt like they were my babies. I would touch them, talk to them, and treat them as if they were pets." (Online Mixed Survey Participant, August 2021).

Ascribing the word 'baby' to a houseplant enacts a certain paternalistic attachment. Both of these responses describe houseplants as 'babies' in connection to the practices of caring also present in the theme of mutual care. Four of the sixteen (25%) participants who demonstrated making kin with houseplants likened them to 'pets'. Originally, this was not considered to be

a likening to family. However, when questioned about their use of the word ‘pet’ during the semi-structured interview, an interviewee explained.

> “She [referring to her favourite houseplant] has [...] personality. She’s like a little roommate. She grows up. [...] Pet is the closest word to describe her, I guess. I love her like I loved my dog when I was a kid, maybe.” (Semi-structured Interview Participant, February 2022).

This participant’s use of the word ‘pet’ held feelings of their childhood home; the relationship they were describing embodied more than a simple ‘feed and water’ relationship. Rather, it was a relationship involving feelings of love and performances of affection. When faced with this illustration of pet ownership, use of the word ‘pet’ was considered an example of making kin.

4.2.3 Rooting

Unpredictability and confinement to the home are defining characteristics of the early coronavirus pandemic for billions, including the tens of millions of people living in Japan during 2020. Prior to the explosion of the pandemic, many people structured their lives according to their social relationships and networks. The pandemic broke down many of these routines in favour of safety of social distancing. University students in Japan were especially vulnerable to the effects of the pandemic (Tsurugano et al., 2021). One interviewee narrates the hopelessness that came with the pandemic:

> “Well, I had to permanently move back home. Which obviously changed everything. And then, obviously, it was fine because I was doing my degree, but then I graduated into a world where everything was shut, so any plans for future employment went out of the window. [...] Essentially, I lost it all.” (Unstructured Interview Participant, July 2021).

Interviews and survey responses were littered with stories like these. University students were less likely to have adequate and reliable work during the pandemic, and many were forced to return home when their workplaces shut or their universities went online (Tsurugano et al., 2021; Horita et al., 2021). The coronavirus pandemic upended the lives of many university students in Japan and forced them to craft new lifestyles fit for the pandemic. Houseplants were a tool during the pandemic to materially and emotionally adapt to the reworldings of the pandemic.

The final theme identified by thematic narrative analysis is that of *rooting*. Rooting—the humour of which is not lost on the writer—pulls from a common description of the home as a system of roots and routes (Blunt & Dowling, 2006). Rooting can be described as the process of changing the material home by caring for houseplants in an effort to construct a predictable routine and a homely space. It tends to follow a sequence of 1) threat or change to the homemaker's lifestyle, 2) negative emotional response to said threat or change, and 3) purchasing houseplants to remedy these negative responses and provide feelings of predictability and homeliness. Rooting, in a sense, is a kind of reactive homemaking; whereas homemaking seeks to create place-attachment, rooting seeks to remedy a lifestyle change through the reshaping of the material and imaginary home. This is not to say that the crafting of feelings of belongingness are banished from the practices of rooting, quite the contrary. It is this sharp change in lifestyle that can make the homemaker feel 'out-of-place' and thus, by changing the material home, rediscovering the home as a space of belonging can and does often seem to occur.

Interviews and long-answer survey responses were coded using words and phrases like 'predictability', 'regular activity', 'routine', 'schedule', 'add colour', and 'lived-in' among others. Rooting included many diverse acts. Some participants described needing to change the material space around them to be more comfortable, other participants reported a desire to intentionally create a routine through acts of caring for houseplants:

> "Houseplants are good for aesthetic value, make the room brighter and greener. It also makes the apartment feel like home. I wanted my home to look like mine, not so random." (Semi-structured Interview Participant, April 2022).

> "Having to care for houseplants added a regular activity into my routine, which was much needed during the pandemic as there was a lot of unpredictability when it came to my daily schedule." (Online Mixed Survey, August 2021).

Houseplants were not the only form of rooting that participants reported engaging with. Rooting involved several different actions and methods. One participant explained how they wanted to redesign their home to be more well-suited to their new work-from-home lifestyle, and that houseplants were useful in designing the home to look 'more lived-in'. Houseplants are only a tool in a wider practice of rooting. This kind of reactive homemaking embodies a more common social phenomenon whereby social worlds are reflected in the material outlays of the home as performed by the homemaker (Blunt & Dowling, 2006).

Rooting was by-far the most common theme identified by using thematic narrative analysis. Of the participants that reported having houseplants at any time during the pandemic, 77.5% demonstrated some action of rooting by use of houseplants (see Table 5). This might reflect a more common theme across the coronavirus pandemic, whereby the forced changing of lifestyles reflected the material home in a more general sense. Nevertheless, the theme of rooting illustrates how the coronavirus pandemic increased the desire amongst university students to purchase houseplants.

5.0 Discussion and Conclusion

The coronavirus pandemic was a tumultuous, unprecedented, and devastating period for many and continues to cause issues for hundreds of millions across the world today. In Japan and, more specifically, Tokyo, businesses and outdoor spaces were closed in an effort to limit physical interaction and chance of infection (Naikaku Kanbō, 2020). Treating other people as objects of potential danger inflicts isolation on the individual, especially on those that live alone, and places the symptomatic burdens of acute loneliness on large swaths of society (Pietrabissa & Simpson, 2020). Social distancing, furthermore, posed a significant threat to the developmental neurobiology of children, teens, and young adults which have implications for decades into the future (Bzdok & Dunbar, 2020). Increased isolation due to social distancing comes in the face of the already growing issue of widespread loneliness in much of the Global North (Cacioppo & Cacioppo, 2018). Japan is no stranger to widespread loneliness. In 2021, the Ministry of Loneliness was established in response to an increased rate of suicides (Kodama, 2021). Scalable, cost-effective solutions or mitigation strategies to widespread loneliness are essential, both during and beyond the coronavirus pandemic.

University students in Japan were especially vulnerable to loneliness and other social and mental issues arising from isolation during the coronavirus pandemic (Fushimi, 2021; Horita et al., 2021; Tsurugano et al., 2021). Aydogan & Cerone (2021) report that there is significant evidence to support the claim that indoor plants improve well-being. Two of the three themes of ecological homemaking (e.g. mutual care and making kin) are inherently social activities: caring and being cared for by another living being and establishing familial social relations with nonhumans can help individuals cope with the mental stressors caused by social distancing during the pandemic. It has been shown that indoor houseplants can improve the mental well-being of individuals during the pandemic (Dzhambov et al., 2021; Pérez-Urrestarazu et al., 2021). Although earlier studies were able to identify the effects of houseplants on mental health, they have been unable to fully understand the

phenomenological process linking houseplants to human well-being. In her study of human-houseplant social relations, Carabelli (2021) finds a common thread in her interviews and posts which parallel the theme of 'making kin' reported on in this study. She writes:

> "Despite the diversity among the experiences I collected, there is one common thread: the reconsideration of plans as more than objects, but as active beings in the making of (non)human bonds and social relations. I think of this process as a radical form of hope, one that promises a transformative trajectory that nurtures new understandings and practices among and between humans and plants, which may lay the groundwork for a more just, equal and ecologically sustainable future." (Carabelli, 2021, para. 19).

Creating affective social relationships with living beings, whether human or nonhuman, seem to reduce the effects of isolation and other mental well-being issues. The most common emotions respondents reported feeling while caring for their houseplants were 1) 'Calm', 2) 'Happy', and 3) 'Belonging' (see Table 4). All three of these emotions are in direct opposition to the stress and lifestyle-upending effects of the pandemic.

Widespread loneliness in Japan is a systemic, long-term public health issue with tangible effects on the physical and mental wellbeing of individuals and Japanese society made worse during the coronavirus pandemic (Yamada et al., 2021). Houseplants and indoor plants more generally may present a potential tool in a wider strategy of mitigation and solution. Previous studies have reported on the beneficial effects of being in close proximity (i.e. being in the same room) as indoor plants, most often the beneficial effects of indoor plants as a visual stimulus (see Adachi et al., 2000). Echoing and building upon the findings of Sofo & Sofo (2020), Carabelli (2021), and Reis et al. (2020), this thesis argues that it is the fundamental social relationship between human and plant that holds a significant amount of utility in mitigating widespread isolation. Houseplants and other nonhumans have the potential to supplement human-to-human social relationships because of the affective act of caring that generates similar thoughts and feelings to caring for a nonhuman. Scholars in animal studies have long noted the complex and fulfilling social relationships between humans and companion species (see Haraway 2003; Cudworth, 2021). Animal companion species are not the only nonhuman beings which have the potential to form such relationships with humans. Plants and other nonhuman companion species are also capable. Thus, in an epidemic where the central issue to combat is a feeling of loneliness arising, at least in-part, from a lack of social relationships and cohesion, nonhumans of every kingdom are tools for supplementing lacking social relationships.

It is not yet clear whether ecological homemaking and the wider plant boom will continue into the future. Indeed, houseplant sales and overall plant sales seem to have reconverged in the mid-2021 in the Tokyo Wholesale Market (see Figure 1), possibly alluding to the end of the plant boom. More studies in different contexts in and outside of Japan are required to understand the scale of the phenomenon of ecological homemaking. Indeed, this study can only conclude that ecological homemaking is occurring within the homes of some of the homes of university students in Japan.

In Tokyo, the plant boom was a relative increase in the number of indoor houseplants being purchased and cared for during the early months of the coronavirus pandemic. Little research had been published during the undertaking of this research project to understand the underlying social phenomena driving such increases in demand. This thesis sought to investigate the phenomenon of the plant boom from an anthropological perspective, asking: *What is the social phenomenon underpinning the utilisation of houseplants in some university students' homemaking practices, particularly during the COVID-19 pandemic?* Using a mixed methodology composed of unstructured interviews, online mixed surveys, and semi-structured interviews, this thesis reports two central findings: 1) some university students in Japan have taken up the a practice called 'ecological homemaking', meaning the praxis of crafting belonging through intimate care between human inhabitant(s) and a network of nonhuman cohabitants, and 2) living alone is a statistically significant factor driving some university students to purchase and care for houseplants (see Section 4.0). With these findings in mind, this thesis encourages a rethinking of human-nonhuman social relationships within the home to include those species not traditionally thought of as capable of performing roles in the social lives of humans. Houseplants are one such group of nonhumans which may provide a significant source of cheap, scalable utility in the mitigation and solving of widespread loneliness in Japan and across the Global North. In conclusion, ecological homemaking presents a potential future where social networks are more affective and reliable; one where the social fabric of the home is built upon care between human and human and/or human and nonhuman. Even when isolated, earth-bound beings lay their roots in even the most anthropocentric of spaces and relationships.

Bibliography

Adachi, M., Rohde, C. L. E., & Kendle, A. D. (2000). Effects of floral and foliage displays on human emotions. *HortTechnology*, *10*(1), 59-63. https://doi.org/10.21273/HORTTECH.10.1.59

Antonsich, M. (2010). Searching for belonging - An analytical framework. *Geography Compass*, *4*(6), 644-659. https://doi.org/10.1111/j.1749-8198.2009.00317.x

Benson, S. (2006). Injurious names: Naming, disavowal, and recuperation in contexts of slavery and emancipation. In G. V. Bruck & B. Bodenhorn (Eds.), *The Anthropology of Names and Naming* (pp. 177-199). Cambridge University Press. https://doi.org/10.1017/CBO9780511499630.010

Bezerra, A. C. V., da Silva, C. E.M., Soares, F. R. G., & da Silva, J. A. M. (2020). Factors associated with people's behavior in social isolation during the COVID-19 pandemic. *Ciencia e Saude Coletiva*, *25*, 2411-2421. https://doi.org/10.1590/1413-81232020256.1.10792020

Bhatti, M. & Church, A. (2000). 'I never promised you a rose garden': Gender, leisure and home-making. *Leisure Studies*, *19*(3), 183-197. https://doi.org/10.1080/02614360050023071

Bihu, R. (2020). Using unstructured interviews in educational and social science research: The process, opportunity and difficulty. *Global Scientific*, *8*(10), 712-719.

Blunt, A., & Dowling, R. (2006). *Home*. Taylor & Francis.

Braun, V., Clarke, V., Boulton, E., Davey, L., & McEvoy, C. (2020). The online survey as a qualitative research tool. *International Journal of Social Research Methodology*, *24*(6), 641-654. https://doi.org/10.1080/13645579.2020.1805550

Bulgari, B., Petrini, A., Cocetta, G., Nicoletto, C., Ertani, A., Sambo, P., Ferrante, A., & Nicola, S. (2021). The impact of COVID-19 on horticulture: Critical issues and opportunities derived from an unexpected occurrence. *Horticulturae*, *7*(6). https://doi.org/10.3390/horticulturae7060124

Burck, C. (2005). Comparing qualitative research methodologies for systemic research: The use of grounded theory, discourse analysis and narrative analysis. *Journal of Family Therapy*, *27*(3), 237-262.

Bzdok, D. & Dunbar, R. I. M. (2020). The neurobiology of social distance. *Trends in Cognitive Science*, *24*(9), 717-733. https://doi.org/10.1016/j.tics.2020.05.016

Cacioppo, J. T. & Cacioppo, S. (2018). The growing problem of loneliness. *The Lancet*, *391*(10119), 426. https://doi.org/10.1016/S0140-6736(18)30142-9

Campbell, B. (2009). Fields of post-human kinship. In J. Edwards & C. Salazar (Eds.),

European kinship in the age of biotechnology (pp. 162-178). Berghahn Books.

Caputo, A. (2017). Social desirability bias in self-reported well-being measures: Evidence from an online survey. *Universitas Psychologica*, *16*(2). https://doi.org/10.11144/javeriana.upsy16-2.sdsw

Carabelli, G. (2020, October 19). *House plants were our link with nature in lockdown – now they could change how we relate to the natural world*. The Conversation. https://theconversation.com/house-plants-were-our-link-with-nature-in-lockdown-now-they-could-change-how-we-relate-to-the-natural-world-147637

Carabelli, G. (2021). Plants, vegetables, lawn: Radical solidarities in pandemic times. *Lateral*, *10*(2). https://doi.org/10.25158/L10.2.14

Carter, J. S. (2021, March 31). *Australians bought more plants than ever in 2020 with COVID-19 lockdowns fuelling sales*. ABC News. https://www.abc.net.au/news/rural/2021-03-31/australians-bought-more-plants-than-ever-in-2020/100040258?utm_campaign=abc_news_web&utm_content=link&utm_medium=content_shared&utm_source=abc_news_web

Carvalho, T., Krammer, F. & Iwasaki, A. (2021). The first 12 months of COVID-19: A timeline of immunological insights. *Nature Reviews Immunology*, *21*, 245-256. https://doi.org/10.1038/s41577-021-00522-1

Chan, D. K., Ivarsson, A., Stenling, A., Yang, S. X., Chatzisarantis, N. L., Hagger, M. S. (2015). Response-order effects in survey methods: A randomized controlled crossover study in the context of sport injury prevention. *Journal of Sport & Exercise Psychology*, *37*, 666-673. http://dx.doi.org/10.1123/jsep.2015-0045

Chen, J., McConnel, D., Henny, R. J., & Norman, D. J. (2010). The foliage plant industry. In J. Janick (Ed.), *Horticultural reviews* (pp. 45-110). John Wiley & Sons.

Coronavirus Resource Center (2022 July 18). *COVID-19 Dashboard* [Data Visualisation]. John Hopkins University & Medicine. https://coronavirus.jhu.edu/map.html

Cudworth, E. (2021). Muddied living: Making home with dog companions. *International Journal of Sociology and Social Policy*, *41*(3), 424-439. https://doi.org/10.1108/IJSSP-08-2019-0165

Dovey, K., Rao, F., & Pafka, E. (2018). Agglomeration and assemblage: Deterritorialising urban theory. *Urban Studies*, *55*(2), 263–273. https://www.jstor.org/stable/26428438

Dzhambov, A. M., Lercher, P., Browning, M. H.E.M., Stoyanov, D., Petrova, N., Noakov, & Dimitrova, D. D. (2021). Does greenery experienced indoors and outdoors provide an escape and support mental health during the COVID-19 quarantine? *Environmental Research*, *196*. https://doi.org/10.1016/j.envres.2020.110420

Emerson, R. W. (2015). Convenience sampling, random sampling, and snowball sampling:

How does sampling affect the validity of research? *Journal of Visual Impairment & Blindness*, *109*(2), 164-166. https://link.gale.com/apps/doc/A681402085/AONE?u=unitokyo&sid=summon&xid=d4bcf038

Eriksen, T. H. (2001). *Small places, large issues: An introduction to social and cultural anthropology*. Pluto Press.

Francis, J. J., Johnston, M., Robertson, C., Glidewell, L., Entwistle, M. P., Eccles, M. P., & Grimshaw, J. M. (2010). What is an adequate sample size? Operationalising data saturation for theory-based interview studies. *Psychology and Health*, *25*(10), 1229-1245. https://doi.org/10.1080/08870440903194015

Fukuzawa, R. E. (2016). English proficiency and internationalization among Japanese university students. In J. Mock, H. Kawamura, & N. Naganuma [Eds.], *The impact of internationalization on Japanese higher education* (pp. 53-67). Sense Publishers.

Fushimi, M. (2021). Student mental health consultations at a Japanese university and the current state of affairs on the increase in suicide victims in Japan during the COVID-19 pandemic [Correspondence]. *Psychological Medicine*, 1-2. https://doi.org/10.1016/j.psychres.2020.113561

Haraway, D. J. (2003). *The companion species manifesto: Dogs, people, and significant otherness*. Prickly Paradigm Press.

Horita, R., Nishio, A., & Yamamoto, M. (2021). The effect of remote learning on the mental health of first year university students in Japan. *Psychiatry Research*, *295*. https://doi.org/10.1016/j.psychres.2020.113561

Horwood, C. (2020a). *Potted history: How houseplants took over our homes* (2nd ed.). Pimpernel Press Limited.

Horwood, C. (2020b, October 3). *Green revolution: Why houseplants took over our homes during the pandemic*. The Telegraph. https://www.telegraph.co.uk/gardening/how-to-grow/green-revolution-houseplants-took-homes-pandemic/

Hussein, A. (2009). The use of triangulation in social sciences research: Can qualitative and quantitative methods be combined? *Journal of Comparative Social Work*, *4*(1). https://doi.org/10.31265/jcsw.v4i1.48

Kirksey, E. (2020). The emergence of COVID-19: A multispecies story. *Anthropology Now*, *12*(1), 11-16. https://doi.org/10.1080/19428200.2020.1760631

Kleres, J. (2011). Emotions and narrative analysis: A methodological approach. *Journal for the Theory of Social Behaviour*, *41*(2), 182-202. Doi: 10.1111/j.1468-5914.2010.00451.x

Knuth, M. J., Khachatryan, H., & Hall, C. R. (2021). How consistent are consumers in their decisions? Investigation of houseplant purchasing. *Behavioural Sciences*, *11*(73). https://doi.org/10.3390/bs11050073

Kodama, S. (2021, February 13). *Japan appoints 'Minister of Loneliness' to help people home alone*. Nikkei Asia. https://asia.nikkei.com/Spotlight/Coronavirus/Japan-appoints-minister-of-loneliness-to-help-people-home-alone

Lasco, G. (2020, September 17). *How COVID-19 is changing people's relationships with houseplants*. Sapiens. https://www.sapiens.org/column/entanglements/covid-19-houseplants/

Lee, S. (2021, April 9). *Lockdown houseplant trend captured by London photographer*. BBC News. https://www.bbc.com/news/uk-england-london-56677607

Lu, Y., Zhao, J., Wu, X., & Lo, S. M. (2021). Escaping to nature during a pandemic: A natural experiment in Asian cities during the COVID-19 pandemic with big social media data. *Science of The Total Environment*, *777*, 146092. https://doi.org/10.1016/j.scitotenv.2021.146092

Maalsen, S. (2020). Revising the smart home as assemblage. *Housing Studies*, *35*(9), 1534-1549. https://doi.org/10.1080/02673037.2019.1655531

Mallett, S. (2004). Understanding home: a critical review of the literature. *The Sociological Review*, *52*(1), 62-89. https://doi.org/10.1111/j.1467-954X.2004.00442.x

Manen, M. (2017). Phenomenology in its original sense. *Qualitative Health Research*, *27*(6), 810-825. https://doi.org/10.1177%2F1049732317699381

Marcus, G. E. & Saka, E. (2006). Assemblage. *Theory, Culture & Society*, *23*(2), 101-106. https://doi.org/10.1177%2F0263276406062573

Martínez, F. (2017). Waste is not the end. For an anthropology of care, maintenance and repair. *Social Anthropology*, *25*(3), 346-350. doi:10.1111/1469-8676.12436

McIntosh, M. J. & Morse, J. M. (2015). Situating and constructing diversity in semi-structured interviews. *Global Qualitative Nursing Research*, *2*. https://doi.org/10.1177%2F2333393615597674

Naikaku Kanbō. (2020). *Shingata Koronauirusukansenshō Kinkyū Jitai Sengen no Jisshi Jōkyō ni Kansuru Hōkoku*. https://iss.ndl.go.jp/books/R100000002-I030605610-00?ar=4e1f&locale=en

Neely, A. H. & Lopez, P. J. (2020, April 4). *Care in the time of Covid-19*. Antipode Online. https://antipodeonline.org/2020/04/04/care-in-the-time-of-covid-19/

Pérez-Urrestarazu, L., Kaltsidi, M. P., Nektarios, P. A., Markakis, G., Loges, V., Perini, K., Fernández-Cañero, R. (2021). Particularities of having plants at home during the confinement due to the COVID-19 pandemic. *Urban Forestry & Urban Greening*, *59*. https://doi.org/10.1016/j.ufug.2020.126919

Pietrabissa, G. & Simpson, S. G. (2020). Psychological consequences of social isolation during COVID-19 outbreak. *Frontier Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.02201

Prime Minister's Office, UK Department for Digital, Culture, Media & Sport, UK Office for Civil Society, & The Right Honourable Theresa May (2018, October 16). *PM Launches Government's first loneliness strategy*. https://www.gov.uk/government/news/pm-launches-governments-first-loneliness-strategy

Punch, K. F. (1998). *Introduction to social research: Qualitative and quantitative approaches.* Sage.

Qin, J., Sun, C., Zhou, X., Leng, H., & Lian, Z. (2013). The effect of indoor plants on human comfort. *Indoor and Built Environment*, *23*(5), 709-723. https://doi.org/10.1177%2F1420326X13481372

Qiu, Z. (2018). Analysis of the integration of indoor ecological landscape design and indoor decoration design. In Zhou, X. & Dai, H. (Eds.), *Proceedings of the 4th Workshop on Advanced Research and Technology Industry (WARTIA 2018)*. Atlantis Press. https://dx.doi.org/10.2991/wartia-18.2018.67

Raine, S. (2020). The narrative turn: Interdisciplinary methods and perspectives. *Student Anthropologist*, *3*(3), 64-80. https://doi.org/10.1002/j.sda2.20130303.0005

Reis, S. N., Reis, M. V., & Nascimento, A. N. P. (2020). Pandemic, social isolation and the importance of people-plant interaction. *Ornamental Horticulture*, *26*(3). https://doi.org/10.1590/2447-536X.v26i3.2185

Sandu, A. (2013). Transnational homemaking practices: Identity, belonging and informal learning. *Journal of Contemporary European Studies*, *21*(4), 496-512. https://doi.org/10.1080/14782804.2013.865379

Simons, H. (2009). *Case study research in practice.* SAGE Publications.

Sjoholm, B. (2004). The natural history of my begonia. *Fourth Genre: Explorations in Nonfiction*, *6*(2), 7-13. https://www.store.org/stable/41939354

Sullivan, E. J. (2021, January 30). *Covid lockdowns turned buying plants into the next big pandemic trend — for good reason*. NBC News. https://www.nbcnews.com/think/opinion/covid-lockdowns-turned-buying-plants-next-big-pandemic-trend-good-ncna1256223

Sunga, A. B. & Advincula, J. L. (2021). The “plantito/plantita” home gardening during the pandemic. *Community Psychology in Global Perspective*, *7*(1), 88-105. doi: 10.1285/i24212113v7i1p88

Swanson, H. A. (2015). Shadow ecologies of conservation: Co-production of salmon landscapes in Hokkaido, Japan, and southern Chile. *Geoforum*, *61*, 101-110. https://doi.org/10.1016/j.geoforum.2015.02.018

Taylor, S. (2020, December 27). *'Plant boom:' Working from home, pandemic stress has people turning green*. CTV News. https://www.ctvnews.ca/lifestyle/plant-boom-working-from-home-pandemic-stress-has-people-turning-green-1.5245778

Tokyo Metropolitan Central Wholesale Market. (2022). *Monthly statistics*. https://www.shijou-tokei.metro.tokyo.lg.jp/

Tsing, A. L. (2004). *Friction: An ethnography of global connection*. Princeton University Press.

Tsing, A. L. (2015). *The mushroom at the end of the world: On the possibility of life in capitalist ruins*. Princeton University Press.

Tsurugano, S., Nishikitani, M., Inoue, M., & Yano, E. (2021). Impact of the COVID-19 pandemic on working students: Results from the Labour Force Survey and the student lifestyle survey. *Journal of Occupational Health*, *63*. https://doi.org/10.1002/1348-9585.12209

Twohig-Bennett, C. & Jones, A. (2018). The health benefits of the great outdoors: A systematic review and meta-analysis of greenspace exposure and health outcomes. *Environmental Research*, *166*, 628-637. https://doi.org/10.1016/j.envres.2018.06.030

Walker, L. (2002). Home making: An architectural perspective. *Signs: Journal of Women in Culture and Society*, *27*(3). https://doi.org/10.1086/337927

West, S., Haider, L. J., Masterson, V., Enqvist, J. P., Svedin, U., & Tengö, M. (2018). Stewardship, care and relational values. *Current Opinion in Environmental Sustainability*, *35*, 30-38. https://doi.org/10.1016/j.cosust.2018.10.008

World Bank. (2020). *Individuals using the internet (% of population) - Japan* [Line Graph]. World Bank Data. https://data.worldbank.org/indicator/IT.NET.USER.ZS?locations=JP

Yamada, K., Wakaizumi, K., Kubota, Y., Murayama, H., & Tabuchi, T. (2021). Loneliness, social isolation, and pain following the COVID-19 outbreak: Data from a nationwide internet survey in Japan. *Scientific Reports*, *11*, 18643. https://doi.org/10.1038/s41598-021-97136-3

Yamazaki, T., Iida, A., Hino, K., Murayama, A., & Hiroi, U., Terada, T., Koizumi, H., &

Yokohari, M. (2021). Use of urban green spaces in the context of lifestyle changes during the COVID-19 pandemic in Tokyo. *Sustainability*, *13*(17), 9817. https://doi.org/10.3390/su13179817

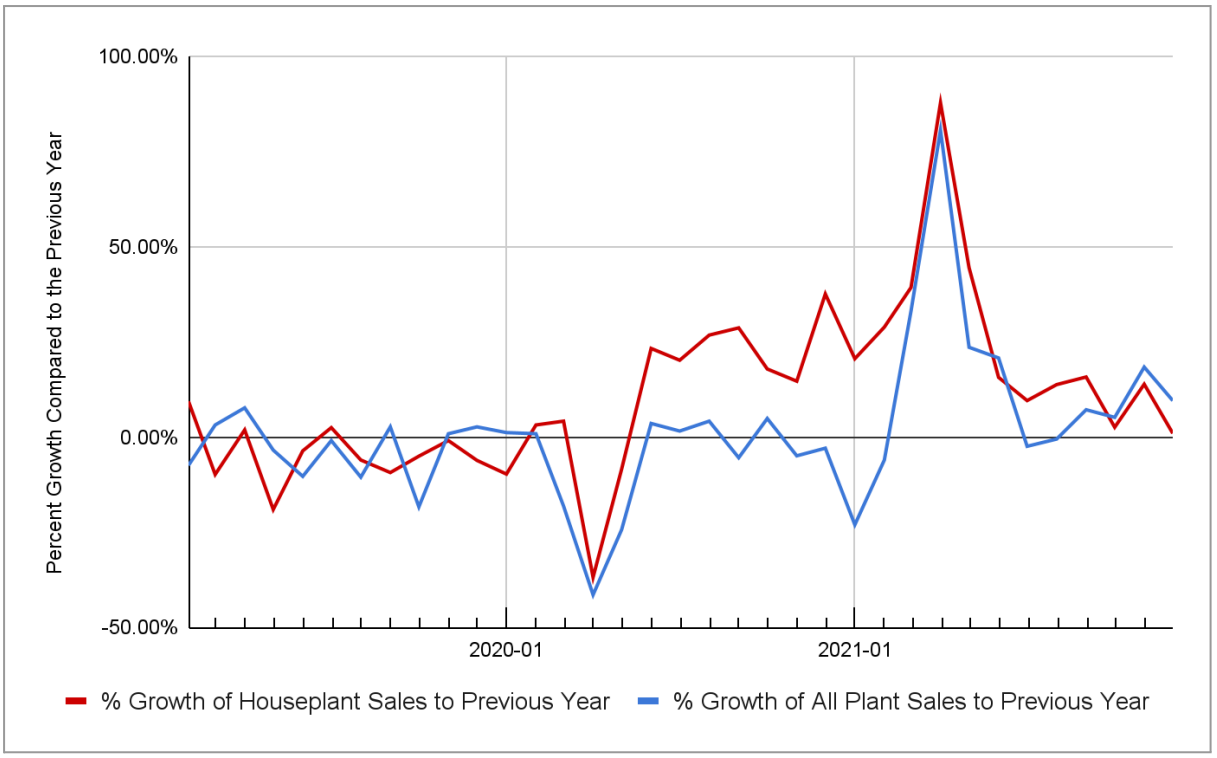
Zhang, R.,Zhang, C., & Rhodes, R. E. (2021). The pathways linking objectively-measured greenspace exposure and mental health: A systematic review of observational studies. *Environmental Research*, *198*. https://doi.org/10.1016/j.envres.2021.111233

Zhang, Y. & Wildemuth, B. M. (2016). Unstructured interviews. In B. M. Wildemuth [Ed.], *Applications of social research methods to questions in information and library science* [2nd ed.] (pp. 239-247). ABC-CLIO.

Appendix

Figure 1

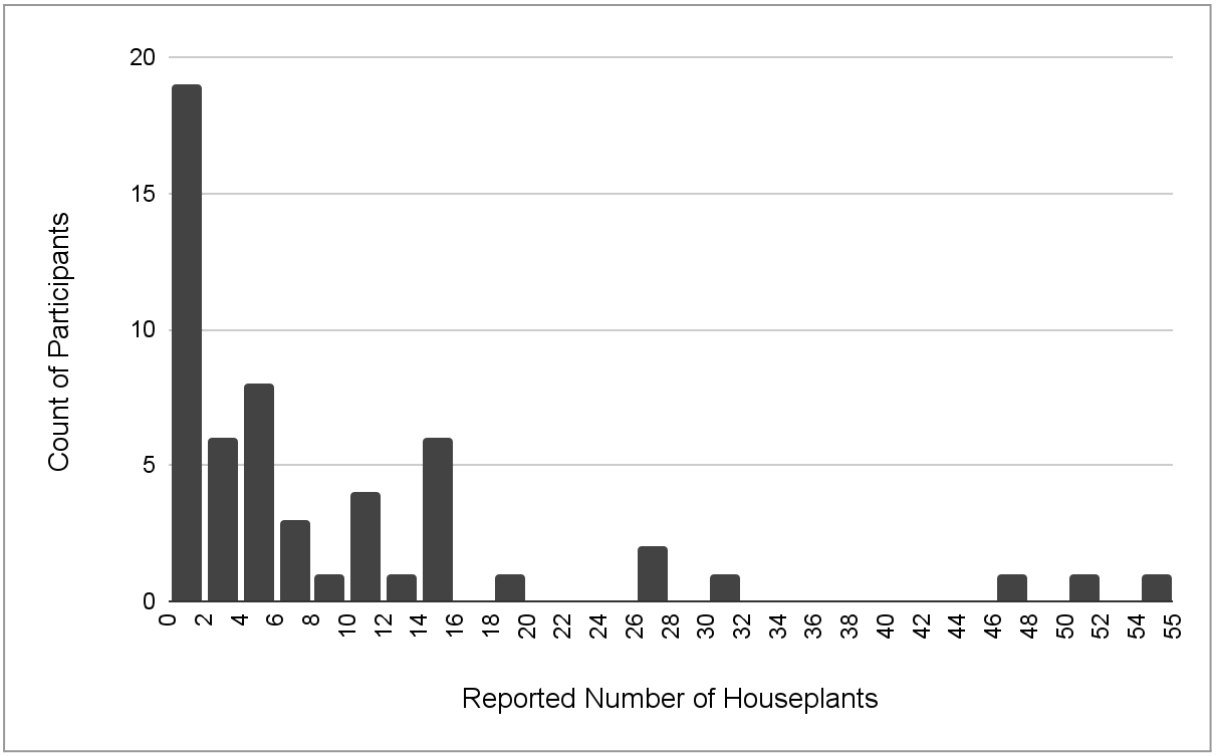
Growth of Houseplant Sales in Tokyo from 2019 - 2021



Note: Produced from sales data reported in (Tokyo Metropolitan Wholesale Market, 2022).

Figure 2

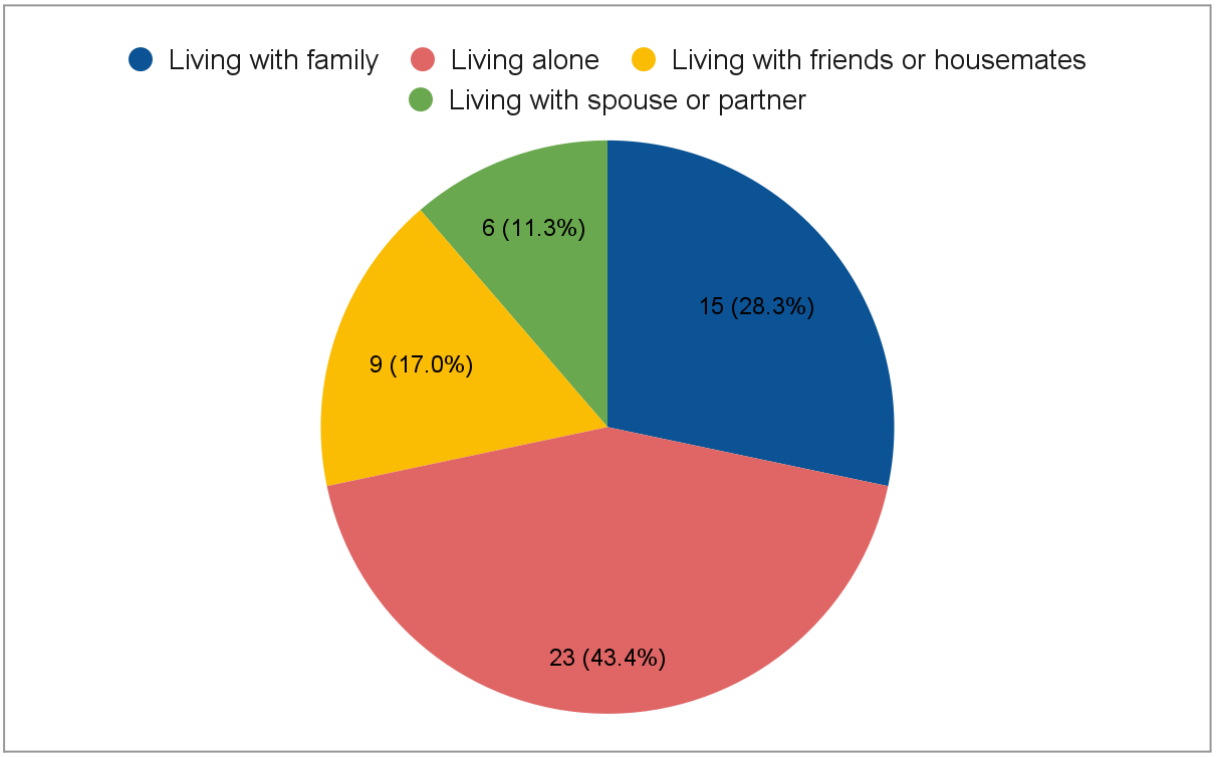
Reported Number of Houseplants by Combined Research Participant Count



Note: The bucket size for the horizontal axis was set at 2.

Figure 3

Proportion of Online Mixed Survey Respondents' Living Situation



Note: For those responses that selected more than one option (e.g. 'Living with family' and 'Living with pet'), the larger family unit would be selected. This figure includes outliers.

Table 1

List of Questions from the Online Mixed Survey

Question Number	Question [Description]	Answer Method [Number of Answers]
0.1	Do you confirm that you are 18 years of age or older?	Checkboxes [1 option]
0.2	By checking this box, you confirm that you have been adequately informed about the purposes of this research, your rights as a participant, and that you consent to take part in this survey.	Checkboxes [1 option]
1.1	What is your gender identity?	Multiple choice [2 options & other]
1.2	What is your age?	Short answer
1.3	What is your nationality? [If you have more than one nationality, please list all of them.]	Short answer
1.4	What was your occupation during the early stages of the COVID-19	Checkboxes [5

	pandemic? (Select all that apply) [The timeline of the COVID-19 pandemic differs by country, so please use when the pandemic first began to affect your daily life.]	options & other]
1.5	What was your primary country and city of residence during the early stages of the COVID-19 pandemic?	Short answer
1.6	What kind of place did you live in during the early stages of the COVID-19 pandemic?	Multiple choice [5 options & other]
1.7	What was. your living situation during the early stages of the COVID-19 pandemic? (Please select all that apply)	Checkboxes [7 options & other]
1.8	Did you have any houseplants at anytime during the COVID-19 pandemic? [“Houseplants” refers to a living plant of any size located indoors or on a balcony. For example, a potted rose plant in a living room is considered a houseplant but cut roses or a rose plant in a garden is not considered a houseplant.]	Multiple choice [3 options]
1.9	Roughly how many houseplants did you care for before the COVID-19 pandemic? [If you have two of the same plant in one pot, that is considered one plant. If you have two different species of plant in one pot, that is considered two plants. If you received a plant as a gift and take care of it, please count it. If you purchased a plant but someone else in your household takes care of it, please do not count it.]	Short answer
2.1	Have you ever purchased or been given a houseplant? (Please select one)	Multiple choice [4 options]
2.2	During the COVID-19 pandemic, did you want to have houseplants but were unable to? (Please select one)	Multiple choice [2 options & other]
2.3	If you answered ‘Yes’ to the question 2.2, what factors kept you from having houseplants?	Multiple choice grid [6 rows / 5 columns]
2.4	Are there any other factors which kept you from having houseplants?	Short answer
2.5	Concerning your answers to questions 2.3 and 2.4, could you provide some examples of how these factors kept you from having houseplants? Please explain in detail.	Long answer
3.1	What was the approximate count of houseplants you purchased or were given during the COVID-19 pandemic? [If you have two of the same plant in one pot, that is considered one plant. If you have two different species of plant in one pot, that is considered two plants. If you received a plant as a gift and take care of it, please count it. If you purchased a plant but someone else in your household takes care of it, please do not count it.]	Short answer
3.2	Why did you choose to purchase houseplants? Please explain your	Long answer

	answer in detail.	
3.3	Which kinds of houseplants did you purchase during the COVID-19 pandemic? (Please select all that apply) [The species does not need to match exactly. For example, select C1 if you purchased succulents during the COVID-19 pandemic.]	Multiple checkbox [3 rows / 3 columns]
3.4	Do you place significance on any of the houseplants you care for? (Please select one)	Multiple choice [2 options]
3.5	If you answered 'Yes' to question 3.4, please explain your answer in detail. [Please describe the plant and its significance.]	Long answer
3.6	Do you think houseplants make a home look better?	Likert scale [1 to 5]
3.7	Please explain your answer to question 3.6 in detail.	Long answer
3.8	Do you think houseplants have impacted your mental wellbeing during the COVID-19 pandemic? [“Mental wellbeing” refers to your thoughts and feelings and how you cope with the ups and downs of everyday life.]	Likert scale. [1 to 5]
3.9	Please explain your answer to the question 3.8 in detail.	Long answer
3.10	Do posts, images, or videos on social media make you want to grow houseplants in your home?	Likert scale [1 to 5]
3.11	Please explain your answer to the question 3.10 in detail.	Long answer
3.12	When you take care of a houseplant, what thoughts, feelings, or emotions do you have?	Multiple choice grid [10 rows / 5 columns]
3.13	Are there any other thoughts, feelings, or emotions you have when you take care of houseplants? Please explain your answer in detail.	Long answer
4.1	Is there anything you would like to add concerning your houseplants or this research project?	Long answer
4.2	If you would be interested in being interviewed about your responses, please leave your email below. [Please be aware that, by leaving your email below, your response anonymity may be compromised. If you would like to remain anonymous, please leave this section blank.]	Short answer

Table 2

Quantitative Responses to Section 3 of the Online Mixed Survey

Question Number	Sample Size	Mean	Standard Deviation
3.4 [Categorical, Binary]	21	0.4761	N/A

3.6 [Numerical, Likert Scale]	22	4.5454	0.5096
3.8 [Numerical, Likert Scale]	21	3.2857	1.3470
3.10 [Numerical, Likert Scale]	22	3.0455	1.4302

Note: Where categorical responses were binary (i.e. 'Yes' or 'No), 'Yes' was assigned a value of 1 and 'No' was assigned a value of 0.

Table 3

Hypotheses, Statistical Tests, and Resultant P-Values from the Online Mixed Survey

Hypotheses	Test Performed	*p*-Value
$H_{null} : \bar{x}_O < \bar{x}_1 \quad H_A : \bar{x}_O \geq \bar{x}_1$ H_A : The average number of houseplants will be higher amongst the participants who reported living alone [0] than those participants who reported living with pets, housemates or friends, family members, or spouses [1]. **Outliers Included*	Independent T-test, One-tailed	0.0038
$H_{null} : \bar{x}_O < \bar{x}_1 \quad H_A : \bar{x}_O \geq \bar{x}_1$ H_A : The average number of houseplants will be higher amongst the participants who reported living alone [0] than those participants who reported living with pets, housemates or friends, family members, or spouses [1]. **Outliers Excluded*	Independent T-test, One-tailed	0.0184
$H_{null} : \bar{x}_4 < \bar{x}_5 \quad H_A : \bar{x}_4 \geq \bar{x}_5$ H_A : The average number of houseplants purchased during the pandemic will be higher amongst those participants who selected 5 than those who selected 4 on question 3.6.	Independent T-test, One-tailed	0.4653
$H_{null} : \bar{x}_1 = \bar{x}_2 = \bar{x}_3 = \bar{x}_4 = \bar{x}_5 \quad H_A : \bar{x}_1 \neq \bar{x}_2 \neq \bar{x}_3 \neq \bar{x}_4 \neq \bar{x}_5$ H_A : The average number of houseplants purchased during the pandemic will differ significantly between the participants who selected 1, 2, 3, 4, or 5 on the Lichert scale to question 3.8.	ANOVA Test, One-tailed	0.5547
$H_{null} : \bar{x}_1 = \bar{x}_2 = \bar{x}_3 = \bar{x}_4 = \bar{x}_5 \quad H_A : \bar{x}_1 \neq \bar{x}_2 \neq \bar{x}_3 \neq \bar{x}_4 \neq \bar{x}_5$ H_A : The average number of houseplants purchased during the pandemic will differ significantly between the participants who selected 1, 2, 3, 4, or 5 on the Lichert scale to question 3.10.	ANOVA Test, One-tailed	0.74
$H_{null} : \bar{x}_O < \bar{x}_1 \quad H_A : \bar{x}_O \geq \bar{x}_1$ H_A : The average number of houseplants will be higher amongst the participants who answered 'Yes, I do place significance on my houseplants' to question 3.4 [1] than the participants who answered 'No, I do not place significance on my houseplants' to question 3.4 [0].	Independent T-test, One-tailed	0.3071

Note: The α value was set at 0.05 prior to the testing of hypotheses.

Table 4

Responses to Q#3.12 on the Online Mixed Survey

Emotion	Mean Response
Happy	3.8571
Calm	3.875
Sad	2
Axious	3
Rejuvenated	3.375
Tired	2.25
Surprised	2.3333
Belonging	3.5714
Confident	2.7143
Lonely	2

Note: Respondents were able to choose between ‘Never’ (1), ‘Rarely’ (2), ‘Sometimes’ (3), ‘Often’ (4), and ‘Everytime’ (5).

Table 5

Identified Themes by Count of Research Participants by Method

Theme	Method	Percentage
Mutual Care	Unstructured Interviews	31.3% (5/16)
	Mixed Online Survey	50% (11/22)
	Semi-structured Interview	50% (1/2)
	Total	42.5% (17/40)
Making Kin	Unstructured Interviews	37.5% (6/16)
	Mixed Online Survey	36.4% (8/22)
	Semi-structured Interview	100% (2/2)
	Total	40% (16/40)
Rooting	Unstructured Interviews	75% (12/16)
	Mixed Online Survey	77.3% (17/22)

	Semi-structured Interview	100% (2/2)
	Total	77.5% (31/40)

Note: Percentages are calculated using the sample size of participants who reported having houseplants during the coronavirus pandemic.