Integrating Care into Food Systems

by

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ABSTRACT

Producing, transforming, distributing, and consuming food requires a multitude of actors, from the microbes in the soil to the truck drivers, from the salesperson to the bacterial life that supports digestion. Yet, the global food system – far from being neutral – unequally provides and extracts resources around the globe to serve and protect the needs of some, while excluding and/or oppressing others and producing trauma in the process. Drawing on feminist scholarship and permaculture research – two fields that discuss the importance of care but only rarely work together – and using social science methods, I explore how to integrate care into food systems, and what are the outcomes of such an integration. I first bring together the voices of 35 everyday experts from Cuba, France, and the United States (Arizona) and perspectives from ethics of care, creation care, indigenous scholars, and permaculture specialists, and I use grounded theory to develop a definition of care in food systems context, and a conceptual map of care that identifies motives for caring, caring practices and their results. I then discuss how caring practices enhance food systems' adaptive capacity and resilience. Next, I study the relationship between a subset of the identified caring practices – what is recognized as "Earth care" – and their effect on well-being in general, and Food Well-Being more specifically, using three case studies from Arizona based on: (1) interviews of school teachers, (2) interviews of sustainable farmers, (3) a survey with 96 gardeners. There, I also discuss how policies and cultural transformations can better support the integration of Earth care practices in food systems. Then, I examine how urban food autonomy movements are grassroots examples of integration of care in food systems, and how through their care practices – Earth care, "People care" and "Fair share" – they can serve as a catalyst for social change and contribute to the achievement of the United Nations Sustainable Development Goals. Lastly, I conclude with

recommendations to strengthen a culture of care in food systems, as well as limitations to my research, and future research directions.

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CHAPTER 1

INTRODUCTION

"(E)very day, beginning with where our feet first touch the earth, we send greetings and thanks to all members of the natural world. (…) Every day, with these words, the people give thanks to the land. In the silence that falls to the end of those words, I listen; longing for the day when we can hear the land give thanks for the people, in return." (Wall Kimmerer, 2013, pp. 107, pp.117)

And I too long for that day.

Positionality

My Journey to Care and Food Systems Research

Inspired by indigenous autoethnographic research methodologies (McIvor, 2010; Steinhauer, 2002; S. Wilson, 2003, 2008), I will start this dissertation by telling you who I am, who my ancestors are, why I am working on care and food systems sustainability, and what these means to me. The answers to these questions shape the positionality of the work you are about to read.

My name is Estève. I am a white woman, who was born in the 1980s and raised in France at a time when public services and the State social intervention were held dear by most of citizens. This deeply shaped my understanding and expectations of what it means to live in a "caring democracy" (Tronto, 2013). What the American English calls "welfare

state," we called "Providence state,"[1] and it was not shameful to receive help from the state institutions when in need. It was understood as part of the "solidarity" principle underlying our national motto, "Liberty, Equality, Fraternity." I benefited from an excellent and free education system (from preschool to college), and from a socialized health care system (also excellent). This strongly impacted my worldview and political beliefs, long before I knew what the word "politics" meant. In contrast with the United States where I now live, in France, I grew up to cherish a society in which I did not need to ask how much a blood test or a medical exam was going to cost me, not did I need to spend hours on the phone with an insurance company to confirm what part of my health care was – or was not – going to be paid for.

I come from a long lineage of farmers, which came to a halt with my parents' generation swept-up in what historians called "rural exodus" (Lynch, 2010). Like many born in France after the Second World War, my parents left their family farms to move to urban areas and pursue a career far from the fields and animals they grew up with. As a result, I was born in a city and grew up an "urbanite." though my grandparents' farm and garden always held a special place in my life. The strawberries, the green beans and the tomatoes that graced our summer table came from that garden. My early understanding of "food systems," was rooted in that garden through my observations of the almost closed-loop system these plants lived in: using water from the well, feeding the food scraps to the chicken and the rabbits, and eating mostly seasonal products from the garden.

"Are we eating green beans today again?" I repeated with boredom. Like many city children, I also experienced that food primarily "came from" the supermarket before coming

[1] In French, État Providence

to our table. In supermarkets, the choices seemed endless, and I remember pressing my mother to buy this or that processed chocolate bar that looked so cool in the ads. My mother was a nurse, and in our home, like at work, she oversaw everything "care-related." She was part of a generation of women who not only handled the unpaid and all-important care work at home and in her marriage, but also worked a 40-hour week (or more) caring for the sick and the elderly. Watching her, I always knew that "care" was a very important and very demanding responsibility, and that it marked the difference between spending an afternoon eating snacks in front of the TV with dirty clothes scattered about, or an afternoon spent baking together and chatting about life, with the smell of fresh clothes Drying on the rack. Her care was making our lives easier, healthier and fuller.

Although food production had been the focus of my ancestors' journey, my interest in food systems started only shortly after my grandfather died of respiratory disease, just as I turned 20. My grandmother told me then that she suspected his painful end had been caused by pesticides. It spurred my curiosity. I started learning more about food production, the introduction of pesticides and the mechanization of modern agriculture. While completing two master's degrees (one in business, another in economics and management), I traveled, interviewed farmers and volunteered for them when I had the chance. These travels took me to Egypt, Spain, India and Australia, and I compiled my reflections into a book on the ethics of organic agriculture published in France (E. Giraud, 2016). Through this process, I started understanding the concept of a food system as one of capital fluxes, ownership structures

and institutions interacting with the living web[2] to produce and distribute some foods (not any foods) for some.[3]

Slowly, I learned to pay attention to the inclusion and exclusion of foods and living groups within that food system, and to identify those whose needs were served via the fluxes and institutions, and the lives which were expendable in various degrees. Traveling opened my eyes to the politics and intersectionality of being white. Until then, I never really reflected on the implications and privileges whiteness were giving me. I was white, the same way my ancestors and my family were white, the same way most of my classmates were white. I only understood racism in the narrow sense – hatred toward people of a different skin tone and/or faith. And, although I had learned about colonialization and neocolonialism, I didn't truly experience the extent of my white privilege until I lived in Egypt at age 21.

In Egypt, I saw racism had less to do with hatred, and a lot more to do with the institutions – the doors they chose to open or close. Exchange rates and passports – and the rights they almost miraculously grant or take away from you – were enlightening. In this ancient African country, I could enter the most private and luxurious places by merely showing my French passport. With my $450 monthly wage, I was paid more than an average family of five. I had access to foods many could not even taste. It was not because I was older or more educated or had a higher wage – all reasons for differentiated access to privileges I had learned to rationalize – but it was simply because the exchange rate was

[2] By "living web," I refer to everything that is alive and interconnected into what we call "ecosystem." I use the term "living web" instead of "ecosystem" because it emphasizes the notion of "life."

[3] This definition emphasizes the notion of preference and privileges within food systems, and that some specific foods are produced in priority, to serve the needs and preferences of some people.

giving me all this power for having a French bank account and a source of income in Euros. Could that really justify that my single workday was worth more than somebody's entire week? At the same time, people often tried to overcharge me for car rides or street food, because I was white. Many local people associated white women with promiscuous behaviors, which I found similar to the oversexualization of black and brown women in the West, yet I was unprepared to deal with. By the way people treated me then, I learned that my skin color was not just about a lower concentration of melanin but a reflection of the perceived privileges that had little to do with who I was or what I did. My later travels to India, then my life in Australia and now in the United States have only reinforced what I learned then: Racism is primarily about embodied structures of power, and the global food system is filled with similar structures, which lead to multipled or increased inequities.

Throughout this journey, I was entrusted to teach others in multiple subjects – French, various business classes, data analysis, theater – and my passion for teaching is what sparked my desire to pursue a doctorate. I was influenced by the works of Jacques Rancière on intellectual emancipation in *The Ignorant Schoolmaster*, and Bell Hooks on radical pedagogies in *Teaching to Transgress* (Hooks, 1994; Rancière, 1991). Their commitment to students' self-actualization and empowerment was groundbreaking to me and opened my mind to "care" as an object of practice and research. Although I had been pursuing food systems research on my own and was enrolled in a Ph.D. program in economics and management in Spain, it was my students who really drew me to the path of research in sustainability. As I was – in truth – more interested by their self-actualization than by the topics I was entrusted to teach them, I spent a lot of time meeting with them and encouraging them to connect the class teachings with the things that were meaningful to them; environmental sustainability in the face of climate change was a recurring theme.

Training Through Research in Sustainability

In 2001, sustainability science emerged as a new discipline with the strong support of ecologists. The first foundational texts of this new field of study give us insights into the principles that underlie sustainability science. For the founding researchers, sustainability science seeks to "understand the fundamental character of interaction between nature and society," encompassing "the interaction of global processes with the ecological and social characteristics of particular places and sectors," requiring "fundamental advances in our ability to address such issues as the behavior of complex self-organizing systems as well as the responses, some irreversible, of the nature-society system to multiple and interacting stresses," and "combining different ways of knowing and learning" to allow "different social actors to work in concert, even with much uncertainty and limited information" (Kates et al., 2001).

To rephrase the above, sustainability science combines different ways of knowing to understand the nature-society interaction, both in global processes and in local particularities, and seeks to bring together diverse social actors (operating with limited information and in high uncertainty) to address – and hopefully solve – the issues caused by nature-society interactions. Shorter yet, sustainability science formally recognizes that our (Western) scientific knowledge has led to ecological collapsing, and that we need a paradigm shift to ensure a chance at collective survival. Even though the influence of ecology in sustainability science is undeniable, the discipline aims to be both interdisciplinary and transdisciplinary, and defines itself by "the problems it addresses rather than by the disciplines it employs" (Clark, 2007).

Arizona State University (ASU) was the first university in the world to create a doctoral program in sustainability at its own first-of-a-kind School of Sustainability. I was seduced by a degree which – at least on paper – would allow me to weave different disciplines and different ways of knowing into my doctoral research to address the food systems issues I had been reflecting on. The school's commitment to not only train researchers, but to train students through conducted research resonated with me. Between ages 15 and 20, I had been trained to interdisciplinarity, first in high school and then within the demanding French "classes préparatoires" – part of the French post-secondary education system focused on anticipation of the national competitive examination of the Ecole Normale Supérieure, an elite research institution born under Napoleon. Despite its many methodological challenges, I had learned to value interdisciplinarity like a form of multilingualism. In 2017, I took the leap, quit the program I was in and started a doctorate in sustainability at the ASU School of Sustainability. When I joined the university, the Ph.D. available in sustainability was still one of the rare programs of its kind. I want to express my gratitude to the scholars who created the path for that discipline to grow as an intellectual space with so much unknown. The very dissertation you are now reading would not have seen the light without them.

Opportunity Statement

Global food production is facing growing challenges due to decades of environmental degradations: loss of soil fertility, groundwater contamination, pollinators extinction – these are only a few examples of the ecological collapse propelled by industrial agriculture (Dearing, 2020; IPCC, 2019; Sanderson & Cox, 2019). Climate change, biodiversity loss and population growth put pressure on food systems and challenge the

model of production ardently promoted throughout the 20th century. Additionally, the global food system itself – far from being neutral – unequally provides and extracts resources around the globe to intentionally serve and protect the needs of some, while excluding and/or oppressing others (Ahmed et al., 2022, p. 12; Allen & Wilson, 2008; Carazo, 2009, p. 15; Patel & Moore, 2017, p. 138; Shiva, 2014, p. 41). Although the system operates under the justification that it is the only way to solve famines and feed the growing world population, decades of research show that it is not the only way, and that there are many less destructive alternatives (CFS & HLPE, 2019, p. 26; De Schutter, 2010; Harvey, 2019; Holt-Giménez, 2006, p. 10; Ikerd, 2020; Shiva, 2016, p. 40). Simply put, the global food system does not have to be this way.

Traditional ecological knowledge (TEK) systems, agroecology and permaculture are examples of food systems that are rooted in principles of care for all forms of life. TEK systems – which have enabled the sustainability of human life on Earth for millennia prior to Western colonization – emphasize the critical importance of care. A Māori environmental guardian – *kaitiaki* – explains:

"Our values and our principles that we live by, in a society structure that we have built up over the many generations, is built around the sea and the land. So it's always been inbred in us to take care of the land and the sea, which includes the fishery because in doing so it will take care of us" (Kawharu, 2002; Turner et al., 2013).

Similarly, Chang and colleagues (2019) reclaim their community agency as Native Hawai'ians, and the traditions of *konohiki* (a resource management approach that invites community stewardship) and *mālama 'āina* and *aloha 'āina* (care and love for the resources that provide life), to affirm and embrace the roles of their island communities in the care of Hawai'i (Chang et al., 2019, pp. 124–125). They describe how the fishing season had to be

preceded by a season of feeding the fish, and that there could not be fishing and feeding occurring during the same season, and that overfishing was prohibited. This practice is reflected in the ʻŌlelo Noʻeau proverb "*aloha aku, aloha mai*, expressing the notion that you must give (love) first in order to receive" (Chang et al., 2019, p. 138; Pukui, 1993).

Although the examples provided by *kaitiaki* and Chang, et. al., relate to fishing care practices, TEK systems also apply variations of these principles in different contexts to other forms of life such as plants and other animals. Agroecology is a science and set of practices developed on the cultural and ecological basis of traditional agriculture. It is rooted in small-holder systems and on agroecosystem management, rather than external inputs. (Holt-Giménez & Altieri, 2012, p. 92). Agroecology also includes principles of care. For example, a collective of 50 women agroecologists in Chiapas, Mexico, work together in acknowledgement that care work, which involves the "affective, psychic, relational and physical work needed for life, is indispensable in creating the conditions for agroecology and food sovereignty"[4] (Trevilla-Espinal & Peña-Azcona, 2020, p. 25). In 2010, Olivier de Schutter – special rapporteur on the right to food at the United Nations – recognized agroecology as a viable path to feed the world by raising productivity, reducing rural poverty, improving nutrition and supporting climate change adaptation (de Schutter, 2010).

Lastly, multiple initiatives around the globe use permaculture – a term coined in 1978 by Bill Mollison when referring to agrosystems that are self-perpetuating and resilient to

[4] Food sovereignty is the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems. It puts the aspirations and needs of those who produce, distribute and consume food at the heart of food systems and policies rather than the demands of markets and corporations. (Declaration of Nyéléni, 2007)

external shocks (Ferguson & Lovell, 2014; D. Mollison & Holmgren, 1978), resulting in the creation and regeneration of soil, the fostering of biodiversity, the beautification of landscapes and the production of healthy food in urban spaces. Permaculture relies on three core principles or "three ethics": (1) care for the earth (the living soil, the forests and the freshwater), (2) care for the people (compassion and simplicity toward human needs, self-reliance and personal responsibility), and (3) fair share (sharing abundance and setting limits to personal consumption) (Holmgren, 2002, p. 1). Industrial and extractive food systems are not the only possible path; it is critical for food systems research to reach a consensus and integrate care theory and practices.

There is increasing attention to the importance of relational values in the study of human-nature relationships for sustainability (K. M. Chan et al., 2018; K. M. A. Chan et al., 2016; Peçanha Enqvist et al., 2018; West et al., 2018), and relational values have long been studied by Care Theory and ecofeminist research. In academic literature, Care Theory[5] and ecofeminist research focus on relationships, and on the effects of societal structures and policies on these relations (Cuomo, 1997; Gaard & Gruen, 1993; Macgregor, 2014; Manning, 1992; Noddings, 1984; Tronto, 1993). However, there have been only a few studies focused on linking Care Theory and ecofeminism with agricultural systems in general, and focusing on the transformative potential of care for food systems (Curry, 2002; Gottschlich & Bellina, 2017; Herman, 2015; Mallory, 2013; Pershouse, 2016; Puig de la Bellacasa, 2017b; Shiva et al., 2014). This, in spite of the countless agricultural and grassroots initiatives that do integrate care in their functioning.

[5] In this work, I use ethics of care and Care Theory interchangeably.

Although permaculture emphasizes the importance of care – both through scholarship and practice – it rarely uses moral philosophy and ethics of care in its discussions on the implications of its three "care ethics," or of its design principles. Similarly, ethics of care has been concerned with establishing itself as moral philosophy; its applications to specific practical fields have been limited (health care is a notable example). The works of Maria Puig de la Bellacasa and those of Starhawk are some of the rare studies that bring together permaculture inquiry, ethics of care and ecofeminism. Ultimately, there are extensive practices and ways of knowing between aspects of care and nature relationships. Drawing on my positionality, prior experiences, the resulting knowledge and the gaps in scientific literature, my work intends to expand the understanding of care in the context of food systems.

Aim and Scope of the Research

The focus of my dissertation research is to answer the following overarching research questions:

RQa: how to integrate care into food systems?

RQb: what are the outcomes of such an integration?

I propose to address this overarching question via three sets of subresearch questions which are each the subject of separate chapters.

Research question 1.

RQ1a: What does care mean in the context of food systems?

RQ1b: How can integrating care in food systems research and policy enhance resilience?

Research question 2.

RQ2a: Which policies and cultural transformations can support the integration of Earth care practices into food systems?

RQ2b: How does growing food using Earth care practices enhance well-being?

Research question 3.

RQ3a: How do urban food autonomy movements integrate care into food systems?

RQ3b: How do Earth care, people care and fair share practices contribute to sustainability as defined by the United Nations Sustainable Development Goals?

Methodology

Each chapter follows a different methodological approach, although each is rooted in qualitative methods in social sciences.

Data collection

For the first chapter, data collection consisted of 35 semi-directed interviews of everyday experts in food systems in France, the United States (Arizona specifically) and Cuba in order to capture diverse biocultural systems. Additionally, 20 of these participants had received a form of permaculture training, hence were sensitive to the integration of the concept of "care" in food systems.

The second chapter consists of three case studies, each with Arizona participants but with distinctive data collection processes. For the first case study, my co-authors and I used the transcripts of the interviews of 21 elementary school teachers in the Phoenix metropolitan area. These interviews were conducted in the context of a graduate course at Arizona State University in which we all participated. For the second case study, we used the

13 semi-directed interviews I had conducted with farmers and gardeners (out of the 35 mentioned above). For the third case study, we surveyed 96 gardeners.

There was no data collection for the third chapter.

Data analysis

In Chapter 2, I use grounded theory to code the interview transcripts, create memos, define care in the context of food systems and develop a conceptual map of care that includes motives, practices and outcomes of care in this context. From this map, I use deductive methods to assess how caring practices enhance food systems resilience research and policy.

In Chapter 3, we use deductive strategies (Bernard et al., 2017, p. 335) to examine the effect of a category of care practices – those identified as Earth care in Chapter 2 – on well-being, using three case studies. The third case study uses a linear regression model to test the hypothesis that sustainable gardening enhances eudemonic well-being, and a sense of purpose.

Chapter 4 is an essay informed by a review of the literature and inspired by the interviews conducted for Chapter 2.

Overview of the Chapters

Each of the chapters is written as a separate piece and to have its own internal coherence; Chapters 3 4 have already been published separately. To maintain the coherence of the dissertation, these two chapters are preceded by a prelude in which I explain how each addresses its specific research questions listed on p. 11.

Chapter 2 – Resilience in Food Systems: Toward a Care-Based Model – proposes a map of care, plotted through interviews with food systems experts and care literature to define the concept of care in the context of food systems (RQ1a). The chapter also distinguishes between the care policies already recognized in food systems resilience research (yet rarely enacted, i.e., participatory governance) and those policies or doctrines that can be further researched and supported (i.e., recognition of the reciprocal relationships between all food system actors and the fair treatment of all parties). The chapter also shows how the integration of care into food systems enhances food systems' capacity and contributes to resilience (RQ1b).

Chapter 3 – Gardening for Food Well-Being in the COVID-19 Era – describes how growing food using Earth care practices can heighten a sense of purpose and eudemonic well-being among gardeners and farmers. Included is the idea that such practices can even balance the lack of hedonic well-being in cases of difficult growing conditions, such as very hot weather (RQ2b). The chapter also demonstrates that a cultural revaluation of food-growing knowledge and better integration of this knowledge in curricula through policy support can contribute to the integration of Earth care practices in food systems (RQ2a). Chapter 3 was co-written with Dr. Sara Aly El-Sayed and Adenike Opejin and published in the journal *Sustainability* in August 2021.

Chapter 4 – Urban Food Autonomy: An Ethics of Care for Sustainability. This chapter has been published previously, in the March 2021 edition of the journal *Humanities*. In Chapter 4, I examine the possible positive outcomes that can result from urban food autonomy movements when permaculture principles are put to use. The integration of Earth care, people care and fair share practices into food systems (RQ3a) are influencing factors that contribute to a number of UN Sustainable Development Goals. Included are "Zero

Hunger," "Climate Action" and "Life on Land" goals. The chapter provides evidence that these food autonomy movements contribute to food security, have climate mitigation potential and support biodiversity (RQ3b). An analysis reveals that "autonomy" and "care" are co-dependent outcomes, and that the development of such urban food autonomy movements holds the transformative potential to restore the value and practice of care in our modern societies.

CHAPTER 2

RESILIENCE IN FOOD SYSTEMS: TOWARD A CARE-BASED MODEL

I say that the development of your consciousness, this will always be dictated by your own consciousness. Our paths will always be different, the vision will be different, and there may be millions of ways to get to the same place, but it's always an impulse from your consciousness that forces you to change, and to find information in place that you did not think about, and it is always this exchange of information between a person and nature that will give you the answers. (consciousness – Chef, Cuba)

Introduction

If the food on our plate could speak, what would it say? In its journey to life, maturation and into our plate, what did it see? Would it talk of the soil it came from, the water it absorbed, the people and the machines that touched and transformed it, and the transports it took? Would tomatoes speak of their pain when harvested too soon? Would the strawberry speak of the unceasing cough of the farmworker who picked it?

Behind each of the food items we consume, there are interwoven stories of plants, animals, machines and people. Often, these stories are silenced and simplified into flows and institutions within the concept of the "food system," generally defined as "the aggregate of food-related activities and the environments (political, socioeconomic and natural) within which these activities occur" (Pinstrup-Andersen et al., 2011). Yet, these stories – however unspoken or subdued – are there, and the global food system and its food product is one that along the way can produce deeply distressing experiences or "trauma" (Bessel, 2014;

Corburn, 2021; Ujuaje & Chang, 2020) in the form of poverty, community violence, food and housing insecurity, exposure to toxic pollution and more.

In the spring of 2020, the COVID-19 pandemic disrupted the food supply chain, and consumers faced unfamiliar food shortages (temporarily in countries like the United States, or over several months in other parts of the world). Farmers had to dump their production, and some meat processing plants were forced to close, which increased meat prices. The vulnerability of farmworkers and meat packing workers made the news. These oft-traumatizing experiences occurred within our food systems and, unfortunately, none is new; most are structurally induced. Indeed, despite the pandemic shock, chain supply disruptions and uncertainty, global systems were seemingly able to bounce back to pre-COVID levels of production and distribution. Food stores today are starting to display the large product quantities that were typical pre-COVID, although there are inequities, and there are those among us who continue to struggle for supply or have been forced to abandon their livelihoods.

But, because of its ability to bounce back, our food systems are seen as resilient. For example, a 2017 report from the Rockefeller Foundation defines the resilience of a food system by its ability to "return to normal as quickly as possible" (Zeuli & Nijhuis, 2017). But the reality is more nuanced and complex. How resilient is a system that produces trauma and returns to its original state of doing so? In this paper, we argue that a food system needs incorporated designs that can address the trauma it inflicts; a food system requires care.

In medicine, systemic trauma is defined as "contextual features of environments and institutions that give rise to trauma, maintain it, and impact posttraumatic responses" (Goldsmith et. al., 2014). In general, external responses to trauma require structures of care to physically repair (i.e., through surgery), to emotionally heal (i.e., through counseling) and

to prevent trauma from occurring in the first place (i.e., seat belt and airbags were introduced to reduce the number of deaths in car accidents).

However, care is not merely a response to trauma, it is also a way of relating with others and with the world, which also happens to be particularly effective in mitigating the conditions that lead to trauma and in responding to external shocks when they occur. Consequently, gaps of care within societies are like cracks in their foundations. Although there is a vast amount of academic literature condemning the systemic inequalities and destruction within the global food system (Alattar, 2021; Allen, 2016), the work that encourages the systemization of care in our food systems remains limited. In the academic literature, Care Theory and ecofeminist research focus on relationships among all living things, and on the effects of societal structures and policies on these relations (Cuomo, 1997; Gaard & Gruen, 1993; Gilligan, 1982; Macgregor, 2014; Manning, 1992; Noddings, 1984; Tronto, 1993). Yet, there have been only a few studies linking Care Theory and ecofeminism with agricultural systems in general, or with food systems resilience theory (Curry, 2002; Gottschlich & Bellina, 2017; Herman, 2015; Mallory, 2013; Puig de la Bellacasa, 2017b).

Meanwhile, there are multiple examples of communities able to regenerate their natural environment and to recover from economic and social crises by reconnecting with their food and increasing local organic and regenerative food production, initiating a community healing process (see examples in Giraud, 2021; Rouillay & Becker, 2020). All beings are entwined within our foodscapes, and Herman describes the existence of "moral economies" surrounding agriculture that create a "collective entanglement of social relations" (Herman 2015). Within this moral economy, the needs of all beings (human and nonhuman) must be met by agricultural practices, with the understanding that a healthy

ecosystem comes as a top priority. We suggest that such an approach requires the prioritization of care in food systems.

The research of Amelie A. Hecht and colleagues on urban food systems resilience recognizes food insecurity as a form of trauma. Their work recognizes a framework developed by Bowen and Murshid to address the consequences of trauma, facilitate healing prevent re-traumatization – especially for marginalized populations – and to use the findings to develop food policy recommendations (Bowen & Murshid, 2016; Hecht et al., 2018). Their work is one of the rare studies that examines food insecurity from a trauma perspective and seeks to develop policies that specifically address trauma. However, the work focuses on food insecurity at the urban scale and ignores issues such as the stress caused by global food systems on ecosystems, which is another form of trauma.

Although the term resilience was initially used in the context of mechanical engineering, it has been largely incorporated in psychology and is now part of everyday language. Its adaptation to the study of food systems has its roots in Holling's research on ecological resilience, and its further development in the study of socio-ecological systems (SESs) to which food systems belong. According to Tendall and colleagues, food systems resilience is defined as the "capacity over time of a food system and its units at multiple levels, to provide sufficient, appropriate and accessible food to all, in the face of various and even unforeseen disturbances" (Tendall et al., 2015). This same focus on living through uncertainty is also present in Hobart and Kneese's definition of care: "a set of acts, ideologies, and strategies that offer possibilities for living through uncertain times" (Hobart & Kneese, 2020). With them, our research explores how care provides resilience strategies.

In this paper, we ask: What is the meaning of care in the context of food systems, and how can the integration of care in food systems contribute to building food systems

resilience in a nontraumatic way? In other words, what does care mean for food systems, and how can food systems resilience be enhanced and transformed by care?

As we discussed earlier, care and food systems resilience research brings together various disciplines. Our methodology consists of thematic reviews of the literature on care in the context of food production, to explore how different fields study care in food systems and bring them together in this interdisciplinary inquiry. Going beyond the academic literature, we also include the voices of "everyday experts" (The People's Knowledge Editorial Collective, 2017) in food systems. This grounds our research findings in the lived reality of those who inhabit these systems. Indeed, food systems connect multiple and diverse actors, ranging from farmers, food workers, gardeners, consumers and chefs to food pantry organizers, distributors, waste collectors, researchers and each and every one of us. Whether we consume, garden, farm, research, purchase, cook or donate, food is omnipresent in our lives, and we are "everyday experts" in segments of food systems, each in our own way.

Between 2018 and 2021, we interviewed 35 participants from Arizona (USA), France and Havana (Cuba) about their definitions of care within food systems and the relationship care shares with food systems resilience. We analyzed the interviews using grounded theory and weaved the voices of interview participants with our literature review.

In Section two, we detail the methodology of data collection and analysis, and we explore the concept of food systems resilience in Section three. Section four is centered on the concept of care and especially what it means to practice care in the context of food systems. Section five includes a detailed analysis of the definitions and practices of care shared by our interview participants. Lastly, we propose a definition and a conceptual map

of care in the context of food systems, and identify where the concept of care can enhance and contribute to food systems resilience research and policy.

Methodology

Thematic Analysis of Academic Literature

In parallel, we reviewed the literature on food systems resilience and on care in the context of food systems, using key words such as "care theory," "care practices," "agriculture," "farming," "food systems" and "resilience." We used search databases such as Google Scholar and ProQuest. Although the interviews were conducted in multiple languages, most of the literature reviewed was in English, with the exception of a few resources on food systems resilience published in French (Les Greniers d'Abondance, 2020, p. 1; Rouillay & Becker, 2020, p. 5).

Semi-Structured Interviews

The concept of everyday experts is defined by the People's Knowledge Editorial Collective as "people whose expertise comes from their life experience rather than from professional training" (The People's Knowledge Editorial Collective, 2017, p. 20). We draw on the work of A. Herman (2015) on agricultural resilience, which underlines the importance of "embedding resilience research within the internal and external sociocultural understanding, practices, and networks in which farmers are enmeshed" (Herman, 2015, p. 7), and we integrate the voices of "everyday experts" in food systems to our analysis of food systems resilience and care. For the purposes of this research, we conducted 35 semi-structured interviews: 11 in Havana, Cuba, 7 in French cities and 17 in Phoenix and Tucson in Arizona, USA. We chose participants with different occupations, from different cultural backgrounds and living in countries with different economic systems and languages to

identify similarities in their approaches to care in food systems that can serve as common grounds in spite of these differences.[6] All interviewees are everyday experts in food systems (see Table 1), and 20 of them had received training in permaculture. Indeed, permaculture theory and practice is rooted on "three care ethics" (B. Mollison, 1990, p. 2) and applies to food systems. With this in mind, we specifically chose participants with such a background to better capture their understanding of care and how it relates to food systems resilience. We were careful not to reduce our sample to only permaculture practitioners in order to stay open to other approaches to care. Additionally, 21 of the interviewees were participants in either gardening or farming practices. Although food systems actors go beyond people who grow food, we wanted to get a good understanding of how those who work closely with the land perceive care. We asked the participants about their definitions of care, how they practice care in their relationship to food, and their general views about the resilience of food systems.

Table 1

Interview Sample[7]

Occupation	Cuba	Arizona	France	Total	Permaculture training
Gardeners and educators	1	8	3	12	10
Farmers and farmworkers	3	5	1	9	7
Artists	3	0	0	3	0
Food systems researchers	2	1	1	4	2

[6] There are roughly 6,500 spoken languages in the world, and this work does not attempt to identify one unique and global vision of care, but to identify similarities within an international sample of everyday food experts.

[7] When participants fell into 2 or more categories, for example an engineer who was also a gardener, we asked them to self-identify and used that identification to classify their occupation.

Food policy analysts and coordinators	0	2	1	3	0
Restaurant chefs	2	0	0	2	0
Botanist naturopaths	0	1	0	1	0
Engineers	0	0	1	1	1
Total	11	17	7	35	20

The interviews in Cuba were conducted during a field trip in the summer of 2018. Interviews with Arizona and French participants were conducted in 2020 and 2021. Whenever possible, the interviews were conducted on site, in a setting chosen by the participant. As a result, 11 interviews took place outside, among which 7 were walking interviews (Evans & Jones, 2011); and 4 interviews took place indoors. Due to COVID and the restrictions on international and domestic travel, the majority of the interviews were conducted over Zoom (29). All the interviews were audio recorded and conducted in the native language of the participants – English, Spanish, or French. The first author conducted all the interviews and is a native French speaker, fluent in English and Spanish. She first used a digital transcription system to transcribe the interviews (Zoom for the interviews conducted online, and Sonix.ai for the other interviews), then cleaned the transcripts and imported everything into the software MAXQDA for data analysis. Although the interviews were conducted in an international setting and in different languages to limit linguistic bias, the focus of this analysis is to identify the similarities in care approaches and practices within a diverse and international sample, and not to conduct a comparative analysis.

Data Analysis

Because there are no existing theories focusing on care in the context of food systems resilience[8], our research was largely exploratory, and we used grounded theory to analyze the interviews (Bernard et al., 2017; Glaser & Strauss, 1967), taking the following steps: (1) coding and theorizing as we went, (2) memoing and theorizing, (3) building and refining theories.

In the first phase, we performed open coding for each of the transcripts, fragmenting the data into conceptual components, and then created categories to bring these different codes together. To name these categories, we either consulted the available literature (for example, one of the subcodes is Earth care, which is directly borrowed from permaculture research) and derived a category name, or considered words used by the participants or *in-vivo* (for example, our subcode "internal disposition"). Although the coding was largely completed by the first author, care definitions in French and in English interviews were also coded by a native speaker, which opened discussions and clarifications of the coding structure. Memos were used throughout the coding process, to facilitate the theorizing process. The analysis required multiple readings and reviews of the interviews; because some took place in 2018, the readings and reviews served to freshen our recollections. Lastly, we used the system of categories and subcategories to create a codebook (Table 2) and conducted selective coding.

[8] There is existing work that discusses the contribution of care in general and care theory more specifically to social resilience in agriculture (Herman, 2015) and to agricultural systems (Curry, 2002), but – to our knowledge – no other work dives into what it means to care in the context of food systems, and what that means in the context of food system resilience.

Table 2

Codebook

Concept	Category	Subcode	Description
Care	Interconnection		Beliefs that humans and nature are interconnected, what happens to one happens to the other.
	Motives	Responsibility	Both references to laws, duties, imperatives, and notions of reciprocity and kinship.
		Emotions	Importance of emotions and affection in decisions to practice care. Also include instinctive impulses to care.
	Practices[9]		Any specific action that is taken or should not be taken in the practice of care.
	Outcomes	Health	Both human and environmental health. Includes physical integrity, emotional health, happiness, ability to thrive and autonomy.
		Bonding	Sense of connection and love as a result of care practices (both for the care-giver and the care-receiver) and group collaboration.
Food Systems Resilience	Hazards		Short - or long-term events that directly challenge the ability of the food system to function (Biehl et al., 2017).
	Vulnerabilities		States of susceptibility, i.e, the likelihood that at a given time in the future, people, properties and resources will be impacted by hazards (Biehl et al., 2017).

[9] In **Practicing Care in a Food System Context** (p 49) we detail all the care practices that were listed by interview participants.

Integration of Academic Experts and Everyday Experts

Finally, we would like to highlight that although it is common for research publications to separate the review of the literature from the data analysis and results section, we chose to weave together the voices of the "everyday experts" with the voices of the "academic experts" by matching the coded interviews with themes from the literature that emerged during the review. Although the literature review was not consistently thematically coded, themes emerged through the process of reading and writing, and we matched them with quotes that addressed similar themes. As such, the reader will find quotes coded as "hazards" and "vulnerabilities" expressed by the participants in the section "Food Systems Resilience." Similarly, in the section "Approaches to Care," quotes from the interviews either serve as examples of the academic literature or as a response to it. The quotes are directly integrated in the text, with its code and the occupation and location of the everyday expert. The intention is to present a dialogue from both sources, weaving them together to develop our model of care for food systems resilience.

Food Systems Resilience

Defining the Concept

The concept of resilience is a powerful communication tool, thanks to its strong emotional resonance (Bartlett & Mistry, 2021). Indeed, although the term resilience was initially coined in the context of engineering, it has been largely used in socio-ecological systems (SES) studies and in psychology, which led the general public to adopt the concept as part of the common language. A 2019 report on food systems resilience authored by the United States Department of Agriculture (USDA) covers the differences in definitions of resilience, depending on the field of study (Harris & Spiegel, 2019).

In the material sciences, resilience is defined as the ability of a material to absorb energy without it leading to its permanent deformation, and to return to its original state. It is a core element of a material's stability (Harris & Spiegel, 2019; Hoddinott, 2014). In psychology, resilience defines the ability of an individual to overcome single or multiple stressful or adverse events, or to come out of difficult situations with a relatively good outcome, despite the risks associated with these experiences (Graber et al., 2015).

In both engineering and psychology, resilience is a desirable attribute, which is why the term "resilience" has such a positive connotation in the collective imaginary. In socio-ecological systems however, resilience is not desirable per se, it is a system's property (Hodbod & Eakin, 2015). SES resilience definitions draw from the foundational work of Holling who defined ecological resilience as "the persistence of systems and their ability to absorb change and disturbance, and still maintain the same relationships between populations" (Holling, 1973). Resilience theory in SES takes a systemic approach on the phenomenon it studies, and it invites a reflection on the stability and the vulnerabilities of such a system and its adaptive capabilities (Lei et al., 2014; Miller et al., 2010). Yet – once again – it doesn't signify that a resilient system itself is desirable, as some resilient SESs are also associated with a long list of negative outcomes. This, for example, is the case of some food systems, which are specific cases of SES (Hodbod & Eakin, 2015) that can very well persist after withstanding shocks and absorbing change (i.e., extreme weather events) while maintaining the same relationships between populations (i.e., dependency of crops to chemical and fertilizer use).

In food systems studies, food security – the idea that "all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (World Food Summit, 1996) – is

generally accepted as a normative threshold for food systems resilience (Biehl et al., 2018; Chodur et al., 2018; Harris & Spiegel, 2019; Hodbod & Eakin, 2015; James & Friel, 2015; Tendall et al., 2015; Toth et al., 2016). In this context, food systems are not resilient if food security is not achieved, and food systems resilience can only be desirable if food security is achieved.

This begs the question of individual food security: If people are food insecure, can we say food systems are resilient? Logically speaking, if food security "for all people, at all times" is the normative threshold, then if only some people experience individual food security, " it is not enough to call the system resilient. This is critical to analyze the relevance and impact of food systems resilience assessments and policies, as they often operate within this tension. Indeed, much of the food systems resilience literature and case studies focus on analyzing the impacts of potential hazards on existing food systems in order to maintain the food security of those who are already experiencing food security (Zeuli & Nijhuis, 2017). But, they may or may not acknowledge the coexisting and the more problematic food insecurity. According to the Food and Agriculture Organization (FAO), food systems resilience is "the ability to prevent disasters and crises as well as to anticipate, absorb, accommodate or recover from them in a timely, efficient and sustainable manner," and it includes the "capacity of a household to bounce back to a previous level of well-being (for instance, food security) after a shock" (FAO, 2016, p. 1).

This definition emphasizes the importance of preparedness for unforeseen events, especially disasters and crises, that could threaten households' food security. But, what about those who are food insecure, what state, then, are they bouncing back to? In the next subsection, we clarify the concepts of "hazard" and "vulnerability" that are found in food systems resilience literature that considers the trauma produced by the current food systems.

Hazards, Vulnerabilities and Traumas

Hazards (or threats) are short- or long-term events that directly challenge the ability of a food system to function. Here, we use "hazards" and "threats" interchangeably. Climate change, biodiversity collapse, soil erosion, pandemics, extreme weather events – flooding, storms, Drought, extreme heat, thunderstorms – political unrest, economic depression, resource shortages, energy price increase, food or water contamination, terrorism, natural disasters, farm labor shortage, damages to cyber infrastructures and technological failure are all examples of threats to food systems (Biehl et al., 2017; Chodur et al., 2018; E. G. Giraud, 2021; Les Greniers d'Abondance, 2020). Additionally, two everyday food experts from our sample commented on specific hazards – political regime change and climate change – and their impacts on the food systems.

After the USSR socialist regime collapsed in 1990, Cuba lost its most important trade partner and supplier of oil and energy, threatening the island country's economy and agriculture. Very suddenly, the food supply dropped drastically, and people experienced food and basic necessities in short supply, a time called by the late Cuban president Fidel Castro the "Special Period in Time of Peace." A Cuban artist shared family memories from that time:

The stories that my parents share with me are insane. I mean, my dad … my parents are doctors… and my dad was riding a bike to the fields to exchange shoes and clothes to get food for us. These were very, very, very difficult times, extremely difficult, with constant electricity cuts because there was no oil to produce electricity. There was nothing. No cooking oil, no soap. There was nothing. There was nothing. (Artist, Cuba)

The looming threat of climate change to the food system is not so looming anymore, it is very much present, here and now. A Phoenician farmer spoke of what the rising temperature in the capital city of Arizona has done to their work:

It's gotten hotter. Our growing season starts later in the fall. We don't have rain. We don't have frost. Yes, in the 15 years that I've been farming, there is a definite, definite change in temperature … we've seen a drastic temperature change happen in the winter months, we used to freeze and I used to cover every night with frost cloth and it was icy and frostbitten and cold, and we'd have to take that cloth off and let it thaw and we're not right now and we have it for the last five to seven years … not only are the temperatures rising, but what comes along with that is change too. Bugs that used to die in, you know, wintertime are staying through. So those are the ramifications of the increased temperature. (Farmer, Phoenix)

Vulnerabilities describe states of susceptibility, the likelihood that at a given time in the future, people, properties and resources will be impacted by hazards (Biehl et al., 2017; Harris & Spiegel, 2019). Resilience assessment usually differentiates hazards from vulnerabilities at a given scale. Specifically, at the urban scale, it allows the identification of threats which are external to the city, such as extreme weather events or economic crises, and how these would affect specific people, places and resources. In looking at the food system through a vulnerability lens, we can observe social trends, organizational factors and governance elements that could be direct outcomes of local policies; this is usually where food systems resilience assessments will highlight existing chronic food insecurity (Harris & Spiegel, 2019). Other vulnerabilities in our food systems include an ageing farming population, loss of farming knowledge, loss of farmland and the system's dependency on shrinking fossil energy and mining resources (E. G. Giraud, 2021; Les Greniers

d'Abondance, 2020). Path dependency on the dominant technology model of industrial agriculture (Calo et al., 2021), and differentiated and separated management of food production, transformation, processing, distribution, consumption and waste management (Hodbod & Eakin, 2015) are additional vulnerabilities. However, whether policy makers focus primarily on vulnerable populations, it must be understood that properties or resources can drastically change the policy outcomes, and these choices reflect priorities and power dynamics. One such example can be found in zoning regulations, according to one food systems coordinator interviewed:

Farms and some produce co-ops tend to lose their farmland. It's on the verge of it. One West Valley farm is about to lose their acreage, another farm here in South Phoenix "Crooked" is about to lose 40 acres here in South Phoenix … and all of it, all around them, you can see either commercial or residential development. And the higher value of these developments is not in the quality of life and the beauty and the open space that the farms create. Like, if you bring all the tech support people in the world and everybody who wants to make a six-figure income and raise their children in a safe environment, if you bring all that here, but all you have is concrete and houses and you don't have a place to go visit something maybe bigger than what humans can make by themselves … I think we're off base and it's a struggle … The housing and the warehouses are built on the most arable land and it's like … Wow. Oh, well, you know, tech companies use a lot of water and people say "those farms, they're just using up all our water." I wonder where they think the food will come from to feed all these people. (Food systems coordinator, Phoenix)

Although vulnerabilities are usually where the policies and recommendations focus, many of the hazards listed previously are direct consequences of socio-economic systems to which food systems are integrated and in which power dynamics are embedded. The concept

of trauma further highlights these power dynamics in our food systems. Instead of looking at hazards, and the magnitude of impact, this concept focuses on the past and current traumatic experiences that occur in the system. The chronic food insecurity of 10.5% of Americans (USDA ERS, 2021), and 9.9% of undernourished people around the world in 2020 (United Nations, 2021) is not only vulnerability to a set of growing threats, it is traumatic. Primarily, it is traumatic for the people who have to live through recurring states of hunger, and the psychological and physical consequences of it. It is also traumatic for the observers who either have to face these people directly or who know about it and must deal with their own mixed emotions of compassion and powerlessness. The living conditions of industrialized farm animals are also traumatic, as these stock spend their lives treated as commodities, often physically abused and prone to diseases, merely awaiting slaughter. Wildlife outside the pens and corrals is equally susceptible to countless instances of trauma, either through such manmade obstacles as deforestation, abandoned fishnets, reductions in available fresh water sources, the massive use of pesticides that threatens insects, plants and microorganisms, as well as other space and food limitations.

For those of us who live with the knowledge that our ways of life – and our ways of eating, more specifically – directly harm billions of other beings is traumatic. It can be painful to simply enter a supermarket and make a choice for what to eat, wondering who and what we are supporting in the process, and which kind of blind perpetuator we will be. But because we are the "lucky ones" who do not suffer from chronic food insecurity or have to give birth entangled in a fishing rope (Bynum, 2021), there is little room to even recognize that we, too, are traumatized. Ujuaje and Chang (2020) discuss these multiple levels of trauma (victim, observer, perpetuator) and how they are directly integrated into our food systems. Far from being simple negative externalities, traumas are constitutive and are

products of our food systems that obey logics of "a colonial, capitalizing force of violent dispossession" (Ujuaje & Chang, 2020, p. 1).

We argue that unveiling the multiple traumas produced by our food systems is an important step in their positive transformation and in the collective healing critical for "true" food systems resilience and food security for all. Indeed, many of the hazards listed earlier (i.e., climate change and biodiversity loss) can be seen as traumatic responses from the beings that our socio-economic systems (including our food systems) marginalize and sacrifice. Accepting the idea that the food systems we have inherited from previous generations are producing structural trauma opens the avenue for care practices to restore health and well-being.

Defining Care in a Food Systems Context

Approaches to Care

Indigenous knowledge.

In the definitions of resilience and in reviewing the origins of the concept, we often forget the importance of Native peoples' knowledge and relationships with nature, which sustained them for thousands of years before colonial conquest (Shilling, 2018). Although indigenous knowledge and beliefs vary around the world, they share a number of similarities, so much so, they have been unified into the concept of "traditional ecological knowledge" (Nelson & Shilling, 2018). In particular, "care" is a core element in indigenous knowledge, especially as it permeates human-human and human-nature forms of relationships. Indeed, a foundational aspect of indigenous worldview is that all humans and the natural environment are interconnected, which grounds the practice of care and extends it to all of the living world (Whyte & Cuomo, 2016). There is no strict ontological separation between the two.

Similarly, there is no distinct and separated self (McGregor, 2018). The self is inherently relational and woven within multiple coexisting entities: community, family, ancestors, future generations, animals, plants, spirits. This implies that one cannot fully isolate an action from all these entities.

Caring means "I'm aware, I'm conscious that everything is alive and everything is biologically linked forever." Everything is intricate. There is no "there is the water here, the soil here and the human here and the carrot here and one tree here." No, everything is in connected. (interconnection – Farmer, France)

When it comes to food, growing, cooking and feeding is inherently a partnership between these groups. A sense of kinship and reciprocal obligation brings these entities together and regulates human behavior toward the natural elements and their community; indigenous knowledge systems recognize biodiversity as part of their family (Salmón, 2012). Indeed, for example, seeds, rivers, the land and animals are considered to be living ancestors, and must be treated with respect. They provide food, water and clothing for humans, and humans must reciprocally care for them. The community is granted the same level of reverence and respect. "And I believe that as a family, we have the responsibility towards the sustainability of the place we live in; I mean, to really make my environment more livable, as a habitat" (responsibility – Researcher, Cuba).

Love and affection infuse this reciprocal ecology. When the Earth is referred to as a mother, it is not a conceptual exercise of material and genetic filiation; it is a filiation rooted in love, humility, affection and generosity. "I strengthen my relationship to the tree and to the Earth through that act of acknowledgement" (bonding – Educator and Gardener, Arizona).

Botanist and member of the Citizen Potawatomi Nation Robin Wall Kimmerer recalls a conversation with her daughter Linden:

Linden is immensely busy, and so I ask her why she gardens, given how much time it takes. She does it for the food and the satisfaction of hard work yielding something so prolific, she says. And it makes her feel at home in a place, to have her hands in the earth. I ask her, "Do you love your garden?" even though I already know the answer. But then I ask, tentatively, "Do you feel that your garden loves you back?" She's quiet for a minute; she's never glib about such things. "I'm certain of it," she says. "My garden takes care of me like my own mama. (Wall Kimmerer, 2013)

For those of us who have grown within a system of thoughts which views the natural environment as different shapes of matter animated by a life denied of consciousness, it can be very difficult to reckon with the idea that the nature around us – the soil, the wind, the trees and the plants – loves us and takes care of us with affection. But this understanding is an essential part of the indigenous knowledge system, and a corollary of the fundamental equality between all forms of life. This affection invites humans to reciprocally care for one another and for nature, not because of an abstract moral duty, or of a legal right of nature to be respected, but because we ought to care for it like we care for family: out of love. An example of such level of care is expressed by one the people interviewed for this study:

I am a plant fan, I am one of those who caress my plants when they bloom and all that, oh my, when they make themselves pretty… look at that one… I love this tree, I love it… I talk to my plants, I caress them, I kiss them. They tell me that I am crazy, I don't care… the plants are my life. When I go out, for example, to my daughter's house, when I come back, the first thing that I do is to go out on the patio, to see the plants, and I say "give water to the plants, don't let them die." You see me, I am constantly living next to my

plants … If you don't take care of the plants, they don't get as beautiful. If you mistreat them and don't … if you don't love them … See, let me give you an example from one of my neighbors. She really likes plants, so she planted some in half of her garden, and her husband planted the other half. But she planted them with a lot of care, carefully, with affection. And the husband, he planted them quickly, without really being into it. All the ones that he planted died off, and hers all bloomed. The plants, they know, as I say, they are living beings and they can understand you, they can hear you, and they listen to you. (emotions – Gardener and educator, Cuba)

Creation care.

In Cuba, an interview participant highlighted the importance of working with churches and communities of faith for environmentalism: "In the end, we want sustainability, we want a better environment, we want to regenerate the creation … because we work with Cuban churches, and we work with churches, and they are focused on regenerating the creation" (health – Researcher, Cuba). Indeed, in the three largest monotheistic religions – Judaism, Christianity, and Islam – the natural world is one of the many expressions of God's power and infinite love for all that lives. God is the great provider, and He provides all things needed for life. Food is especially a recurring theme:

> Who provides food for the raven
>
> when its young cry out to God
>
> and wander about for lack of food
>
> (*New International Version Bible*, 2011, Job 38:41)
>
> And:
>
> Look at the birds of the air; they do not sow or reap or store away in barns, and yet your heavenly Father feeds them

(*New International Version Bible*, 2011, Matthew 6:26)

And:

He blessed the earth and measured therein nourishment for all things.

(Quran 41:10)

However, these religions, and especially Christianity, have been accused of promoting environmental destruction. In a well-known article published in *Science*, Lynn White Jr. largely blames Christian theology and the Old Testament chapter of Genesis in particular for framing a dualism between man and nature, and making Christianity "the most anthropocentric religion the world has seen" (White, 1967, p. 1205). According to White (1967), this founding story serves to justify environmental destruction and exploitation for the sole benefit of man. One of the most targeted examples found in Genesis can be seen when God tells Adam and Eve to subdue the Earth and to rule over living creatures: "[F]ill the earth and subdue it. Rule over the fish in the sea and the birds in the sky and over every living creature that moves on the ground" (*New International Version Bible*, 2011, Genesis 1:28).

Yet, the concept of "care" – including environmental care – is also strongly rooted in religious texts. In the words of Roger S. Gottlieb, a historian of religious environmentalism, "[I]t is the task of religious environmentalism to set itself against the reigning social vision, putting forward values that will ultimately serve people and the Earth far better than the ones currently in place" (Gottlieb, 2009, p. 13). Evangelical environmentalism and the "creation care" movement invite believers to be stewards of God's creation, that is to care for humans and the natural environment. The movement primarily draws its commitments from the Bible, in particular Genesis 2:15: "The Lord God took the man and put him in the Garden of Eden to work it and take care of it" (*New International Version Bible*, 2011, Genesis

2:15) The command to take care of the Garden of Eden comes before God forbids Adam to eat from the tree of knowledge; Adam's disobedience sets the stage for the man's fall. Evangelical environmentalists believe that our collective failure to tend for the world and our tendency to take more than we need is nothing less than an amplified echo of the original sin. Nature is not worshiped for itself, but humans must take care of it because it is the image[10] and the belonging of its Creator[11].

In 2015, the Pope Francis' Encyclical Letter "Laudato Si'" was released. It calls Catholics around the world to "care for our common home" (Pope Francis, 2015, p. 1). The title "Laudato Si" is an echo to a canticle by Saint Francis of Assisi praising God for the Earth.[12] The figure of Francis of Assisi is famous for his care for the poor, his mystic pilgrim lifestyle and his preaching to animals, flowers and even the sun. By opening his encyclical with such a figure, the Bishop of Rome anchored his call to Catholics in a symbol of devotion to God through a relationship of equality with the environment. Later, Pope Francis writes:

I would like to show how faith convictions can offer Christians, and some other believers as well, ample motivation to care for nature and those of their most vulnerable brothers and sisters. If the simple fact of being human moves people to care for the environment of which they are a part, Christians in their turn "realize that their responsibility

[10] "Through the greatness and the beauty of creatures one comes to know by analogy their maker"(Wisdom. 13:5 as cited in Pope Francis, 2015, 12) (Wisdom 13:5)

[11] "Everything under heaven belongs to me" (*New International Version Bible*, 2011, Job 41:11)

[12] "Praise be to you, my Lord, through our Sister, Mother Earth, who sustains and governs us, and who produces various fruit with colored flowers and herbs" ("Canticle of the Creatures," 1999, as cited in Pope Francis, 2015, 1)

within creation, and their duty towards nature and the Creator, are an essential part of their faith" (Pope John Paul II, 1990, 15). It is good for humanity and the world at large when we believers better recognize the ecological commitments which stem from our convictions. (Pope Francis, 2015, 64)

Like in indigenous knowledge, creation care inspires responsibilities, obligations and duties toward the natural world. The natural environment is God's creation, thus, it ought to be respected, and the food that we receive is a testimony of God's love and care for his children. However, the sense of kinship primarily exists through and with God – the Father – and with other believers. Although the holy texts reference prophets and saints seeing God in and through his natural creation, God exists beyond and independently of the created order. If humans and the natural environment are interconnected, it is through the Creator, and the sense of self is distinct. After drawing attention to and endorsing the theological roots of modern American environmentalism, Evan Berry, as assistant professor in ASU's School of History, Philosophy, and Religious Studies, writes that American environmentalism "appears to have remained committed to the notion that human beings are ontologically independent of the biophysical world and that the well-being of the world presents humanity with a spiritual challenge irreducible to scientific, technical terminology" (Berry, 2015). Contrary to indigenous knowledge that recognizes the spirit of animals and plants, and regards them as family members and parts of the self, none of the monotheistic religions does. Care for the environment is primarily perceived as a moral duty. Consider this idea voiced by a Cuban farmer and interview participant:

When you stop charging a price for the sake of it, even to an old lady (who cannot afford it), it gives you the measure of human essence … The day that we lose this, we would stop living by principle … And I am not talking about political principles, but about ethical

principles; we would stop living by ethical principle, we would be failing our values. So we sell things at much lower prices than we could otherwise, because it feeds us on a spiritual level. (responsibility – Farmer, Cuba)

Feminist care theory and ecofeminism.

In the 1980s, Kant's universal moral principles – so-called Kantian Ethics – were formally challenged by feminist care ethics. In opposition to the idea that morality is the prerogative of rational individuals making objective and detached decisions based on abstract principles, feminist care ethicists – beginning with Carol Gilligan's work on ethical relationships – affirmed the idea that the concept of self is inherently relational and that moral decision making occurs in response to these relationships (Noddings, 2012). In the words of one Cuban chef, "there is … an understanding of the interaction between species, of the relationship between me and the environment, between me and the other, of my connection to the other, of my own specie … we are a big web" (interconnection – Chef, Cuba).

Indeed, from birth to death, human beings require care and connection to grow, survive and thrive. However, care is – still today – largely performed by women. Gilligan's work found that when surveyed, women were more likely than men to view moral disputes within their given context, assigning weight to the relational aspects of a given scenario rather than referring to a universal set of codes, ala Kant. Women were often perceived as irrational, too emotional and less able to make sound moral decisions than men.

Feminist care ethicists such as Gilligan, Noddings, Held and Tronto, among others, helped to elevate care as a valid form of moral judgment within Western philosophy. Additionally, care ethics recognize the importance of emotions and affection in moral decision making and for the very practice of care. In 2019, Vincent Duclos suggested it may

be "by way of the inhuman – the insensible, the irrational, the unfathomable, and the incalculable – which is 'always already within us,' that humans come to care, respond and be in touch with the other ..." (Duclos, 2019)

Emotions and affections are both motives and components of the practice of care. In talking about care, a Phoenician gardener and educator who participated in the interview process talked about his affection for his plants: "I put seeds in the ground. I spent money on them. I've spent time preparing the ground. I've watered it. They're my babies now; there's an emotional connection" (Gardener and educator, Phoenix).

In her work with Berenice Fisher, feminist scholar Joan Tronto defines care as follows:

On the most general level, we suggest that caring be viewed as a species activity that includes everything that we do to maintain, continue, and repair our "world" so that we can live in it as well as possible. That world includes our bodies, ourselves, and our environment, all of which we seek to interweave in a complex, life-sustaining web. (Tronto, 1993, p. 103)

For the philosopher Daniel Engster, this definition of caring is centered on the general functions necessary to reproduce human life and society. He expands this definition by highlighting "the development and basic well-being of another" as the end of caring activities (Engster, 2005, p. 51). Engster distinguishes three aims of caring necessary for individual survival, development and social reproduction: 1) meeting the basic biological needs (food, water, shelter, rest, protection from harm, physical contact, a clean environment), 2) helping others to develop or sustain "the capabilities necessary for basic functioning in society" and 3) "helping individuals to avoid or relieve suffering and pain so that they can carry on with their lives as well as possible" (Engster, 2005, pp. 51–53). The researcher also posits that caring does not only extend to the satisfaction of these ends, but

as well according to the virtues of caring: these "are constitutive of caring in the sense that one cannot successfully achieve the aims of caring without them, or at least do so with any regularity" (Engster, 2005, p. 55). He lists three virtues of caring: attentiveness, responsiveness and respect:

In sum, caring may be said to include everything we do directly to help others to meet their basic needs, develop or sustain their basic capabilities, and alleviate or avoid pain or suffering, in an attentive, responsive and respectful manner. (Engster, 2005, p. 55)

Born of the American environmental and feminist movements, ecofeminism integrates the centrality of care, relationality and emotions in ethics with the notion of stewardship for the nonhuman. In doing so, parallels can be drawn between the oppression and exploitation of women, people of color and that of the nonhuman (i.e., animals, land and ecosystems).

In 1991, ecofeminist Deane Curtin wrote, "[A]n environmental ethic is incomplete if it does not in some important ways take into account feminist ethical perspectives" (Curtin 1991). This distinction can be seen as a node from which traditional environmentalism grows to rightfully encompass the interlinked social issues tied to conversations of nature and society. "I like to emphasize 'elements in relationship,' whether we're talking about people or plants or buildings or mountains or whatever – it's all about relationships" (interconnection – Gardener and educator, Arizona). However, as Christine Cuomo notes in *Feminism and Ecological Communities: An Ethic of Flourishing*, care for the nonhuman can and has been purported as mutually exclusive from matters of social injustice (Cuomo, 1997). Exclusive environmentalism meshes quite well with ideologies of oppression, notably including German National Socialism. "While some idealize the purity of nature and uphold it as a model for social control, others notice the commonalities among the assumptions

behind various types of cruelty and mistreatment" (Cuomo, 1997, p. 15). Though there is no unified ecofeminist voice, ecofeminists focus on the ways that racial, gender and environmental exploitation overlap, and how this combination has been/is used to fuel systems of oppression.

Far before Gilligan formally introduced the notion within Western academia, care has been utilized as a tool of social and political resistance. "Radical care" can foster a sense of community among those who have been marginalized by privatized systems of care, as well as victims of state violence (Hobart & Kneese, 2020). Notes a self-identified educator and gardener in Tucson, and an interview participant:

We do a lot of projects together in communities, so I think what I enjoy the most is not necessarily like the finished product, but the process to get there, you know. I think that's like when we do a process that involves everybody's voices and inputs and … that's really energizing for me. (bonding – Educator and gardener, Tucson)

During the American Civil Rights Movement, the Black Panther Party carried out a series of care-based initiatives to strengthen community ties, as well as the overall health and resilience of those who were systematically trodden upon. The Panthers implemented programs to ensure health care, housing and food security (Hobart & Kneese, 2020). Care is often wielded in this way, today, as in Hobart and Kneese's 2020 publication that defines radical care as "a set of vital but underappreciated strategies for enduring precarious worlds" and "a collective capacity to build an alternative to colonialism and capitalism" (Hobart & Kneese, 2020).

Approaches to Care in Food Production Spaces

There is limited but notable work that examines the relationship between "care" and food production (Curry, 2002; Leck et al., 2014; Puig de la Bellacasa, 2017b), but the scope

and approach to care in food systems varies. In this section, we first give an overview of some of these works, and then specifically focus on permaculture and how it integrates care in agricultural space design.

Caring systems of agriculture and care farming.

The work of Janel Curry on "caring systems of agriculture" examines how care theory can help reveal the moral choices involved in food systems (Curry, 2002). The liberal assumption that humans are autonomous self-defining individuals prioritizes individual rights over community health or social harmony under a veil of apparent neutrality. In agriculture, this translates into an emphasis over farm profitability at the expense of public health (i.e., effects of pesticides on cancer, fertility, endocrine system, degenerative diseases, etc.) or environmental destructions (i.e., water eutrophication and soil erosion).

Care theorists insist on the relational and embedded nature of humans, which emphasizes the importance of communities and of living in harmony with the natural environment. Adopting a care approach to agriculture implies the understanding of individual autonomy as something fundamentally relational; there can be no autonomous individual who would be totally stripped of relationships. Second, J. Curry recognizes that emotions, attentiveness and attachments need to be integrated as valid elements of agricultural knowledge. For example, our emotions and our attachments to landscapes are powerful tools for agricultural research because they express the relational reality of a particular space and help us understand, even appreciate, the motives of a farmer's specific action with the space. Attentiveness to the local ecology moves the attention away from the self to the other and reveals the uniqueness of a place and its inhabitants. On this

foundation, Curry develops a framework for caring agricultural systems[13], and recommends new research methodologies and policies which include "care" in the measure of efficiency. Her analysis goes beyond the food production space and expands to the food system at large, especially integrating multiple levels of governments and the impacts of their policies on agricultural systems. Building on the work of Tronto, Curry considers the practice of care "not only as a moral concept, but as a political concept as well" (Tronto, 1993, p. 161) and calls for "re-binding politics and morality" in food systems (Curry, 2002, p. 129), that is to forego the illusion of morally neutral policies.

"You must take care of the farm. When you produce organic food, you must be there and constantly maintain it" (responsibility – Farmer, Cuba). Green care, care farming,

[13] List of caring agricultural practice by J. Curry (Curry, 2002, p. 129):
1) Start with the assumption that humans are primarily relational.
2) Expand on the government's role to include the promotion of harmony among citizens, rather than just individual freedom.
3) Include community health and vitality into the realm of political action.
4) Re-bind politics and morality: No longer should the local be considered biased.
5) Recognize moral decision making as a process where individuals and groups use an ethical framework grounded in deeply felt beliefs to construct meaningful everyday lives.
6) Include connection, engrossment, attachment and interest as requirements of reason and morality.
7) Describe experiences of wholeness and use them as goals toward which to work: Build on the best picture of ourselves caring and being cared for.
8) Lessen social distance as a way of increasing embeddedness and relational wholeness.
9) Build agricultural systems that are socially and ecologically embedded rather than trans-locatable.
10) Measure social embeddedness of agricultural systems by the richness of their connection to the local environment and local economies.
11) Avoid moving "caring" into realm of problem but maintain it as fundamentally relational.
12) Focus on skills that require enhanced relationships over skills that only involve technical systems: Skills of husbandry trump skills of following directions.
13) Enhance attentiveness to the "other."
14) Support discovery rather than invention or control.

and therapeutic agriculture have become catch-all descriptors for the varied approaches to re-center care within agricultural practices. The binding notion among the unfolding portfolio of green care practices is the view of the farm as a "locus of care" (Leck et al., 2014). Industrial agriculture notoriously sidelines care, and in its prioritization of efficiency and profit, the exploitation of land, life and culture are the byproducts. By prioritizing care within agricultural practices, "care farming can help to facilitate reversion back towards activities that sit more comfortably with the intrinsic values of farming" (Leck et al., 2014).

Care farming can take the form of operational rehabilitation centers. Another form of care farming is the provision of aid and/or therapy for those with disabilities. From a bird's-eye view, the idea of care farming can be understood as a reconnection to the agricultural practices that sustain us, and through it a reconnection the nonhuman entities hold within them. Drawing from Richard Gorman's work on the role of human-animal relationships within care farming, the welfare (physically, socially and emotionally) of the care provider is intertwined with the welfare of the recipient of that care (Gorman, 2017). Leck, Evans and Upton point to this as a unique combination of production and consumption happening concurrently, and indeed, responsively to one another (Leck et al., 2014). In this way, the basic needs required to support life on a farm call for the production of care alongside the production of food, and in turn nurturing deeper connections among people, animals, ecosystems and place. As the actions involved in providing care have proven beneficial to those who provide care in a multitude of forms, the benefits of this care flow multidirectionally. The depth of opportunity on this front has led to interest in the rebranding of care farming with a term reflecting its full potential. In 2014, survey-based research among care-farmers in the UK came to suggest "connective agriculture" in its place (Leck et al., 2014).

Similarly, the work of K. Morgan also seeks to unpack the nuances of care within agriculture, beyond the scope of farms themselves. Debunking the idea that locally sourced agriculture and global fair trade are opposing approaches to forming a more ethical foodscape, Morgan illustrates a way in which both approaches are complementary; what he calls a "new politics of care" (Morgan, 2010, p. 1860). The contention becomes reality when 1) reframing care as a "function of the public sphere" occurs, and 2) challenging the scope of care ethics to extend globally becomes a focus. For example, food provisioning in the public sphere (i.e., school lunch initiatives) is posited as the "quintessential litmus test" for the new politics of care (Morgan, 2010, p. 1863). Morgan's reassignment of care duties to the public subverts the commonly held expectation that the private sector is solely responsible, let alone equipped, to build the foundations of an ethical foodscape.

"All jobs have an ethics. This job especially needs to have a strong ethics, because what you do, people eat it, people put it inside of their bodies, so it must be the healthiest possible" (health – Chef, Cuba). The role of care within agriculture transcends scale, time and place. The addition of increased or more meaningful "care" necessary in improved agricultural production at any level, it follows that the politics and economics surrounding foodscapes on a local, national and global scale are undoubtedly intertwined with the livelihoods of producers, consumers and ecosystems. "Connective agriculture," and all that it encompasses, could be integral to the forming of an ethical foodscape, if harnessed in the direction of a "public ethic of care".

Permaculture.

Care is a central aspect of permaculture – a regenerative agriculture practice and philosophy – that is anchored in three "care ethics": care for the Earth, care for the people and fair share (Holmgren, 2002, p. 1). Care for the Earth – Earth care – is defined as

"provision for all life systems to continue and multiply" (B. Mollison, 1990, p. 2) and includes the living soil, the forests, the oceans and the freshwater, among others. "You have to take care of (the earth) and make sure that you can use it, and (that) those coming after can use it" (responsibility – Gardener and educator, Arizona). Care for the people or People care is defined as the "provision for people to access those resources necessary to their existence" (Mollison, 1990, p. 2). It manifests as compassion for human needs, self-reliance and personal responsibility. In the early writings of Bill Mollison, developer and promoter of the theory and practice of permaculture, fair share existed under a different name: "setting limits to population and consumption," and was defined as the governing of one's own needs, setting limits to personal consumption and setting resources aside to share abundance and support Earth care and people care. Starhawk and Maria Puig de la Bellacasa are two authors who work on the connection between permaculture and "care". Author, activist and permaculture designer and teacher Starhawk focuses on the promise and importance of what she calls "social permaculture" – the "aspects of people-care and group dynamics that go beyond the garden and the food forest." Permaculture principles such as social permaculture, can be used to transform human relationships and in turns, transform society. Puig de la Bellacasa, meanwhile, focuses on the connection between permaculture practice and feminist care theory.

Starhawk sees permaculture as a path to create abundance. According to her, it understands the world as a web of dynamic relationships which form communities, and it considers how to build beneficial relationships among all aspects of these communities (Starhawk, 2007). This Cuban permaculture gardener from our research sample summarizes well this relationship between food production and social abundance:

We always share, you understand? I harvest bananas, and I share them with my daughter, I share them with the neighbors. The mangoes, you give them to everybody, to make juice. There are things that are meant to be shared, you understand? (bonding – Gardener and educator, Cuba)

Starhawk became active in the neopagan community in the San Francisco Bay Area in the 1970s. In 1979, she published the *Spiral Dance* about neopagan beliefs and practices such as considering the Earth as a living entity. She continues to advocate for social justice and nature-based spirituality. In 2010, she contributed to the film documentary *Permaculture: the growing edge*. The movie features different permaculture activists such as Elaine Ingham, who builds healthy soils in the aftermath of hurricane Katrina in New Orleans, or the Hunters Points Family who uses permaculture principles to create inner-city food gardens. The documentary's message encourages exploration of universal design patterns, and empowers people to come together and apply them to their own food growing efforts (Roth, 2011). Starhawk writes:

Our human relationships are our biggest constraining factor in the work of transforming society … My practice of permaculture informs my approach to group social design and conflict, and my understanding of group dynamics informs my practice of permaculture. Permaculture principles can be translated into guidelines and approaches that will help us work together more effectively and more joyfully, as we strive to change the world (Starhawk, 2011).

Puig de la Bellacasa studies permaculture as the practice of an ethics of care, i.e., a practice that is less focused on traditional morality in terms of abstract universal principles, and more centered on how to "make and live with everyday systems and techniques that embody and embed care for the Earth" (Puig de la Bellacasa, 2017a, p. 126). An example is

provided by an Arizona gardener and educator: "In permaculture, we talk a lot about regeneration of landscapes, you know. Like coming in and being able to create the situation for the environment to regenerate itself" (health – Gardener and educator, Arizona).

Permaculture is an ethics that is essentially embedded in relationalities of a collective of humans and nonhumans. It fosters durability and renewal. Puig de la Bellacasa develops the example of caring for the soil in agriculture. In industrial agriculture, the soil is already taken care of (for instance, through tilling and chemical fertilizers). In permaculture, taking care of the soil requires taking time; time that respects the biological time and cycles of the soil, as well as the emotional time of creating attachment to the life in the soil.

The point is not so much to translate care into acting – acting is already there in the practice of maintaining soils – or to care about something that was previously unknown, but to alter existing relations of taking care through alternative modes of affectivity (Puig de la Bellacasa, 2017c, p. 199).

Puig de la Bellacasa's research shows how the practice of permaculture requires an emotional connection to the natural environment. Her work highlights the importance of emotions in designing food productive spaces using permaculture. In her research, the concept of "care" is one that is primarily concerned with relationality and emotions, and permaculture can be understood as an application of a "caring system of agriculture" to borrow the words of J. Curry (Curry, 2002).

Practicing Care in a Food Systems Context

This section focuses on the care definitions and practices detailed by participants during their interviews. Our analysis revealed that for the participants, the concept of "care" integrates practices such as (1) nurturing and meeting the needs of the object of care, (2)

protecting and defending the object of care against external aggressors, and (3) respecting the autonomy of the care receiver.

(1) For multiple participants, practicing care meant to meet the needs of the care receiver. For example, a French gardener and educator defined care as "meeting my own needs, others' needs, and the needs of the ecosystem I inhabit" (Gardener and educator, France). A Cuban farmer shared that caring required meeting the different needs for each plant – "each plant has its own characteristics, there are plants requiring more humidity, other more sun" (Farmer, Cuba). Another: "To care? Caring? I guess nurture is another word" (Farmer, Phoenix). And nurturing supports the idea of meeting the needs of the care receiver, and to do so gently, as another of the participants noted:

The first thing that comes to my mind is tending. It's an action, or a verb, that's what we do. But then the second word that came to mind is gentleness. Like when I'm interacting with students, I always want to be gentle … even if I'm being firm, I want to have an element of gentleness. So a gentle tending I guess would be care. (Gardener and educator, Tucson)

(2) Regarding "protection" and "defense" as elements of care, one interviewee noted, "To care is to protect" (Food policy analyst, France). The notions of "protection" and "defense" also appeared in several other interviews, including in reference to the importance of preserving natural spaces (i.e., a Phoenician farmer discussed the importance of preserving wetlands) as well as the importance of protecting and respecting nonhuman worlds, environments.

(3) Although care can imply a relationship of dependency, especially in the context of medical health care, participants' responses insisted on respecting the autonomy of those

being cared for. Establishing the autonomy of the care receiver was often a priority. A gardener and educator in Tucson explains:

Instead of us taking care of (the community members), you know, I think this is a very important thing that happens in communities, that we want to come and, like show people how to … like how to do things, and then, like don't even think about, sometimes, asking what it is that people need. You know? Caring for more than human communities is about "putting systems in place that become autonomous." (Farmer, Phoenix)

Below, we detail the type of caring practices mentioned by participants in the context of food systems. We categorized these practices into "internal dispositions," "Earth care," "people care" and "fair share," borrowing the last three categories from permaculture.

Internal Dispositions

In their definitions of care, participants discussed internal dispositions to be practiced in relationship to the land and to one another: observation, patience, gratitude and humility. Interestingly, these internal dispositions have been explored in virtue ethics – one of the three major Western approaches to normative ethics, with Aristotle as its generally recognized founding father (Hursthouse & Pettigrove, 2018) – and more specifically within the boundaries of environmental virtue ethics, which studies the human-environment relationship and the character traits that are good for this relationship (Cafaro & Sandler, 2011; R. D. Sandler & Cafaro, 2005; R. L. Sandler, 2007; van Wensveen, 2000). In her detailed catalogue of ecological virtues, L. van Wensveen identifies patience, gratitude and humility (van Wensveen, 2000, pp. 163–167). She also identifies attentiveness and attunement, which are integrated in what we coded as "observation."

Observation.

Interviewees regularly mentioned the importance to observe and to "be more attentive" (Farmer, Phoenix). In permaculture, the first principle calls to "observe and interact, be attentive" (Holmgren, 2002), which might explain why many trained permaculture practitioners included observation and attention in their definitions of care:

And looking through the permaculture lens means thinking about the design principles … and the first one is "observe before interacting" … "Observe and then interact." So how can we really see, like if we want to tackle something, then how important it is to observe … and then start taking the interaction process through the rest of the principles, right? (Gardener and educator, Tucson)

Another interviewee noted, "Okay, well, for example, we're always observing. And edge is where two mediums meet, and so we look in nature for inspiration" (Farmer, Tucson).

A farmer in Phoenix had this to say:

(Among the permaculture principles), I would say patience and observation are really big for me. Um, if I have a problem and I keep on trying to implement something and it's not working, the best thing is just to step back and really try to look at what's going on, and try to decide if the land is trying to do something, and you keep on trying to interpret that. It's going to ultimately do that. So taking care of the land is letting it do what it wants to do or what it's supposed to do and altering your plans around that. (Farmer, Phoenix)

Another example:

I observe, like when I want to regenerate a land, I look at it. I don't come like Conquistador, and I'm like "okay we're going to do that here." No! what is under the soil? Where is the water? Oh the water flows there … What is the quality of the soil? Where is the sun? Why does the wind blow this way and in this month? Something very, you know…

measurable, and then after I watch the plants, I watch the insects. I just sit and stay like that and observe … (Farmer, France)

Meanwhile, farmers with no training in permaculture also highlighted the importance of observation and attention in their definitions of care. For example:

You have to take care of the land. When you produce organically, you need to keep up with all the problems that might arise. You can't expect that the pest will come to tell you, "I am here." You need to monitor … you have to see everything …whether it is a fungi, an insect that is creating problems, if you're not there … you have to keep up with everything. (Farmer, Cuba).

Patience.

According to interview participants, patience – the capacity to accept or tolerate delay, trouble or suffering without getting angry or upset – is also an internal disposition to be cultivated in the practice of care. Said two of our research participants, "You really have to be patient" (Farmer, Tucson), and "Nature is not instant gratification. You have to learn to engage with nature. You have to be patient" (Gardener and educator, Phoenix).

Especially, patience for the biological timing needs to be cultivated in caring for the soil and restoring its fertility, particularly for the soils whose microbiota is poor or has been destroyed by industrial agriculture: "You know, it just takes time. Got to grow the soil. You got to, we got to bring it to life. It takes time" (Farmer, Phoenix).

Another farmer says:

And then, we need to bring back to life the soil and the planet. The soil has its own time duration to heal, you know? If you break your knees and then the day after you get the surgery and we say "Hey, let's run the marathon," you're going to be a piece of shit. (Farmer, France)

Humility.

"Observe, learn from the process in a humble way" (Gardener and educator, Tucson).

The quality or state of not believing that one is better than others – humility – is also recognized as an important element in participants' care definitions, especially as it connects to serving others and the land. Says one interview participant: "Since the project started, its essence was always to be of service to people." (Farmer, Cuba)

Another interviewee notes:

Humility. That's it. That's the first beginning. I think you can be a biologist, or you can be the king of whatever, or you can be no nobody; you know, it's all about internal posture … again, care is linked with humility. (Farmer, France)

Gratitude.

In Phoenix, one research respondent notes:

In various traditions, there are ceremonies performed to express gratitude to plants. There are many different ceremonies that are done [to express gratitude] and it's really kind of unique to every individual. So, sometimes it's very formal, sometimes it's very silent and sometimes it's done in group. You know, everyone is making the acknowledgement. There is traditional offerings, for instance, like corn powder is a very traditional one … Using your own hair is a traditional thing to do. Even to spit, you know, to give your own saliva to the plant, watering the plants … Song is another. (Botanist and naturopath, Phoenix)

A grateful disposition – especially toward plants – was listed in participants' definitions of care. Gratitude is practiced as the acknowledgement of the care that humans receive from plants, and take from it. One example is this researcher's practice: "When I'm about to cut part of the aloe vera, I ask for permission to the plant, and after cutting the

plant, I say thank you" (Researcher, Cuba). In this instance, it is part of the reciprocal relationships and synergies that occur. Feeling and expressing gratitude for the plants also encourages a greater level of care for them.

Says one of the practitioners interviewed:

I read the stunning book *Braiding Sweetgrass* by Robin Wall Kimmerer last year, and it was a great reminder to practice gratitude every time I am cared for by the earth. I rarely stop to say thank you when I pull an orange off the orange tree in our yard, but when I do, I strengthen my relationship to the tree and to the earth through that act of acknowledgement … We are beholden to protecting what provides us with food. (Gardener and educator, Tucson)

Earth Care

Bill Mollison, the father of permaculture, defines "Care of the Earth" – Earth care – as the "provision for all life systems to continue and multiply" (B. Mollison, 1990, p. 2). Although it is not directly stated, Earth care is conceptually separated from people care in permaculture teachings. However, this does not reflect a theoretical separation between "people" and "Earth," as permaculture recognizes the interconnection between all beings. It is merely a conceptual distinction for the purpose of educating about the practice of care. In this subsection, we include all the care practices aimed at nonhumans and described by interview participants. Many of these practices were listed as components of sustainable gardening in our previously published research (Giraud et al., 2021, p. 10) and are the object of Chapter 3, and are in line with permaculture research manuals (Holmgren, 2002; B. Mollison, 1988, 1990; D. Mollison & Holmgren, 1978).

Irrigate.

"How do I take care of the plants? I water them." (Farmer, Cuba)

Water is a core element of biological systems (and consequently of food systems) because life needs water. Earth care practices include designing irrigation systems that respond to the needs of plants, animals and humans without depleting or polluting these resources (Rouillay & Becker, 2020). Water saving irrigation techniques and water harvesting are examples of such practices, as explain these two interviewees: "Around trees, we have a swale, it's used for rainwater harvesting … for the drier climates" (Farmer, Phoenix), and "We can't make a basin after you put a tree in, you got to put the basin in first, plant the water first, then plant the tree" (Gardener and educator, Phoenix).

Mulch.

I am a huge believer in mulch, whatever it is, except gravel, and even in my own home garden, which is desert at the front. I had to go to England last summer … and those plants that had the wood chips around them survived so much better than the plants that had the gravel around them. (Gardener and educator, Phoenix)

Applying mulch to the soil supports microorganisms and enhances the soil's fertility. It protects the soil from extreme heat and cold, maintains soil moisture and improves drainage.

Recycle nutrients and waste.

"Produce no waste" is permaculture design principle 6 (Holmgren, 2002), and composting is a common example of nutrient and waste recycling.

Says a research respondent:

So there are many aspects and resources that I can harvest from the garden, whether it's pine needles to put in the compost, or vegetables to bring in the kitchen and the scraps go back out to the compost, which becomes my fertilizer and go back to the garden. That's the classic example of compost to veggie garden to kitchen back to the compost again.

That's a closed loop and that's the regenerative model: closed loop. There's no waste. It's not leaving the property. (Gardener and educator, Phoenix)

Nutrient recycling is not only identified as an Earth care practice; it is also a food systems resilience strategy identified by the research team Les Greniers d'Abondance (Les Greniers d'Abondance, 2020). This strategy includes the recycling of biowaste to make compost, and the recovery of human excreta for agricultural use (phosphorus in particular, as phosphate is rare and mining it creates water pollution.)

Save seeds.

Saving seeds allows food production spaces to be independent from industrial seed producers, and to protect rare plants from extinction (Rouillay & Becker, 2020; Shiva, 2016).

Notes an interviewee:

There's absolutely satisfaction of knowing that I have in many cases, saved the seed from the previous years, because I'm a huge seed saver. So save the seeds from the previous years … I get to grow varieties of things which are not available in the supermarket. It's not genetically modified … A lot of them are heirloom and some of them are ones that are adapted to grow here in this particular climate. (Gardener and educator, Phoenix)

No use of chemical pesticides or fertilizers.

We use organic pesticides and fertilizers that we produce ourselves, we use [organic] neem insecticide for example … we also use cow manure as a fertilizer that we collect from communities outside the city. We produce worm casting, and use it to make liquid fertilizer. We do not have chemicals; we have a production that is totally … I mean, these products are harmless. (Farmer, Cuba)

There is much research on the dangers of using chemical pesticides and fertilizers for the natural environment. Risks for the pollinators, soil microbiota, rodents, rivers and oceans

have been largely studied (Cycoń & Piotrowska-Seget, 2015; Lo, 2010; Lupatini et al., 2017; Mineau, 2020; Ramaswamy, 2017). Interview participants unanimously rejected the use of chemical pesticides and fertilizers as environmentally caring practices.

Says a Phoenix respondent: "If you're going to use anything, it would be biological control. For me the whole set of farming without pesticide, reducing the use of fossil fuel, this sort of thing; that is part of caring" (Gardener and educator, Phoenix).

Adapt to hyperlocal climates and bioregion.

Understand microclimate.

In Phoenix, a respondent shared this: "For me, the most important thing [in caring] is to look after your soil, and to know the microclimates" (Gardener and educator, Phoenix). Microclimates – humidity, sun exposure, temperature and wind exposure – at a specific site are unique to the site itself and influenced by vegetation, human infrastructures and local terrain. Understanding the microclimate of a specific site allows the gardener/agriculturist to work with those conditions, rather than against them. For example, the Phoenix gardener cited above explained how some areas at the site had trees planted close to each other, which helped retain the soil moisture and lowered the temperature on the north side of the tree, which allowed her to plant crops there that needed more shade and cooler temperatures.

Work with native plants.

Incorporating native food into my diet has multiple uses; it's not just food. You know there's a lot of other things that come from that [incorporation] when you're very much more in touch with your bio region and where you live. (Gardener and educator, Tucson)

Indeed, native plants that grow easily in a particular landscape have multiple benefits. First, they do not need to be imported, and some can even be foraged. In France, this is the

case of mushrooms and chestnuts during the fall season. If we do not build over these spaces, they provide sources of food at very low cost, and the plants are adjusted to the local ecosystem. Also, working with native plants is a way to fight against the simplification of diets and ecosystems, and to maintain the rich biodiversity unique to each landscape. It also encourages people to be creative about their way of feeding themselves, and in doing so, to reconnect their health to the health of their surrounding plants. Says a respondent: "So really, using native plants and rediscovering native plants in food production … I think it can be also a quite fun and playful way of dealing with food" (Researcher, Phoenix).

People Care

People care is defined by Bill Mollison as the "provision for people to access those resources necessary to their existence" (Mollison, 1990, p. 2). Later in the text, he explains that Earth care comes first because it assesses "our best course for survival" and then comes people care that fosters interdependence rather than competition, because cooperation builds healthy communities. He includes all humankind in people care "for all life has common origins. All are our family" (Mollison, 1990, p. 3). Below, we detail the participants' responses, categorized under "people care."

Support the most vulnerable.

The idea of supporting the most vulnerable was recurring among participants in explaining their vision of care. Says a farmer respondent: "Many elderlies who don't have money come here, and we don't charge them. We don't charge them anything. This is because the objective really, it's not to become rich. It's to serve" (Farmer, Cuba).

Another research participant notes:

I would say that … I would appreciate a country and a system where everybody's

basic needs and getting adequate nutrition would work based on a charity model … You know, every single day I drive to a food bank in the poorest part of town and get our drivers for the co-op set up for their routes during the day. And every single day I pass by a group of people that live on the concrete and they have lived there all summer long. And what would I do? If I had the way to do it, I would put up parking covers with solar panels to at least just help them and, you know, it's not, like, "well, everybody has to do everything the same way." It's just that it has to matter; not to just a few and that the faith-based organizations are going to pick up the slack. I don't understand all the government types and all the ramifications that … but I believe that I would prefer a form of government that made all of its people come first, not just some of them. (Food systems coordinator, Phoenix)

Educate.

Education was another recurring element. This is partly due to the fact that almost half of the participants were gardeners and educators, and they believed in teaching people how to grow food to help make the system more resilient. Among the other participants, many also believed that people can learn to eat, cook, think and live differently and that educating them is a way to care for them.

For instance:

That's how we do it, we're building that resilience, educating people. That's why I do what I do. Everything, every single thing that I do, is based in educating people. If you look at all of the stuff that we do here … all of them are designed to bring more knowledge, more care to people. (Farmer, Phoenix)

Set local boundaries.

Care, in the context of food systems, means a "hyperlocal economy, neighborhood-scale food production and resource sharing" (Gardener and educator, Tucson).

A responding food policy analyst puts it this way:

It means to shorten the distance between the producer and the consumer, and also the processor who is in the middle. When the consumer can influence the processor, we are recreating an ecosystem and a safe environment, in particular to avoid inequalities, which mean problems, in case there is an external threat. (Food policy analyst, France)

Setting local boundaries and strengthening a hyperlocal economy was discussed multiple times by respondents as a way of bringing communities together with their local landscapes, and to collaborate within that local economy rather than merely living next to one another.

Hold people accountable.

On accountability, a gardener/educator responded:

There are practices of care, such as boundary-setting and holding people accountable, that aren't necessarily "being nice," but they are caring. Conflict and disagreement are healthy and natural … Part of people care is having appropriate consequences and healing processes after harm is caused, for both the person/s who caused harm and who experienced harm. (Gardener and educator, Tucson)

This practice of care is also a feedback loop. It is a checking mechanism that allows the redirection of practices when they are, in fact, not caring.

Fair Share

A respondent in Tucson in southern Arizona asked:

Is it fair share in the sense that is it mimicking nature and how nature does constant recycling instead of [hoarding]? At least not [hoarding] for very long, and so we consider that

fair share. And so that's what I think about when I think about the word "care." (Gardener and educator, Tucson)

Initially, Mollison called "fair share" under a different name – "setting limits to population and consumption" – and, he added, "by governing our own needs, we can set resources aside to further the above principles" (Mollison, 1990, p. 2). This third "ethics" is a way of strengthening the first two.

Participatory leadership.

Fair share also means sharing power and decision making rather than concentrating it in the hands of a few. Participatory leadership was cited by several participants. Said one, "I am a passionate learner and practitioner of participatory leadership and decision-making systems, as I see them as the best way to practice an ethic of care in formal spaces" (Gardener and educator, Tucson). Another said, "I think that's like when we do a process that involves everybody's voices and inputs and … that's really energizing for me" (Gardener and educator, Tucson).

A researcher who participated as an interviewee said this:

The objective of the permaculture program is "supporting the creation of sustainable communities, thanks to citizen action." It doesn't say thanks to public policies, but thanks to the people … thanks to the people also participating; to the people saying, "No, this cannot be done here. What you are telling me that you want to build, you cannot do it here." It's also people's participation in local governance. (Researcher, Cuba)

Share resources.

Share value, fair exchanges.

Sharing value in economic exchanges is part of fair share, and it was repeated by participants in the three countries. In Cuba, participants talked about the importance of fair

prices (*precio justo*). In Tucson, a gardener and educator discussed the economic exchanges between Mexico and the United States, the consequences it had for the border and the need to have fair exchanges.

Said a French respondent:

[When you organize the food system at a local scale] people have to know one another, because they often go pick up their kids at the same school. It's much harder to screw somebody that we know, so the value is shared with much more fairness. And when we guarantee value to someone, we maintain a someone's existence. So really, recreating a social economy at the local scale, to me, it means recreating a collective safety. (Food policy analyst, France)

Redistribute land.

Land redistribution did not escape the attention of respondees:

Truly centering care in the food system, in my opinion, would involve a radical redistribution of land, including returning land rights to the indigenous stewards from whom these lands were stolen (#landback), and agrarian reform policies where every individual/household has equal access to a plot of land, like what was enacted in some Latin American countries in the 1950s. By providing access to land, it creates a foundation where all people could truly participate in a local food system. (Gardener and educator, Tucson)

Table 3

Categorization of Participants' Responses for Care Practices

Internal dispositions	Observation
	Patience
	Humility
	Gratitude

Earth care	Irrigate
	Mulch
	Recycle nutrients and waste
	Save seeds
	No use of chemical pesticides and fertilizers
	Adapt to hyperlocal climates and the bioregion: - Understand microclimates - Work with native plants
People care	Support the most vulnerable
	Educate
	Set local boundaries
	Hold people accountable
Fair share	Participatory leadership
	Share resources - Share value, fair exchanges - Redistribute land

Building Food Systems' Adaptive Capacity Through Care

In this section, we develop a definition of care based on the literature and the interviews, we discuss the theories that emerged from our analysis of care and how they contribute to building food systems resilience in a nontraumatic way.

In the previous section, "Defining care in a food system context**"** (p32), we cited Engster's definition of care as "everything we do directly to help others to meet their basic needs, develop or sustain their basic capabilities, and alleviate or avoid pain or suffering, in an attentive, responsive and respectful manner" (Engster, 2005, p. 55). Although his work focuses on caring for human beings, this definition can be extended to more than human worlds.[14] To better reflect the inputs of the everyday experts, we adjust the caring virtues

[14] In his work, Engster discusses the concept of capabilities as developed by Finnis and Nussbaum and chooses to reduce the list of capabilities necessary to live in society to "the ability to sense, feel, move about, speak, reason, imagine, affiliate with others, and in most societies today, read, write, and perform basic math" (Engster, 2005, p. 52). It is clear that some of these specific capabilities can only apply to humans, but we envision here to apply this concept to more than human worlds by enlarging the notion of society beyond human groups. Indeed, research has shown that trees, microbes and mycorrhiza among others do

detailed in this definition and define care as "everything we do directly to help other living to meet their basic needs, develop or sustain their basic capabilities, and alleviate or avoid pain or suffering, in an attentive, patient and humble manner."

Indeed, in our analysis of internal dispositions or virtues, we had identified "observation" as one such and highlighted that it was synonymous with "attentiveness" and "attunement" in this context, and it is consistent with Engster's definition. "Patience" was repeatedly mentioned by participants and although Engster does not mention it, we believe it is difficult to practice care successfully and repeatedly without patience. As Puig de la Bellacasa reminds us, it is necessary to understand and work with the biological time to provide care (Puig de la Bellacasa, 2017c). Whether we are talking about healing a physical or psychological wound or about growing food, care requires patience and an understanding of the biological time. We exclude "responsiveness" from our definition because we believe it is already covered by the action-oriented element of the definition: "everything we do directly to help other living." We also choose to include "humility" instead of "respect" to recognize the inputs of the everyday experts and because Engster's definition of respect – "the idea that others are … not lesser beings just because they have needs they cannot meet" (Engster, 2005, p. 55) – is similar to our definition of humility: the quality or state of not believing one is better than others.

Based on our analysis of participants' responses, we propose a conceptual map of care (Figure 1) in the context of food systems. The map builds on Tronto's levels of care

live in communities and have complex networks to exchange information and nutrients. As soil fertility is highly dependent on these communities, caring for the soil demands not only to meet the basic needs of microbes is not sufficient, and it is also necessary to develop or sustain their capacities necessary to live in their respective communities.

(Tronto, 1993) – caring about, caring for, care giving, care receiving – to represent care as a circular continuum between motives (caring about), practices (caring for, care giving), and results (care receiving), all centered on the ontological interconnection of all life.

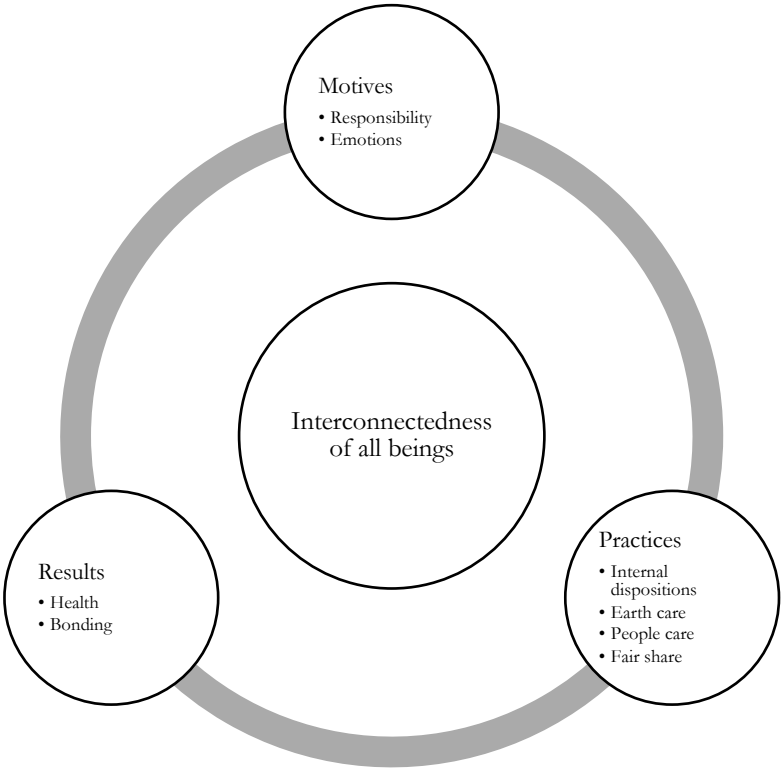

Figure 1. Map of care in a food system context.

In the context of food systems, interconnectedness is central to first reaffirm that human life does not exist in a vacuum, separately for other forms of life but, rather, that these are instead necessary for and constitutive of human existence. Second, interconnectedness is a prerequisite to the moral obligation to care (Engster, 2005, p. 57):

We live in a web of dependency and caring. It is not just that we have depended and probably will depend someday upon the care of others; it is that human life is deeply implicated in relations of dependency and caring. (Engster, 2005, p. 61)

We add that human life is deeply implicated in relations of dependency and caring with all forms of life. Unless we resort to cannibalism, food that plants and animals provide for us is an excellent example of this dependency. We need these plants and animals to live and to reproduce so that we can use them for our daily sustenance.

Motives include a sense of responsibility (that also includes reciprocity), emotions and affection (see Table 2). Motives encourage taking action in the form of caring practices. Practices include everything listed in the previous section, categorized into the internal dispositions of Earth care, people care and fair share.[15] These practices lead to results that confirm that the actions taken were caring in the first place. The results discussed by research participants in this study include health in the large sense – from human nutrition to land regeneration – and bonding, including a sense of cohesion with the land and "enchantment" (Herman, 2015). Both health and social relations are part of well-being, and emerging from this research is the hypothesis that care practices contribute to enhancing well-being.[16]

It is possible for the continuum to be interrupted, for example not to practice caring acts although the motives exist, or to take actions that do not lead to results confirming the practices as caring. Meanwhile, the continuum does not always occur chronologically. Motives to care are also often co-created while performing caring actions, and results can serve as motives from a utilitarian perspective. Nevertheless, the map is a useful

[15] This list reflects what was covered during the interviews. It does not pretend to be exhaustive or to include all the possible care practices in a food system context.

[16] The academic literature on well-being is very large, ranging from philosophy to psychology, economics and policy, and it will not be extensively discussed in this dissertation. The relationship between Earth care practices and well-being will be examined in Chapter 3.

communication tool to present the theoretical findings from our analysis of care in the context of food systems.

This model of care can be used both to inspire food systems research and policy that seek to respond to the trauma currently produced by food systems, as well as to encourage a preventive approach to trauma. Similarly, health care can be used both as a response to physical trauma and as prevention when people are healthy – with variations adjusted to the specific needs of each situation. Our analysis suggests that adopting a care lens on not only food systems policies and budgets, but also processes, practices and even individual intentions establishes the conditions necessary to enhance food systems' adaptive capacity and resilience (Figure 2).

Figure 2. Relationships between care practices and food systems' adaptive capacity in the literature.

Indeed, multiples strategies listed in food systems resilience research include elements that participants identified as care practices, such as participatory leadership (Biehl et al., 2018; Hecht et al., 2018), land redistribution (Calo et al., 2021), education (Toth et al., 2016) and support of the most vulnerable (Biehl et al., 2018; Harris & Spiegel, 2019), which are listed among "people care" and "fair share" categories. These practices enhance food systems' adaptive capacity, which means "the system is flexible and can adapt to changing circumstances, modifying behaviors and adapting existing resources to new purposes" (Harris & Spiegel, 2019, p. 19). For example, Biehl and colleagues recommend to "strengthen and draw from existing community-level social networks to increase food access" after shocks (Biehl et al., 2018, p. 123), recognizing that the existence of community social networks increases food systems resilience because individuals who have social capital can better adapt to changing circumstances in case of such events.

Adaptive capacity is an important element of SES resilience as it allows the system to prepare for adverse events, cope with stress and reorganize itself (Adger, 2000; Adger et al., 2011; Berkes & Ross, 2013; Carpenter et al., 2001; Chaigneau et al., 2021; Herman, 2015). Additionally (although they are not traditionally included in food systems resilience research), studies show that some of the practices categorized under "Earth care" support ecosystem resistance, recovery and adaptation – three pillars of ecosystem resilience – in case of extreme weather events. For example, organic farming systems do not use synthetic pesticides, which tends to reduce soil erosion (Gattinger et al., 2012; Gomiero et al., 2011; Muller et al., 2017) and improves resilience to in case of floods. Similarly, research conducted after 1998 Hurricane Mitch in Central America showed that agroecological farms – which largely implement earth care practices – reported higher levels of topsoil, soil moisture and

vegetation cover when compared to their conventional neighbors. These farms were generally better able to resist the storm and to recover more quickly (Holt-Giménez, 2006).

Lastly, what we categorized as "internal disposition" is generally excluded in food systems resilience research. However, environmental virtue ethics discusses how such internal dispositions or virtues are central for environmental decision making (R. L. Sandler, 2007, p. 85) and for the good of the environment more specifically. In creation care that we introduced in section 4, internal dispositions such as patience, humility and gratitude are essential for the good of the environment and for the spiritual well-being of those who practice these virtues. Research in psychology has also largely identified that such character traits help individuals to bounce back in case of shocks and traumatic events, and to build inner strength and resilience through challenges (Connor, 2006; Coulehan, 2010; Devenish, 2016; Dwiwardani et al., 2014; Garg & Sarkar, 2020; V. Scott et al., 2021; J. T. Wilson, 2016). It thus appears that – as mentioned by our "everyday experts" – internal dispositions ought to be integrated in research on food systems resilience since these care practices have such a deep effect on people and, as a result, their systems' adaptive capacity.

Deeply inspired by sustainability science, our research proposes an innovative approach to the integration of care in food systems resilience research by building on interdisciplinary literature and interviews of everyday experts to first develop a conceptual map of care in the context of food systems and then discussing how care practices participate in building food systems' adaptive capacity. By using interdisciplinary inquiry and grounding our findings in the lived realities of a multilingual and international sample of "everyday experts," our work reaffirms that food systems cannot be resilient without addressing the trauma they co-produce for more than human worlds. It also reclaims the importance of care practices for true resilience in our food systems and argues for the

revalorization of such practices in food policy and research. Indeed, we specifically recommend food policy take a holistic perspective on food systems resilience, integrating food production practices (Earth care), hyperlocal communities and their dynamics (people care), and resources and power distribution (fair share). Although our map of care includes motives behind care practices (responsibility and emotions), further research is needed to better understand the mechanisms that encourage care practices. Additionally, future sustainability research could examine in greater depth the impacts of the identified care practices on what we categorized as "results" in our model ("health" and "bonding") and in the context of research on well-being and happiness.

CHAPTER 3

GARDENING FOR FOOD WELL-BEING IN THE COVID-19 ERA

Prelude

This chapter was co-authored with Dr Sara Aly El-Sayed and Adenike Opejin, and published as an article in the journal Sustainability for the special issue "Advancing Sustainability through Well-Being" in August 2021. For this dissertation, the purpose of integrating this Chapter 3 is to answer the following research questions:

RQ2a: Which policies and cultural transformations can support the integration of Earth care practices into food systems?

RQ2b: How does growing food using Earth care practices enhance well-being?

Note that what we refer to as Earth care practices in this prelude follows our analysis in Chapter 2, but in this chapter, they are referred to as sustainable gardening, sustainable farming, or sustainable growing practices. The reader will note that Table 6 – Lexical Analysis of Sustainable Gardening Components, p 93 – includes the same elements that were identified as Earth care practices in Chapter 2 (see p 54).

Abstract

"Life, Liberty and Pursuit of Happiness", is what millions of Americans strive for. The onset of COVID-19 has highlighted the disparities that exist among Black, Indigenous and People of Color (BIPOC) communities, which are facing food access inequities. In this paper, we argue that engaging in growing food sustainably can improve food access, support food justice and enhance sense of purpose and well-being. We expand the notion of Food Well-Being (FWB) to include food producers—especially gardeners—and hypothesize that

gardening has the potential to enhance FWB, regardless of the racial and socio-economic background. However, without policies tackling social and racial justice issues, structural barriers may hinder this potential. We use three studies to draw a rich profile of sustainable food gardeners in Arizona, USA, and their well-being: (a) the children and teachers engaged in school gardens in the Phoenix metropolitan area; (b) sustainable gardeners and farmers in Phoenix and Tucson; (c) Arizona gardeners during the pandemic. The results show a connection between sustainable gardening and eudemonic well-being, and an impact on the five FWB dimensions (physical, intellectual, spiritual, emotional, and social). However, without appropriate policies, funding and infrastructure, the impact might remain minimal, volatile, and subject to tokenism.

Introduction

The spread of COVID-19 across the United States in March 2020, outlined the risks and fragilities and inequities in food systems. The lockdowns and disruptions in food distribution and access, highlighted the fragility of accessing basic goods, especially amongst more vulnerable communities, such as Black, Indigenous and People of Color (BIPOC) communities (IPES-Food, 2020). A research study conducted in the first four months of the pandemic in Arizona, found that 33% of 620 Arizona residents sampled were food insecure, with the Hispanic population being the highest hit (Acciai et al., 2020). Additionally, the pandemic had adverse effects on mental health, in particular due to reduced social interactions, increased economic uncertainty, and health-related concerns (Acciai et al., 2020). Concurrently, the pandemic situation also gave people both the time and the sense of urgency to garden more, which jointly provided opportunities for an increase in healthy food access. A surge of gardening activities around the globe has been documented during the

lockdowns imposed by the COVID-19 pandemic (Theodorou et al., 2021; Walljasper & Polansek, 2020), along with a growing interest in food self-reliance (E. Giraud, 2021). As an anecdotal evidence of this phenomenon: the number of subscribers to the Urban Farm newsletter in Arizona - a letter that focuses on home gardening and developing self-sufficient food production systems at home - has tripled with the start of the pandemic, going from 8,000 new subscribers in a typical year, to 26,000 in 2020 (Peterson, 2021). Many individuals and communities around the world began focusing on strengthening their homegrown production, or even growing part of their food, finding solace in growing a garden and being part of nature (Theodorou et al., 2021). Gardening activities - whether indoor or outdoor, and whether small, medium or large gardens - have been shown to contribute to greater health and well-being in individuals who partake in them (Vogt et al., 2017; Webber et al., 2015).

Originally developed by Block et al (2011), the food well-being (FWB) framework highlights the role of food to improve well-being for both individuals and society and uses a holistic approach to well-being (i.e. it includes for example spiritual and emotional dimensions in addition to nutritional health) (Block et al., 2011; Frentz, 2020). However, this framework has largely been focused on food consumption activities, although a large body of literature shows the connection between growing food activities and well-being (Clatworthy, Hinds, & Camic, 2013; Jepson, 2014; Pfeiffer & Cloutier, 2016; Theodorou et al., 2021; Webber et al., 2015). Additionally, a growing body of literature has shown a positive relationship between sustainability or sustainable development and well-being (Barton et al., 2003; Cloutier et al., 2017; Colfer et al., 1998; Dolan et al., 2006; DTI, 2003; Gibbons et al., 2018; O'Brien & Claridge, 2001), especially how environmentally sustainable practices can help support ecosystems services which have direct impact on human well-

being (Metson & Bennett, 2015; Wali et al., 2017), but also how prosocial behaviors and connection to nature are key elements of sustainable practices and directly enhance human well-being (Barrington-Leigh, 2016; Gheitarani et al., 2020). More research has shown how sustainability can directly enhance eudemonic well-being (Helne, 2021), ranging from sustainable fisheries (Coulthard, 2012) to organizational psychology (Di Fabio, 2017). Yet, as far as we are aware, no research has shown the relationship between sustainable gardening and eudemonic well-being.

In this paper, we present three different case studies conducted in Arizona to assess how sustainable food growing practices (gardening and farming) can enhance well-being – and food well-being specifically. We also investigate the role of these activities to increase social justice and reduce food access discrepancies. We specifically ask two questions: (1) can growing your own food sustainably[17] contribute to enhanced FWB and happiness – namely the eudemonic and hedonic aspects – especially during the COVID-19 pandemic? (2) And how can food gardening help mitigate food access inequalities, and social and racial injustice? To answer these questions, we delve into the literature and also focus on three studies conducted in Arizona: one on school gardens, one on small sustainable farmers and gardeners, and one on a sample of 96 gardeners.

Food Well-Being Framework

Taste and nutrition plays an important role in individual well-being. Nutrition has effects on growth, cell regeneration, and immunity among others, which are critical for human health (Fanzo et al., 2013; Floud et al., 2011; Weidema & Stylianou, 2020) and well-

[17] This is what was published originally, and we detail below what we mean here by "sustainably." In the context of this dissertation and following Chapter 1,

being (Firth et al., 2020; Owen & Corfe, 2017). The sensory ability to taste also has a direct effect on well-being (Atkinson, 2021; Dini & Laneri, 2021; Spackman & Lahne, 2019). We saw for example that people who lost their sense of taste due to covid reported emotional and psychological difficulties as a result (Diamond, 2020). The concept of food well-being (FWB) uses a holistic perspective to analyze the connection between people's relationship with food and their well-being. Frentz (2020) developed a framework that builds on the work of Block et.al 2011, and highlights the role of food to improve the well-being of both individual consumers and society as a whole. The premise is to enhance the discussion around people's relationship with food, and especially expand it beyond the biomedical model that traditionally focuses mainly on fulfilling nutritional needs. These needs are very important for human health and well-being, and a core component of the "physical dimension" in Frentz' framework described below. However, food well-being goes beyond. Frentz defines food well-being as "a multidimensional, synergetic construct represented on a continuum of a low to high relationship to food, taking into account hedonic (striving for positive emotions) and eudemonic (striving for a sense of fulfillment) approaches, where both subjective and objective evaluations of people's physical, emotional, social, intellectual, and spiritual relationship with food are taken into account (Frentz, 2020, p. 39)(." Indeed, the framework assumes there are different elements that characterize food well-being. Firstly, FWB is set as a continuum, ranging from low to high, and can change throughout the individuals' life, based on an individual's experiences and external influences. It includes both hedonic and eudemonic approaches to well-being, consistently with part of the happiness literature (Deci & Ryan, 2008; Pfeiffer & Cloutier, 2016). Hedonic well-being refers to experiences of pleasure and associated with high positive emotions (Deci & Ryan, 2008). Eudemonic well-being is generally associated with long term fulfillment coming from

a sense of purpose and actualizing one's full potential (Deci & Ryan, 2008). Secondly, it also assumes that there are 5 dimensions through which individuals evaluate their experiences with food: the physical dimension (which includes direct physical needs such as nutrition, and sensory taste), the emotional dimension (such as the emotional experiences around food consumption), the social dimension (for example referring to culturally acceptable foods), the intellectual dimension (such as cognitive challenges associated with food), and the spiritual dimension associated for example with food religious practices and spiritual beliefs. Both subjective and objective evaluations of these experiences are recognized by the framework, in the forms of subjective individuals' perceptions of their own health and well-being or objective tests such as medical health assessments. Finally, food well-being is subject to external influences such as food availability, policies, literacy, socialization, and marketing. Frentz represents food well-being as an individual journey in the form of a cycle, called food well-being cycle (FWBC), that we adjusted to focus on gardening (Figure 3).

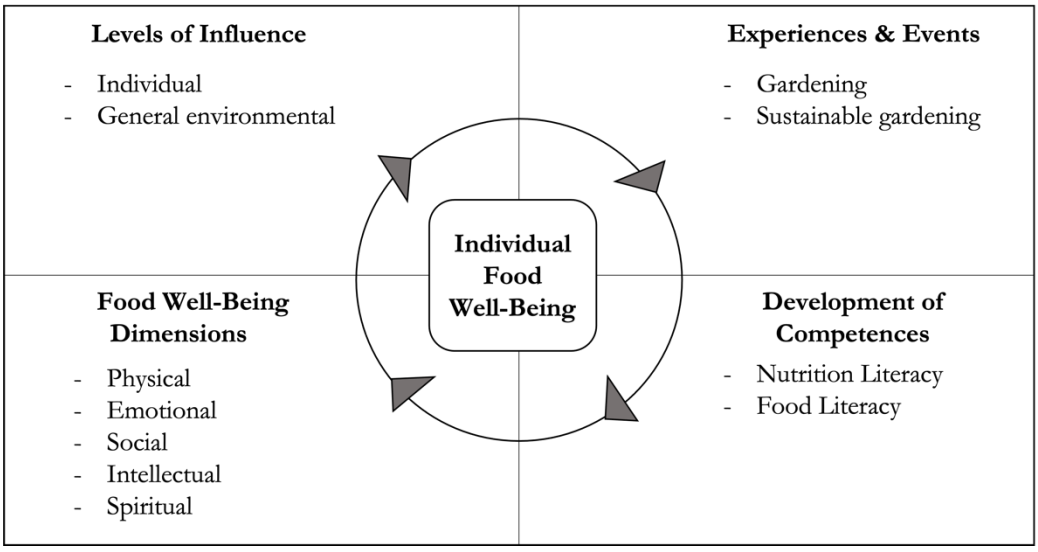

Figure 3. Gardening Food Well-Being Cycle adjusted from Frentz' FWBC (Frentz, 2020)

This paper focuses on a few of the aspects of the four components of the cycle, namely: a. two levels of influence (1) individuals demographic variables (such as age, race, gender and education level) and (2) general environmental influences (especially racial and social justice policies), b. food growing experiences, and c. the five FWB dimensions. We also integrate measures of hedonic and eudemonic well-being to our analysis. This cycle was applied to our understanding of how gardening in Arizona can ensure more happiness and tackle issues of racial disparity. Currently, the FWBC largely focuses on food consumption and explains its impact on individual well-being through that lens. Here, we focus on food growing practices, and use this cycle to understand whether and how they enhance well-being. One of the objectives of this paper is to expand the notion of food well-being to include food producers who play a critical role in this conversation.

Gardening and Well-Being

Previous research indicates that there is a strong connection between gardening and well-being. Studies have been conducted amongst people above 60 (T. L. Scott et al., 2015), school children (Blair, 2009; Skelly & Bradley, 2000), people with mental health (Clatworthy, Hinds, & Camic, 2013), and leisure gardeners (Vogt et al., 2017). Some results indicate that gardening has positive impacts on mental health, reducing symptoms of depression and anxiety (Clatworthy, Hinds, & Camic, 2013). Some also linked gardening practices to an increased sense of connection to nature, or what is known as biophilia. Biophilia refers to human's innate affinity to life and life-like processes (Baker, 2005; E. O. Wilson, 1984). Researchers have suggested that this connection has helped people cope during the COVID-19 pandemic, as the reconnection to nature through gardening has lessened the impact of depression, apathy and has improved general well-being (Theodorou et al., 2021).

Research with elderly populations 60 years and above shows how gardening increases physical and mental activity and improves physical psychological well-being (T. L. Scott et al., 2015). Research on school gardens emphasizes the increased popularity of using them to address curricula and learning outcomes (Smith et al., 2021), as well as promoting students' well-being through nature-reconnection (Malberg Dyg & Wistoft, 2018; T. L. Scott et al., 2015; Taylor et al., 2021). Although there isn't sufficient research on the long-term impacts of school gardens on children, research has shown that students experience positive emotions when they are outdoors, interacting with peers and educators, which positively impacts their self-esteem and allows them to develop empathy towards animals, insects, and plants (Malberg Dyg & Wistoft, 2018). Furthermore, research shows that people who maintain a home-grown food culture also make better food choices in line with food well-being, such as sourcing locally, and sourcing fresh produce (Wiseman et al., 2018).

COVID-19 had a significant impact on people's well-being worldwide (Theodorou et al., 2021). This was caused by different factors: loss of occupation, lack of access to affordable and healthy food and other goods, isolation, and lack of connection to other people. As of April 2020, the increased unemployment rate had reached 13.2%. This did eventually decline, however, Arizona continued to have high rates, such as 7.8% in November 2020 (Acciai et al., 2020). Different studies (Theodorou et al., 2021; Vaughn, 2020) showcase that many people either started or increased their gardening practices during the COVID-19 shut-down. Gardening enabled people to have a bit of control on their food in a context of failing food chains, but it also appeared to alleviate their levels of stress (Webber et al., 2015). People who gardened during the pandemic reported that it enabled them to distress and connect with nature when they were forced to shelter in place (Theodorou et al., 2021).

Gardening for Social and Racial Justice

Creating gardens in times of crises is not a new concept. Throughout US history gardens have surged in multiple instances. During the Great Depression, city governments supported the creation of welfare garden plots to combat hunger. Shortly after, during the World War 2, victory gardens gained traction to support the war effort. Recently, urban agriculture developed as a response to the 2008 economic crisis in cities like Detroit. These are only a few historical examples but the agrarian history of this country is inextricably tied to the various inflows of populations who immigrated to the United States, bringing seeds and creating small-kitchen gardens to survive (Horst et al., 2017). In Arizona Chinese immigrants in the late 1800's started farming near Tucson, growing their own crops from cabbages to garlic and other fresh produce (Fong, 1980).

Although there is evidence that there are many benefits to community and urban gardens, such as improving health, generating income, building skills, enhancing community development, and developing stronger community bonds (Horst et al., 2017), minorities are often confronted with the realities of land access, ownership, barriers imposed by the dominant model of industrial agriculture, discrimination and lack of time and resources to grow food. In the 1960's, Black independent farmers created Freedom farms in the Deep South and in Detroit to counter racism and fight economic difficulties (Williams & Holt-Giménez, 2017). Unfortunately, they quickly dissolved by 1974 (Williams & Holt-Giménez, 2017). Today, African American farmers constitute only 1% of all farmers in the United States. Food justice research highlights that both the industrial dominant and the more grassroots alternative food movements can perpetuate racial and social disparities in our food systems, and overall, different scholars argue that due to market tensions and state

policies, race and class remain central to food justice issues (Alkon & Agyeman, 2011; Horst et al., 2017).

However, new narratives are being written and new local systems are being created (Alkon & Agyeman, 2011). The alternative food movement often encourages the creation of community gardens with the intention of serving the community, especially in public space. Community gardens can often be spaces for cultivating social justice especially within cities and amongst disadvantaged communities, mostly communities of color (Milbourne, 2012). When they are designed to do so, these spaces can help the communities resist neoliberalism and empower food producers and community leaders to have ownership over their food and fight food insecurity (Mello et al., 2017). In these cases, the food growers are also activist citizens, fighting for the non-commodification of food (Barron, 2017). It has been argued for several decades that urban agriculture can provide opportunities to improve food security, health, improve skills, provide jobs, and even change food systems, however racial injustices and food disparities still remain (Alkon & Agyeman, 2011; Horst et al., 2017). Examples from marginalized communities across the globe use urban gardens as ways of reclaiming public space along with their food sovereignty (Bleasdale, 2015; De Wilde et al., 2020; Horst et al., 2017; Milbourne, 2012). However, there is often a toggling that takes place between what citizens want and have access to and what local governments and municipalities allow (De Wilde et al., 2020; Horst et al., 2017). They often exist as both spaces building social, physical, and environmental health, and spaces of conflict based on competing political, economic, and ecological projects (Cutts et al., 2017).

Gardening in Arizona

Arizona is growing to be one of the most diverse states in the USA. According to 2019 statistics from the census, Latinx represent 31.7% of the state's population. Arizona is

also home to 22 official indigenous tribes and to a growing African Americans and Middle Eastern population. However, minorities lacks representation in gardening. Farming and gardening in Maricopa County has been racialized since the 19th century. Still today, the majority of the food produced is not intended for local food security, but rather to make profit through crash crops (Bleasdale, 2015). Furthermore, Maricopa County is home to more than 4.8 million people and many members of minority groups live in one of the 55 documented food deserts (Albright, 2020; Smith et al., 2021), defined as an area without access to fresh, healthy and affordable food, where at least one-third of the population live more than a mile from a supermarket (Dutko et al., 2012). Unfortunately, urban gardens and farmers are rarely connected to food desert sites (Mack et al., 2017), and there are multiple land access issues. Agricultural land is being given to developers, and few accessible zoning permits exist to facilitate farming and gardening (Bleasdale, 2015). Little research has been conducted on the relationship between gardening, well-being and justice in Arizona. The few that exist argue that although there is a move towards urban gardens with increasingly supportive policies, not much work has been invested in ensuring social justice and tackling fair food access for diverse communities (Bleasdale, 2015). There is indeed a growing population of gardeners amongst minority groups, and this increased during the pandemic, but many obstacles hinder their growth, from justice issues to the challenges of a rough arid climate.

Due to difficult climate conditions, maintaining gardens in Arizona is a real struggle, be it for school gardens with few expert teachers and resources, for small-to-medium scale farmers who have land tenure and certification challenges, or even home-gardeners who are battling heat and low soil fertility. Although the recent increase in master gardeners trained through a program led by the University of Arizona (Bleasdale, 2015) has helped spreading

desert gardening knowledge, the limiting factors of growing in an arid region are still a reality. For farms and some areas of the city, water comes from the Salt River Project (SRP) and allows cheap food irrigation. For others, they need to use tap water at much higher prices. Additionally, soils are not very fertile and a lot of soil amendments are needed to ensure soil productivity. To successfully grow in an arid environment, a gardener needs water management and harvesting skills, soil health knowledge, and the ability to select drought-tolerant seeds and seedlings among others. Despite these challenges, urban gardens are on the rise and have especially multiplied during the pandemic.

Materials and Methods

To assess the relationship between gardening (in particular sustainable gardening), food well-being, and food justice, we conducted three small studies that build on each other and examine these variables. The three studies give an overview across three types of gardening as they relate to Arizona. The first study was conducted in 2018, and consists of 21 semi-directed interviews of school teachers from 9 elementary schools in the greater Phoenix area. It focuses on the relationship between gardening and experienced well-being across the 5 dimensions of FWB. The second study, conducted in 2020-2021, includes interviews of sustainable small-scale farmers and gardeners in Phoenix and Tucson, the two biggest cities in Arizona. This study focuses on sustainable growing practices specifically, and how they relate to the FWB framework. Conducted in Spring 2021, the third study is an online survey of 96 self-identified gardeners in Arizona. For this study, we build on study 2 to develop a Sustainable Gardening Score (SGS) and relate it to existing measures of well-being from the literature. The pandemic affected the design of our studies 2 and 3: most

interviews were conducted online or six feet apart, and the survey recruitment, completion and compensation occurred 100% online.

Study 1

In 2018, the authors of this paper and a group of graduate students from Arizona State University conducted a research project on school gardens in the Phoenix metropolitan area as part of a class in Food System Sustainability. The original goal of the project was to assess the opportunities and challenges faced by the school teachers in using and maintaining school gardens, and a total of 21 teachers working in 9 different schools were interviewed for an average of 20 minutes. For example, we asked teachers about what they initially hoped to achieve using school gardens, and the benefits of using the garden for the students, the teachers, and the school community. We also asked them about the specific challenges they faced with the school gardens, and the strategies to overcome them. The answers pointed to the relationship between gardening activities and enhanced well-being among teachers and students. We transcribed the interviews and coded the transcripts using the food well-being framework – in particular, the 5 dimensions: physical, emotional, social, intellectual and spiritual, and the "general environmental influences" – to get a preliminary understanding of how gardening experiences can be part of the food well-being cycle. For our analysis, we use a pre-existing conceptual model (the FWBC framework) that we enhance using inductive strategies (Bernard et al., 2017, p. 336) to determine (1) how gardening activities affect well-being and especially the five FWB dimensions, and (2) what are the specific general environment influences that can have an effect on these relationships.

Study 2

Building on the results from study 1, we conducted 13 semi-structured interviews with small farmers and gardeners using sustainable growing techniques. The interviews took

place between 2020 and 2021. The interviews were semi directed and included open ended questions such as "Can you tell us the journey of how you became a gardener/farmer?" "What does growing sustainably means to you?" "What are your motivations and challenges to garden/farm?" "Can you give us examples of experiences related to gardening/farming that you find particularly enjoyable?" One of the interviews was conducted over email, and the others were conducted in person six feet apart, by phone, or over zoom. They were recorded, transcribed and uploaded onto MAXQDA, where we subsequently coded them based on previous literature and in-vivo (Table 4). Specifically, the codes used were well-being (especially hedonic, eudemonic, and the five dimensions from the FWB framework), racial and social justice, and sustainable gardening. The codes then helped us understand how the gardeners and farmers define sustainable growing practices, and the relationship between these practices and their overall well-being. We used the same method of analysis as in Study 1, with a focus on sustainable growing activities.

Table 4

Codebook

Code name	**Definition**	**Source**
Hedonic WB	Well-being associated with a sense of pleasure and positive emotions.	(Deci & Ryan, 2008)
Eudemonic WB	Well-being associated with sense of fulfillment and purpose in life.	(Deci & Ryan, 2008)
Physical dimension (FWB)	Well-being as it relates to body awareness, healthy dietary choices and eating habits.	(Frentz, 2020)
Emotional dimension (FWB)	Well-being in relation to someone's emotional state and how they cope with stressors. Experiencing, expressing, and dealing with emotions that are associated with food-related activities.	(Frentz, 2020)
Intellectual dimension (FWB)	Well-being as it stimulates the mind; thinking and being intellectually engaged. Ex: a hobby (fitting for gardening), intellectual stimulation of gardening in a desert climate because it's so difficult	(Frentz, 2020)
Social dimension (FWB)	Wellbeing in relation to social interactions. May include norms, values, status symbol, and traditions and how these affect food-related behaviors (ex: what to grow, what to eat, how to grow)	(Frentz, 2020)
Spiritual dimension (FWB)	Well-being in relation to spirituality and one's overall worldview. Harmony with religious views, feeling at peace with oneself, support mind-body connection.	(Frentz, 2020)
Racial and social justice	A socially just food system is one in which power and material resources are shared equitably so that people and communities (regardless of race or social status) can meet their needs, and live with security and dignity, now and into the future.	(Allen, 2010)
Sustainable gardening	References to methods of food production, descriptions of what it means to them to grow food sustainably	in-vivo

Study 3

Using our analysis from sustainable growing practices in study 2, we developed a Sustainable Gardening Score (SGS) (Table 5) and conducted a survey to analyze the relationship between sustainable growing practices and well-being in a bigger sample. In order to test the hypothesis that sustainable gardening enhances eudemonic well-being, and sense of purpose, we also asked participants about their eudemonic well-being, and if they believed that their backyard contributed to biodiversity at home (Purpose 1) or around the world (Purpose 2) (Beumer, 2018). Other variables included the barriers experienced by the participants to garden or to garden more, changes in gardening pattern during the COVID-19 pandemic, race, age, and education level. We conducted a series of linear regressions to determine the predictors of the participants' eudemonic well-being, and sense of purpose (Purpose 1 and Purpose 2), and test the hypothesis that sustainable gardening enhances eudemonic well-being and sense of purpose. The survey was conducted on Qualtrics and was distributed through three local networks: two which focus on sustainable gardening and farming education in Arizona (the Urban Farm and the Rocky Mountain Seed Alliance), and one that tackles issues of racial justice (Phoenix Black Lives Matters). 96 participants self-identified as gardeners and took the survey. In our sample, 76 respondents were over the age of 45 (79%) and 39 had a graduate degree (41%). On race, 75 participants identified as Caucasians (78%), 9 identified as Afro-American (9%), 3 as Hispanics (3%), 1 as Asian, 3 as others, 4 preferred not to disclose this information, and one did not answer.

Table 5

Sustainable Gardening Score (SGS)

Question items	Scale
1. Do you use synthetic pesticides and/or fertilizers for your outside spaces?	1: yes, pesticides and fertilizers, 2: only pesticides, 3: only fertilizers, 4: none
2. Do you use mulch?	1: yes, 2: no
3. What type of irrigation do you use?	1: drip irrigation, 2: subsurface irrigation, 3: flood irrigation, 4: hose, 5: sprinklers, 6: others
4. What time of the day do you water your garden?	1: morning, 2: daytime (10 to 4), 3: evening, 4: whenever I have time
5. Do you use compost?	1: yes, 2: no
6. Do you use your own organic waste to make compost?	1: yes, 2: no
7. What type of seeds do you use?	1: organic, 2: local, 3: swapped seeds, 4: saved seeds, 5: nonorganic seeds, 6: GMO seeds
8. Which of the following actions do you take to provide for the native wildlife in and around your garden? (Beumer, 2018)	1: I make sure there are flowers, 2: I try to attract species that naturally keep pests out, 3: I leave some leaves, branches, and others, 4: I have a water pond, 5: my garden is surrounded by natural hedges, 6: I don't do anything special

Results

Study 1

Although not a food consumption activity, gardening falls under the "experience and events" phase of the food well-being cycle. It enables students and teachers to have access to firsthand food growing experiences that can enhance both nutrition and food literacy. For example, students can learn about the vitamins, water and carbohydrates that compose the produce that they help to grow, which improves their ability to understand nutrition information (nutrition literacy). Also, they can bring fresh vegetables home, where they can wash, prepare, and cook the produce, and assess the quantities needed for their families

(food literacy). These experiences give them new perspectives on food, which in turn creates enhanced lifestyle choices, and positively affects their well-being.

Our results are consistent with the literature (Blair, 2009; Cutts et al., 2017) and show a positive relationship between maintaining school gardens and wellbeing for both children and teachers. More specifically, the results show an effect on most of the food well-being dimensions. Results also illustrate the influences of what Frentz calls "general environment (Frentz, 2020, p. 50)" on the food well-being cycle, especially in the forms of barriers to successful gardening programs.

Food Well-Being dimensions.

Many of the interviewed teachers mentioned various benefits to students. The interviews were coded against the five dimensions of the FWB framework. Intellectual and physical well-being were the most prevalent, and to a lesser extent social and emotional well-being. There was no mention of spiritual well-being.

Intellectual well-being.

Six out of the nine schools saw a value in intellectual well-being, the garden enabled teachers to make linkages to science, social studies, and math curricula, and they were able to have students truly understand where their food comes from and how it grows. A Broadmor elementary school teacher said: "the garden helps relate text to real world and real world to text -- spelling, vocabulary, and the science curriculum supports the garden, math, social studies." In a different school, a teacher emphasized the potentials of the garden to teach problem solving skills: "I really appreciated the fact that I think our kids can "problem solve", so if they planted something which is not growing, let's try to problem solve why is it or why other plants are growing and ours aren't."

Physical well-being.

Six out of nine schools saw an effect on physical well-being. Gardening allowed students to be physically active outside in the garden, and it allowed them to consume fresh produce directly from the garden. "They might not have ever tasted an eggplant or something else before, and to realize that they liked it… so it really opened up their eyes to healthy food" (Echo Canyon elementary teacher).

Social well-being.

Teachers also mentioned how the garden helped build a sense of community for children and parents, and increased social well-being. Indeed, gardening helped children work together in an informal setting, and enabled them to connect gardening practices to larger sustainability and social issues. "(Gardening is) great for socialization for my kids" (Echo Canyon elementary teacher). Gardening also enhances teachers' social well-being by a. giving alternative learning opportunities to children who don't perform well in traditional classroom environments; b. involving and accessing parents, community members and other departments in the school; c. building relationships with children who are less social in class.

Emotional well-being.

Gardening allowed students to develop a sense of care and empathy for each other, and nature, as well as create a sense of calm and peacefulness which can be described as emotional well-being. When asked about the benefits of the school garden, a Madison Rose Lane teacher said: "I think just the overall feel of being surrounded by the garden, being in nature, building respect for nature and for caring."

Spiritual well-being. The spiritual component was not mentioned in any of the interviews. We believe that it might be difficult for teachers to connect spiritually with students given the diversity of their backgrounds, and because public schools are not traditionally spaces of discussions around spiritual beliefs.

General environmental influences.

We found that various levels of policies had a direct effect on the potential of gardening activities to enhance well-being. For example, gardens who benefitted from the experience and involvement of a master gardener or a highly knowledgeable school teacher were the most successful. In these cases, gardens produced food for students to share. They were able to enhance food and nutrition literacy through experiential learning, participated in improving food socialization, and contributed to well-being. Unfortunately, teachers' education usually does not include significant training in gardening skills, which are not considered to be a critical part of curriculums. Only a handful of schools had access to master gardeners to ensure the availability of food and a continuous production through growing seeds and seedlings. In schools that lacked funding, internal policies and community support to strengthen the gardening program, the garden played a very minor role in students and teachers' life at school. "The garden activity is not part of our programming, so little time is available" (Solano elementary teacher).

These results show that gardening is a relevant experience for the food-well-being cycle, as it holds the potential to increase both teachers and children's well-being and to provide fresh food access for the communities they serve. However, without the proper general environmental influences, issues of internal policies, teachers' training, funding and infrastructures around the garden can become barriers to this potential. This study encouraged us to dig deeper into the relationship between gardening and happiness in terms of eudemonic and hedonic well-being, as well as discover whether it can tackle disparities found in food access.

Study 2

Building on our results from the school garden study, we sought to examine if the relationship between growing food activities and well-being could also be observed for adult populations, and especially for those who grow food for a living (farmers) and if their well-being differs from those who grow food as a leisure (gardeners). Among the interview participants, 7 people identified as farmers and 6 identified as gardeners. Two of them were African American, 1 was Latinx and the rest were Caucasian, from both Phoenix and Tucson metropolitan areas. For members of a minority group, the questions of racial and social justice and their impacts on their activity were brought up quickly during the interview. Also, we specifically chose to interview growers who use environmentally sustainable practices, to assess the relationship between sustainable gardening practices. None of them used synthetic pesticides or fertilizers, and 6 of them used permaculture principles and techniques (B. Mollison, 1988). Because we conducted the interviews between 2020 and 2021, many interviewees referred to the COVID-19 pandemic, and how that affected their relationship to gardening and farming. For example, a Phoenix community gardener who sells some of her produce discussed the adjustments she made to respect measures of social distancing: "I put a cooler at my front door and you know message them and say your stuff's here. This is how much you owe me. They come to the front door, take it out the cooler, leave the money and off they go. So there's absolutely no involvement of any viral transfer." Although it required adjustments, the pandemic did not seem to transform the positive relationship between growing food and well-being in our sample.

Sustainable gardening.

Sustainable farming was defined by the farmers as multifold, and we coded the components which were redundant across multiple interviews. The 6 most important elements were rainwater harvesting and water-saving irrigation techniques, adaptation to heat

and local climate, seed saving and sharing, soil and plant health enhancing practices such as mulching, composting, and the absence of synthetic pesticides and fertilizers. We conducted a lexical analysis of these components of sustainable farming and gardening practices to assess their frequency across our interviews (Table 6).

Table 6

Lexical Analysis of Sustainable Gardening Components

Component	Number of interviews	Quote example
Rainwater harvesting, water saving irrigation systems	11	"Around trees, we have a swale, it's used for rainwater harvesting […] for the drier climates"
Adaptation to climate and bioregion (heat, climate, weather)	10	"[The chickens] are adapted to being in the heat and more resilient. […] So that's a little story from resilience and adaptation and how, yes, we can begin to adapt our seeds, our animals and ourselves to higher heat."
Mulch, mulching	5	"So under our shades with our mulch, the quality of our soil, the temperature in our gardens is 10 degrees cooler"
Seed saving, self-seeding plants	4	"We try to save some seeds and this year we got a few seeds from the seed library"
Composting	9	"(there are various) resources that I can harvest from the garden, whether it's pine needles to put in the compost or vegetables to bring in the kitchen, and the scraps go back out to the compost, which is the classic example of compost to veggie garden to kitchen back to the compost again"
No chemicals (pesticides and fertilizers)	6	"When you put pesticides and insecticides and all kinds of chemicals in the farming system that's how you destroy"

Well-Being.

To analyze the references to well-being, we first looked at the references to eudemonic and hedonic well-being, and then conducted a more detailed analysis of the five dimensions of the FWB framework. We did not find differences between the farmers and gardeners who participated in our interviews, and both groups had similar results. Eudemonic well-being was highlighted by 11 interviewees, especially as it relates to the sense of purpose experienced by farmers and gardeners. They talked about how meaningful growing food is to them. After detailing her life experience in agriculture, a Phoenix farmer summarized: "food is a big issue for me. It's not just a little one." Similarly, a Tucson gardener described gardening as "something very meaningful and essential" to her. "This is really wonderful" she added. The well-being derived from a sense of purpose was also heightened by the pleasure derived from the commitment to a cause bigger than themselves. A Phoenician farmer explained: "My objective is to demonstrate first to my family and then to my community that it's possible to live life on the Earth and still have the things that you want to have." In the same vein, a Tucson community gardener told us: "I feel like growing your own food is a revolutionary act (...) Growing the food is an excuse you know, it is like the vehicle that takes people to like a larger accomplishment." Self-sufficiency and supporting the health of their communities were particularly strong motives. Indeed, farmers and gardeners alike identified the motivation to be resilient and become self-sufficient (both individually and as a community), which was particularly relevant during the early days of the pandemic when food shortages in supermarkets encouraged an increased reliance on smaller scale and local productions. Farmers and gardeners alike also stated that their work

contributed to the health of their community, especially as a means to educate about healthier choices.

At the same time, the participants often highlighted the hedonic challenges (physical and sometimes emotional) associated with farming and gardening in the Arizona climate. Indeed, as mentioned above, farming in Arizona, comes with many challenges, especially for those who are trying to farm sustainably as it often implies an increased use of manpower. For example, a farmer insisted how hard it has become to farm in Phoenix: "All I know is now and it is getting hotter and harder. The pests are not getting laid to sleep and going dormant during the winter months. The pest pressure is on us all the time. The weed pressure, same thing." Yet, in the midst of these challenges, the strong sense of purpose seemed to participate in helping them to overcome these difficulties:

I'm very connected to the earth and it tends to empower me to continue to do what I do. Like, (...) it's one hundred and thirteen degrees at twelve thirty in the afternoon and I'm like, "oh my gosh, I have to quit right now. I can't do this anymore. This is crazy." And it's like "Oh, all I need is two more bunches, just keep pushing. You're not going to die in five minutes, OK?" I mean, this is me talking to myself in the heat, on the field, and I'm by myself out there and it's hot and it's hard. (...) And all of a sudden when it's so hot, I think I can't make it anymore, a cool breeze. The sweat on my body comes and even at one hundred and thirteen degrees, that cool breeze after you're sweating is just enough of nature to keep you moving forward. (Phoenix farmer)

Food Well-Being dimensions.

To get a more detailed picture of the participants' well-being, we also coded their interview responses across the 5 FWB dimensions (Table 7). The physical dimension appeared the most often because the majority of participants referred to the pleasure of

producing and eating healthy fresh food. The social dimension was also mentioned frequently, which is consistent with the sense of purpose and contribution to communities that we discussed earlier. The spiritual dimension, largely characterized by a deep sense of connection with nature, also adds another layer of understanding to the eudemonic well-being experienced when growing food.

Table 7

Frequencies of Food Well-Being Dimensions across Interviews

	Spiritual	Intellectual	Social	Emotional	Physical
#1 Phoenix farmer	3	0	1	3	4
#2 Phoenix farmer	1	0	1	0	2
#3 Phoenix farmer	1	1	3	2	3
#4 Phoenix farmer	1	5	0	1	1
#5 Phoenix farmer	3	1	5	1	3
#6 Phoenix farmer	0	3	0	0	1
#7 Phoenix gardener	5	2	1	3	2
#8 Phoenix gardener	2	1	4	3	9
#9 Phoenix gardener	0	0	1	3	0
#10 Tucson gardener	0	0	5	0	0
#11 Tucson farmer	0	0	0	1	1
#12 Tucson gardener	0	0	2	1	2
#13 Tucson gardener	2	0	0	0	0
Total	18	13	23	18	28

In order to identify the dimensions of FWB that were discussed closely to sustainable gardening descriptions, we mapped the codes to analyze their proximity in the transcripts with a maximum distance of 5 paragraphs (Figure 4). In our sample, sustainable gardening practices had the highest proximity with the social and spiritual dimensions, although these were not the most frequently mentioned. This means that in the interviews, when participants referred to the social and/or spiritual dimensions well-being they derive from growing food, they did so shortly after or before describing their sustainable food growing practices. For example, participants mentioned the sacred relationship that occurs

between them and their plants while tending to them. "The act of caring for a plant and receiving nourishment from it is a sacred reciprocal act, where you feel the relationship with nature physically in your body, via the food you eat" (Tucson gardener). Not all participants expressed social and spiritual well-being, but when they did, it was interconnected with their definitions of growing sustainably.

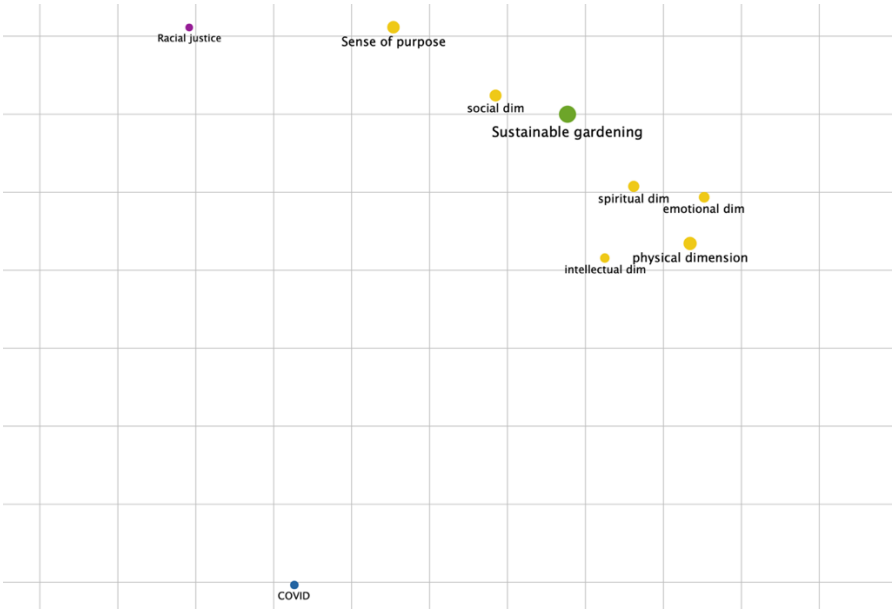

Figure 4. Map of the interview codes developed using MAXQDA. In our transcription of the interviews, the references to sustainable food growing practices occurred within a 5 paragraph distance from references to 1) the social, 2) the spiritual, 3) the emotional, 4) the intellectual and 5) the physical dimension of well-being participants derive from growing food, ranked from highest to lowest proximity.

Social and racial justice in the general environment.

Most farmers were outspoken about the issues in our food systems, and about the policies and larger cultural values that hampered their capacity to do their work and could be experienced as a form of social discrimination. One Phoenix farmer described the farming land access difficulties coming from zoning issues and the constant work to be heard:

I think there's a lot of talk out there about it, really, but without actualizing and saving farmland or open spaces from development, it's not going to happen. And so that

becomes a citywide urban and zoning issue, which needs constant voices saying "no more houses don't develop that space, we need that open space, we need those lands for food production." (Farmer, Phoenix)

Another farmer talked about a general cultural lack of respect towards farmers:

I would love for the growers of food to be as respected, if not even possibly more, than the doctors. Now, on the socioeconomic of it all, I don't know if that's possible, because right now a doctor on the socioeconomic level is paid so much more and can buy respect much easier than a farmer. And that's pretty evident ... You and I could dress like a really wealthy person. And I would say I'm treated differently than when I'm dressed like a farmer. I just am. (Farmer, Phoenix)

Three of the 13 farmers were from a minority group, and all three emphasized the critical dimension of community engagement. Their work centered on issues of racial and social justice, either by working on issues of food insecurity or poverty within their communities or by providing a form of professional training to their members. They described how the "general environment" is not fair for some of their community members, and how their work seeks to create solutions. One LatinX community gardener stated:

We're moving south of the border, creating a series of trainings, because we cannot ignore the fact that a lot of the food that we get here comes from there so… We need to make sure that the practices and the way people are treated is fair.

A black farmer talked about the "prison pipeline" in his community and how it "takes the youth away." He highlighted that his work with the garden served as prevention and rehabilitation for people to "grow roots" and transform their lives. Non-minority farmers and gardeners also sought to create solutions to negative "general environmental influences" in our food systems. However, they often were able to focus less on racial justice

issues. Instead, they concentrated mostly on reducing environmental harm, and on some dimensions of social justice such as growing healthy affordable organic food for their communities, and educating people to grow on their own. Minority farmers and gardeners too worked on reducing environmental harm, growing healthy food, and educating their communities. In addition to this work, they also sought to tackle racial injustice because they could not "ignore the fact."

Study 3

The first objective of this study was to test the relationship between gardening and well-being during the COVID-19 pandemic on a larger sample, and especially the hypothesis that gardening sustainably enhances eudemonic well-being using a series of linear regression between measures of eudemonic well-being and sense of environmental purpose, and a Sustainable Gardening Score (SGS). Second, the study also sought to identify the barriers to gardening experienced by the participants, and how they relate to "general environmental influences" from Frentz' framework (Frentz, 2020).

Gardening practices appeared to support many of the respondents during COVID-19. 54% declared that gardening activities increased during COVID-19, and many also stated that gardening helped them reduce food expenses and access food when it was a challenge, which contributed to their well-being. Based on our lexical analysis of sustainable gardening in Study 2, we first developed a Sustainable Gardening Score (SGS) including the 6 components listed in Table 6. An individual score was calculated for each survey participant based on their answers to a set of 8 questions (Table 5). We scaled the range of possible answers and attributed a number of points to participants for each question, for example, 2 points if they used mulch, 0 points if they did not. We added their number of points per question and divided the result by the total number of possible points. The resulting SGS

ranges between 0 and 1. Second, we ran three sets of linear regression to observe the relationship between eudemonic well-being and our SGS (Table 8). To measure eudemonic well-being, we used the six question items from the Pemberton Happiness Scale (Section A) that focus on eudemonic well-being (Hervás & Vázquez, 2013), for example: "gardening makes me feel a sense of purpose and fulfillment" (1=completely disagree, 5=completely agree).

In order to clarify the sense of purpose associated with sustainable gardening, we also asked the participants if they believe their gardens contribute to nature close to their home (Purpose 1) and to global biodiversity (Purpose 2), using a reverse scoring scale (Beumer, 2018). Our results show that the SGS is a significant predictor of eudemonic well-being and of sense of purpose as it relates to the impacts of gardening on the natural environment. Although the adjusted R^2 is quite small in each of the regression, and only a small percentage of the variance in our dependent variables can be explained by our statistical model (7 to 20%), it appears that people who adopted more sustainable gardening practices were more likely to report higher eudemonic well-being, and to believe their garden had an environmental purpose, which confirmed our hypothesis.

Table 8

Linear Regressions of Eudemonic Well-Being and Purpose 1 and 2 on SGS, Age, Education, Race and Data sample (N = 96)

	Eudemonic Well-Being			**Purpose 1**			**Purpose 2**		
	B	SE B	b	B	SE B	b	B	SE B	b
SGS	1.28	0.43	0.32***	-1.18	0.56	-0.21*	-2.06	0.71	-0.32**
Age	-0.02	0.15	-0.01	-0.63	0.20	-0.34***	-0.29	0.24	-0.14
Education	0.25	0.12	0.24*	-0.24	0.15	-0.16	-0.28	0.19	-0.16
Race	0.15	0.14	0.11	-0.31	0.19	-0.17	0.13	0.23	0.06
Data sample	-0.30	0.18	-0.20	0.11	0.23	0.05	0.02	0.29	0.01
(Constant)	3.37	0.31		3.00	0.40		3.37	0.51	
Adj. R^2		0.07			0.2			0.07	
	*F (5,87) = 2.45**			*F (5,87) = 5.53****			*F (5,87) = 2.46**		

* p < .05, ** p < .01, *** p < .001

To identify the "general environmental influences" to gardening in our sample, we also asked survey participants about the barriers they faced in their attempt to garden or to garden more. We adjusted the questions items from a survey on food access and affordability conducted by Missoula Food Security Initiative (*Missoula Food Bank: Annual Report 2016*, 2016) to specifically focus on gardening. In our sample, race, education and age were not significantly correlated to any of the barriers identified by the respondents. The top answer came from a third of our respondents who said they didn't have enough knowledge. Second and third top answers related to lack of time (30%) and lack of space respectively (28%) (Figure 5). Respondents also mentioned the financial cost of gardening and having a physical disability as a barrier. These barriers highlight a lack of accessibility in gardening activities, and how it relates to larger environmental constraints. Beyond individual choices, the lack of knowledge, time, space and money point to larger societal issues.

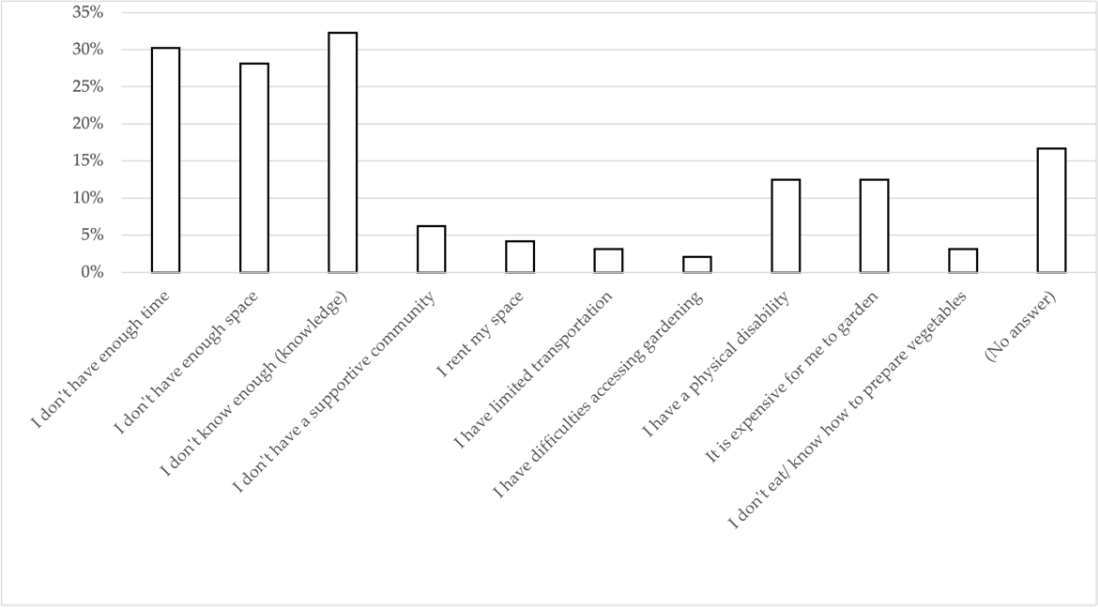

Figure 5. Barriers to Gardening. Question: "Which of the following barriers apply to you to garden or to garden more? (select all that apply)" (N=96).

Discussion

Across our studies, gardening appeared to have a positive impact on Food Well-Being and happiness. For school children, gardening was associated with hedonic well-being, as they experienced the pleasures of being outdoors, tasting fresh fruits and vegetables, and interacting with peers and teachers in a more informal setting than the traditional classroom. Hedonic well-being was also expressed by participants in our second and third study, along the same lines as school children: tastiness of fresh food, pleasure of being outside, and agreeable time spent with others.

Eudemonic well-being was also reported in our three studies. Teachers explained how gardening with the children heightened their sense of purpose. Study 2 participants also highlighted how producing food is deeply meaningful to them, especially as it gives them the opportunity to be more self-sufficient and a purpose in having a positive impact on their communities and the environment. This sense of purpose was powerful enough to compensate the hedonic challenges of growing good in difficult environmental and social conditions. Additionally, we found in our third study that Arizona gardeners who use more sustainable growing practices were likely to also report higher purpose and eudemonic well-being. To our knowledge, no other study has shown a relationship between sustainable gardening and eudemonic well-being.

In study 1 and 2, this paper also analyzed the relationship between gardening and the five dimensions of FWB. Conceptually, physical well-being largely intersects with hedonic well-being, and it was reported as the most prevalent dimension in both studies.. This is consistent with the gardening literature which has long identified the health benefits of gardening (Soga et al., 2017; Thompson, 2018) and how they contribute to general well-being (Blair, 2009; Clatworthy, Hinds, & Camic, 2013; T. L. Scott et al., 2015; Vogt et al.,

2017). In addition, both the social and emotional dimensions appeared in most interviews in study 1 and 2. Interestingly, the intellectual dimension which appeared in most interviews with teachers was also the dimension least mentioned by sustainable farmers. Inversely, the spiritual dimension was never mentioned by school teachers while it appeared in 8 out of 13 interviews in our second study. In study 3, we did not specifically test the relationship between gardening and the five dimensions of the FWB framework, and this could be the focus of further research. Indeed, the development of instruments that would specifically test for these dimensions might help to better identify the nuances across them in a larger sample.

In her research, Frentz describes the influences of the general environment as those exerted by governments, public institutions and non-profit organizations that shape the consumers' physical surroundings by implementing policies (Frentz, 2020). The structural causes of racial and social inequality lay in these influences. Across our studies, gardening seemed to improve fresh food access for everyone which is an important component of food justice. In schools with successful gardening programs, children and teachers were able to go home with produce, even in low income communities, and to gain food and nutrition literacy which is consistent with previous literature (Bleasdale, 2015). Farmers and gardeners in our second study also talked about their engagement to improve affordable fresh food access, in particular by voluntarily teaching their community members to grow their own food. In study 3, people reported eating more fruits and vegetables since they started gardening, and 52% of our respondents said they now spent less money on purchasing fruits and vegetables. However, in each of our studies, a number of barriers limited the benefits of gardening on social inequalities. In particular, the lack of gardening knowledge prevented schools from implementing successful gardening programs and hindered our survey

respondents' capacity to garden more. Similarly, the lack of knowledge was the #1 barrier to gardening shared by our study 3 participants. This lack of knowledge among the general population is the result of both cultural norms that have long disvalued farming activities and knowledge, and of curriculums that – still today – do not regard food and nutrition literacy as fundamental competences. Additionally, people struggle with land access in urban environments, which adds another challenge, even for people who have some gardening knowledge. These results highlight the importance of general environment influences: without the proper policy support, it remains very difficult for gardening to deeply tackle social justice issues and its effects on well-being may be volatile.

For this paper, we were able to observe potent but limited examples of the effects of gardening on racial inequalities. In our study 2, minority farmers actively worked to reduce racial injustice by successfully providing trainings, mentorship, and fresh food access to their communities. However, racial injustice was rarely mentioned by other interview participants. In study 1, no information on race was available. In our third study, only 16 people identified as minority and their results did not significantly differ from Caucasians but the sample is too small to make any conclusion. To remedy these limitations, future research should consider tailoring recruitment methods to different minority groups. For example, conducting interviews and surveys in Spanish would be relevant in the Arizona context. Additionally, further research could specifically seek to compare the lived experiences of white and minority gardeners to better understand the relationship between well-being and sustainable gardening across racial groups

To conclude, this paper highlights the importance of including food producers to the discussion on well-being and happiness. Our studies show the effects that gardening – and especially gardening sustainably – can have on the five dimensions of the FWB framework,

and on both hedonic and eudemonic well-being. Thus, the conversation on Food Well-Being needs to go beyond food consumption and integrate food producing activities to better capture the food-related drivers of well-being. While conducting this research and exploring the effects of gardening on racial and social inequalities, it became clear across our three studies that food growing knowledge and activities do not benefit from a level of support commensurate to their contribution to society's well-being. At the risk of stating the obvious, we want to stress that there can be no type of food consumption without food production. Food producers, especially sustainable farmers and farmworkers, serve as a lifeline for all of us; this became very clear during the food shortages at the beginning of the COVID-19 pandemic. It is vital for our society to better value their role with policies that improves their situations, for example: fair prices, better land access, and safe working conditions. It is also critical to recognize and value food growing competences, and to provide a solid education on the subject to everyone. In doing so, policy makers can contribute to enhancing food justice and happiness.

CHAPTER 4

URBAN FOOD AUTONOMY: AN ETHICS OF CARE FOR SUSTAINABILITY

Prelude

This chapter was published as an article in the journal *Humanities* for the special issue "Food Cultures and Critical Sustainability" in February 2021. For this dissertation, the purpose of integrating this Chapter 4 is to answer the following research questions:

RQ3a: How do urban food autonomy movements integrate care into food systems?

RQ3b: How do Earth care, people care and fair share practices contribute to sustainability as defined by the United Nations Sustainable Development Goals?

By presenting urban food autonomy movements, I refer to several care practices that they integrate into food systems such as hyper-localism, education, participatory governance, and soil building practices, all of which can be integrated into Earth care, people care and fair share categories as detailed in Chapter 2 and which answers RQ3a. I also show how urban food autonomy movements contribute to the UN SDGs (RQ3b).

Note that in this chapter, I often use the word flourishing as a synonym of developing successfully and thriving. I am aware that flourishing is also a concept developed by Aristotle and referring to the "good life" or *eudaimonia* – the highest good of human endeavors and towards which all actions aim – but I do not discuss it in these pages.

Abstract

Urban agriculture is often advanced as a sustainable solution to feed a growing urban population, offering a number of benefits: improved fresh food access, CO_2 absorption, social justice and social cohesion among others. Going beyond these direct

tangible/objective benefits from urban agriculture, in this paper we ask: How can growing food in the cities teach us about taking care of each other and the natural environment? We use the example of urban food autonomy movements to discuss the transformative potential of a grassroots-led initiative promoting permaculture, which is anchored in three "ethics": care for the Earth, care for the people, and fair share. Through examining the philosophical underpinnings of "autonomy" and "care", we explore how urban food autonomy initiatives can enable the development of an ethics of care, especially using permaculture inspirations. Our theoretical review and case analysis reveal that "autonomy" can never be achieved without "care" and that these are co-dependent outcomes. The urban food autonomy initiatives are directly relevant for the achievement of the three of the UN's 17 Sustainable Development Goals: "Zero Hunger," "Life on Land" and "Climate Action", and contribute to a culture of care. Indeed, urban agriculture can act as a powerful education platform for the engagement of diverse stakeholders while also supporting a collective transformation of values.

Introduction

What can growing food teach us about care? In a 2015 interview, UN Secretary General for Economic and Social Affairs Wu Hongbo reminded that, considering the way we currently produce and consume, "The planet's resources will not sustain unless something is done to change the way we treat (it)." (UN DESA, 2015) Among the many things humans produce and consume, agriculture and food systems are major sources of environmental destruction (FAO, 2011), and their transformation is central to the achievement of many United Nations Sustainable Development Goals (SDGs) (Willett et al., 2019). In a world shaken by COVID-19, the importance of caring for one another and

adjusting our productive system for that purpose has moved to the front. Many people have experienced for the first time, with disarray, the sight of empty shelves in the supermarkets of developed countries. Meanwhile, farmers have been forced to throw away million gallons of milk and to euthanize their livestock (Yaffe-Bellany & Corkery, 2020), as the number of people relying on food banks to feed themselves sharply increased (Schanzenbach & Pitts, 2020). Yet, the novel coronavirus did not create these problems, but instead revealed its long existing vulnerabilities. When an open market stores a large amount of food and living wild animals in anticipation of end of year celebrations – like it happened in Wuhan (China) in December 2019 (Frutos et al., 2020) – the whole world might be affected via a network of social relationships and high mobility. The agro-industrial model is highly sensitive to shocks, and the current crisis urges us to collectively transform our relationship to food: from a commodity to a web that connects us physically and morally to our natural environment and each other.

Food systems are complex and interconnected. They bring together very diverse actors and have strong moral implications. For example, at least 48% of farmworkers in the United States had no legal status in 2014 (USDA ERS, 2020), receiving lower pay, and being exposed to higher health related risks. Meanwhile, these workers are necessary for US agriculture to function and for food to reach our pantries (Zahniser et al., 2018). The consequences of our agriculture on the natural environment – soil erosion, extinction of pollinators, water nitrification and greenhouse gases emissions among others – reveal the connection between humans and the natural environment and raise serious ethical questions as they threaten our collective survival. Yet, the web of relationships that constitute our food systems is often reduced to neutral (or amoral) transactional relationships. Before being places of economic transactions, food systems are a web of connectedness, and of diverse

relationships that carry responsibilities and ethicality (Puig de la Bellacasa, 2017b; Whyte & Cuomo, 2016). Consequently, we can only transform our relationship to food by casting light on the ethical fabrics of the places we inhabit and from which we eat.

Local foods and urban agriculture benefit from a socially and environmentally conscious image (Grebitus et al., 2020; Low et al., 2015). Within food systems literature, the scholarship on urban agriculture has increased dramatically over the years. It has been discussed with a focus on food security (Eigenbrod & Gruda, 2015; Siegner et al., 2018; Sonnino, 2016), sustainability (Lovell, 2010), social justice (Duchemin et al., 2008; Passidomo, 2014; Reynolds et al., 2016), and urban planning (Hara et al., 2018; McClintock et al., 2013). Several research works account for the therapeutical benefits of gardening, both for physical and mental health, such as stress, anxiety, depression and obesity reduction, and with mood and general health improvement (Clatworthy, Hinds, & M. Camic, 2013; Soga et al., 2017; Sullivan, 1979; Teig et al., 2009). A growing number of studies emphasize how urban agriculture can build relationships and trust among community members, and foster social cohesion (Camps-Calvet et al., 2016; Kingsley & Townsend, 2006; Peters et al., 2010; Petit-Boix & Apul, 2018). Additionally, it has been argued that urban agriculture gives its participants the opportunity for caring and nurturing life. In doing so, it helps restore their ecological knowledge, which is a critical condition for stronger stewardship of the natural environment (Barthel et al., 2010; Colding & Barthel, 2013). It thus seems that care is part of the ethical fabric of urban agriculture, as it offers opportunities to care for one another and the environment. Yet, as far as we are aware, there is currently no study that explores the potentials of urban agriculture practices in relation to the development of an ethics of care, and how they support the achievement of the UN Sustainable Development goals. This is what we propose to do in this article, by reviewing the literature on ethics of care,

permaculture and urban food autonomy movement. Our argumentation is also informed by interviews with farmers, permaculture practitioners, food activists and urban food system experts, conducted in the United States, in France and in Cuba. The methodology and analysis of these interviews are excluded from this paper.

Following the 2008 economic crisis, a number of initiatives around the world have advocated for urban food self-reliance and autonomy, especially in developed economies. This is the case of the cities of Todmorden in the UK and Albi in France, along with grassroots initiatives in Athens, Rome, Madrid, Morocco, Switzerland, Canada and Puerto Rico, to only name a few. These initiatives encourage urbanites to (learn how to) grow their own food, increase food production areas in the cities and place a preference on local food consumption. Many of these programs have used permaculture principles and philosophy to support their food production efforts. Todmorden (UK) is a well-known example, as it birthed the Incredible Edible movement (Paull, 2013). This groundswell encourages free food production by using public spaces to plant herbs and vegetables that are free for everyone to pick. The initiative has been replicated worldwide in around 1,000 groups (*Incredible Edible Network Organisation Information*, 2018; Warhurst & Dobson, 2015).

In this paper, we explore in depth the concept of urban food autonomy by connecting it to the philosophical underpinnings of "autonomy" and "care," and its permaculture inspirations. Permaculture is a regenerative agriculture practice and philosophy that is anchored in three principles or "ethics": care for the Earth, care for the people and fair share (Holmgren, 2002, p. 1). In this paper, we argue for the development of an urban food autonomy that is regenerative for the environment (starting with the soil) and the human populations, one that is anchored in the practice of care. First, we explore what the concept of urban food autonomy unveils. In the second part, we discuss the potentials of

urban food autonomy in fostering food systems moral transformation, highlighting the contribution of Care Theory to food systems conversation. Lastly, we make the case that urban food autonomy movements using permaculture support the flourishing of an ethics of care, and contribute directly and indirectly to several Sustainable Development Goals (SDGs) as set by the United Nations.

Urban Food Autonomy: Food Self-Sufficiency and Political Empowerment

From its Greek root, the concept of autonomy means "one who gives oneself one's own law." It is used in medicine, politics and moral philosophy in which it conveys different yet similar meanings. In health care, personal autonomy refers to the right of the patients to make decisions regarding their own health. It is a key element of informed consent, which applies both to medical research and treatment (Beauchamp & Childress, 2013). In moral philosophy, Kant regards autonomy as a condition to the existence of morality (Kant, 1997; Sensen, 2013). It is because we have the ability to make our own decisions that we can choose to behave morally. Kohlberg develops this idea further in his study of the stages of moral development (Kohlberg, 1981). According to Kohlberg, the highest degree of autonomy is reached when moral principles such as justice are internalized, and failure to meet these standards results in guilt and self-condemnation. In political philosophy, the concept of autonomy often refers to self-determination – a principle fundamental to the decolonization process. For urban food movements, the idea of autonomy addresses both the aspiration to local self-sufficiency, and the sense of political transformation toward greater control over food and territories. Embracing the idea of autonomy supports an aspiration to local food self-reliance and the emancipation from a food system thought to be oppressive.

Urban Food Self-Sufficiency

Throughout history, food was produced in cities or in their close surroundings to feed their respective populations (Imbert, 2015). Today, diverse types of urban and peri-urban agriculture within 12 miles of cities account for 60% of all irrigated croplands in the world and supply a large portion of the vegetables consumed in many cities (Tefft et al., 2020). However, it is not the case in industrialized economies that largely rely on modern and longer supply chains. Sanitary regulations, the increase in urban land prices, the development of transportations and storage capacity were all factors that led to the disappearance of farms and gardens in inner cities, and with it, food production knowledge among its inhabitants. Meanwhile, cities became increasingly dependent on food imports, with limited food reserves, and resulting in vulnerabilities to disruptions in production, transformation and distribution channels (Zeuli & Nijhuis, 2017). In the early stages of the COVID-19 pandemic, consumers faced empty supermarket shelves, as the system was not able to quickly adjust to the shift in the demand (Yaffe-Bellany & Corkery, 2020). Meat processing plants had to close temporarily because of virus outbreaks, driving up the price of meat. Urban food autonomy movements advocate for a re-localization of food production, partly as a way of mitigating such risks. By bringing back the knowledge and practice of food production in cities, these movements seek to reintegrate agriculture at a larger scale in urban spaces and to encourage cities to plan for self-reliance; this is the first part of food autonomy. A study of the city of Cleveland concluded that from 22 to 100% of self-reliance (measured as a function of yield, area and intake) in fresh produces, chicken and honey would be possible to achieve for over 430,000 inhabitants by using vacant lots, residential houses and rooftops, conventional urban gardening and hydroponics (Grewal & Grewal, 2012). A study conducted in France for the city of Rennes, with a population over 220,000,

concluded that the urban and peri-urban space could produce 100% of kCal – food calorie – needs per inhabitant by shifting the local production from an intensive animal farming environment (meat, eggs, milk) to the harvesting of grains, vegetables, fruits and oils, and integrating rooftops, forests, private/public gardens and natural areas (Darrot & Boudes, 2011). According to these studies, it could be technically possible to feed the entire city population using only the urban and peri-urban spaces, if we use the city space (e.g. rooftops, private yards, vertical gardening, etc.) more efficiently and are willing to transform parts of our diets. However, the urban food autonomy movements argue that the process toward food self-sufficiency is more important than the *a priori* feasibility of the goal. The steady increase of people's knowledge and practice of food production should support the end goal by unveiling new possibilities.

Control Over Food and Territories

Urban food autonomy seeks to empower people to control their food and their territories by choosing the type of food systems in which they wish to live. It is a direct echo to food sovereignty18 movements, but it nevertheless covers different political realities, and can support diverse political agendas. Indeed, the local food movements have and still fall under different – and at times opposite – political umbrellas. Some support local production as a matter of local pride and reject the non-local as a potential danger. For instance, traditionalist conservatives prefer localism over the power of a centralizing state. From a different political angle, radical anarchist movements are also supportive of self-sufficiency

[18] The "Declaration of Nyéléni" adopted by 80 countries in 2007 proposes the following definition: "Food sovereignty is the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems."(Declaration of Nyéléni, 2007)

initiatives. Many *orti urbani* (community gardens) in Rome are located in squatted spaces and developed by anarchist groups, promoting horizontal decision making, cooperation, refusal of fascism, racism, patriarchy, labor exploitation and neoliberalism (Mudu & Marini, 2018). These gardens are ways for urbanites to reclaim their city and autonomy in opposition to perceived oppressive forces.

In Athens, following the debt crisis, radical movements have been organizing to maintain the life of the cities, developing solidarity networks, often organized around food. The crisis encouraged conversations and dreams of autonomous zones in the city (Newman, 2011), and the subsequent "back-to-the-land" migrations from urban centers sparked food solidarity between urban and rural spaces (Morales Bernardos, 2017). In Madrid, food movements joined the anti-austerity Indignados movement in response to the 2008 economic crisis, developing community gardens and self-organized food banks for the construction of political alternatives (Simon-Rojo et al., 2018). Originally, it was characterized by a strong anti-capitalistic contestation and slowly evolved to integrate selective private actors through the social economy. It ultimately became active members of city councils working in concert to co-create public policies.

In each of these initiatives, autonomy has a political motive, even though the political ideals they seek to develop and their mode of advocacy can vary greatly. In this paper, we focus on urban food autonomy movements that use permaculture inspirations to invite "care" in their path to political transformation. Together with permaculture, urban food autonomy has potentials to recreate and enrich the relationship urbanites have with their food, their local communities and their natural environment. In doing so, it also directly supports the achievement of multiple UN Sustainable Development Goals. These transformative potentials are worth exploring. The extreme proximity of food production in

urban spaces can help reframe the status of food – from a commodity to a catalyst for social and environmental change.

The Moral Transformative Potentials of Urban Food Autonomy Movements Through the Practice of Care in Permaculture

Urban food autonomy movements that embrace permaculture use the concept of "care," especially to refer to environmental care, social care and, in some cases, self-care. Yet, it is not always very clear what "care" means and how it is compatible with the idea of autonomy. In this section, we first provide an overview of the concept in light of its uses in the ethics of care and ecofeminist traditions. Then, we examine how caring urban spaces can be designed using permaculture techniques.

The Concept of Care

Ethics of care is rooted in feminist philosophy and political movements that gained voice and momentum in the 1980s and 1990s. In the 1980s, feminist philosophers emphasized the critical importance of "care" in human societies and its exploitation in line with the domination of women and other disenfranchised groups. In his book, *A history of the world in seven cheap things*, Raj Patel (2017) describes the work of "caring" and its underpaid commodification as one of the key characteristics of our modern capitalist societies. He writes:

> The work of caring for, nurturing (…) is overwhelmingly unpaid. (…) The availability of proletarian labor was possible only because of the transformation of care work into unpaid work, available as one of Nature's "free gifts" - which are neither free nor gifted. (Patel & Moore, 2017, p. 133)

This is an echo to ethics of care theorist Joan Tronto's work in *Moral boundaries*:

Care is a central but devalued aspect of human life. To care well involves engagement in an ethical practice of complex moral judgments. Because our society does not notice the importance of care and the morality quality of its practice, we devalue the work and contributions of women and other disempowered groups who care in this society. (…) (O)nly if we understand care as a political idea will we be able to change its status and the status who do caring work in our culture. (Tronto, 1993, p. 157)

Carol Gilligan and Nel Noddings are traditionally considered to be the founders of ethics of care in the 1980s (Gilligan, 1982; Noddings, 1984). Gilligan is known for opposing her Ph.D. mentor Lawrence Kohlberg and his theory of moral development stages. In response to the Heinz dilemma – one of the stages of Kolhberg's moral development – Gilligan argued that the emotive and context-sensitive "care perspective" is as valid as the liberal tradition of rationalistic and universalistic moral reasoning, not inferior (Gilligan, 1982; Kohlberg, 1981). According to her and those authors adopting a similar philosophical position, the ethics of care is essentially relational, it accepts the moral validity of emotions in ethical decision-making and is less focused on individual moral reasoning. Caring is essentially relational, it happens "in the relation between the one caring and the one cared for" (Noddings, 1984). The feminist movement supported the idea that women were more likely to adopt relational moral positions, and that these were not ethically inferior to Kantian or utilitarian ethics, which focus on individual decision making. It generally endorsed the ethics of care as a valid and valuable moral theory.

Milton Mayeroff defines care as follows: "To care for another person, in the most significant sense, is to help him grow and actualize himself." (Mayeroff, 1971, p. 1) However, this definition does not explain "how" to help or what it means in practice, so that the self-

actualization can take place. This is an important point since we know that the best of intentions do not always benefit the one being helped. Nel Noddings gives the example of a teacher trying to help someone learn mathematics (Noddings, 1984, p. 15). She emphasizes that it might be easier for the helper to take an expert stance and to ensure that she knows better. But, in order to really "help," the helper needs to humble herself and be ready to apprehend the other's reality. This is a critical dimension in growing food. In order to best grow a crop and care for an agricultural space, it is necessary to apprehend the reality of the plants themselves and to be able to "read the landscape." (Whitefield, 2015) Similarly, the advocates of urban food autonomy that rely on permaculture adopt a participatory educational approach to social change, as opposed to top-down policies. For the urban food autonomy activists, care requires genuine attention and collaborative processes.

Tronto emphasizes caring as an ongoing activity and a process. She distinguishes four phases of caring: caring about, taking care of, care-giving and care-receiving.

Caring about involves the recognition in the first place that care is necessary. It involves noting the existence of a need and making an assessment that this need should be met … Taking care of involves assuming some responsibility for the identified need and determining how to respond to it. (Tronto, 1993, p. 106)

Also, writes Tronto:

Care-giving involves the direct meeting of the needs for care. It involves physical work… Care-receiving recognizes that the object of care will respond to the care it receives… for example, the starving children seem healthier after being fed. (ibid, 107)

For her, ethics of care does not limit caring to human beings, and she and Berenice Fisher "include the possibility that caring occurs for objects and for the environments, as well as for others."(ibid, 103) In a note on this comment, she adds: "In general, I believe that

ecofeminist concerns form a part of care, but I have not explored these implications here." (ibid, 203).

Ecofeminism emerged at the convergence of environmentalism and feminism. Ecofeminists conceptually tie the patriarchal oppression of women to other forms of exploitation, i.e., of nature and "other others" such as racial minorities, indigenous groups and LGBTQ populations (Cuomo, 1997). According to Cuomo, ecofeminism must focus on the ways oppression functions so that it can derive alternative anti-oppressive ethical and philosophical insight, committed to the tied-up flourishing of humans and non-humans. And the practice of care is essential to such flourishing, as it reveals the interdependent nature of autonomy.

Tronto studies the relationship between autonomy and dependence, and writes a response to moral philosophy, for which autonomy presupposes individualism and considers dependence as a form of submission. Her critique highlights that Kantian and consequentialist ethics are anchored in the political climate of the European and North American 17th and 18th centuries, a time when dependence was associated with slavery and serfdom, from which moral philosophers of the Age of Enlightenment wanted to break. These shaped our ideas of freedom and individual rights, and drove aside the intertwined natures of dependence and autonomy. "We start our lives as dependent," writes Tronto, and the role of early care is to foster our autonomy (Tronto, 1993, pp. 162–163). Sickness also makes us dependent, and the care received during illness aims to restore our autonomy. In that perspective, care is a response to dependence, in a way that does not abuse it, but instead uses it to promote autonomy.

Our modern societies have been strongly inspired by the idea that autonomy is a condition for moral judgment, hence, we defend the freedom and autonomy of individuals

and states, but we discard the critical importance of caring to achieve such autonomy. There is no autonomy without the consistent work of caring, which itself is a central element to environmental sustainability. Albeit, care promotes autonomy of the care-receivers, and conversely, autonomy is a testimony to a skilled practice of care.

To summarize, ethics of care insists on the relational nature of individuals and situations, and values emotions and affects as part of moral decision-making. It pursues the self-actualization and autonomy of the caregiver and the care-receiver. Along with ecofeminism, it seeks to understand and oppose the constructed oppression of nature, women and other dominated groups, by putting the practice of care at the center of moral action and as key to political transformation.

Designing Caring Spaces with Permaculture

Caring for plants, soil and spaces defines the core of permaculture, and is a good exercise of care habit formation. By reintegrating these caring practices into our urban spaces, urban food autonomy movements provide a catalyst for social change. Permaculture and ethics of care emerged as different disciplines: the former as a branch of moral philosophy, and the latter as a set of design principles to mimic and work with natural ecosystems. In spite of coming from different traditions, we argue in this section that permaculture is an ethics of care, and that it supports societal change by designing caring spaces.

First, permaculture relies on three core principles or "three ethics": (1) care for the Earth (the living soil, the forests, the oceans and the freshwater), (2) care for the people (compassion for and simplicity toward human needs, self-reliance and personal responsibility), and (3) fair share (sharing abundance and setting limits to personal consumption). (Holmgren, 2002, p. 1) The goal of permaculture is to create self-reliant and

autonomous communities through the practice of these three ethics, each centered on the practice of caring. It represents what Janel Curry called "caring agricultural practices" (Curry, 2002, p. 129) that seek to address and transform the mechanisms of oppression in our agricultural system.

Second, permaculture values emotions and affectivity in moral decision making. Maria Puig de la Bellacasa studies permaculture as the practice of an ethics of care, i.e., a practice that is less focused on traditional morality in terms of abstract universal principles, and more on how to "make and live with everyday systems and techniques that embody and embed care for the earth." (Puig de la Bellacasa, 2017b, p. 126) Permaculture is essentially embedded in relationships inherent in a collective of humans and non-humans. It fosters durability and renewal. Puig de la Bellacasa develops the example of caring for the soil in agriculture. In modern agriculture, the soil is already "taken care of" she says, for instance, through tilling and chemical fertilizers that put the farmer into a managerial role rather than into a tending one. When relying on permaculture, the farmer needs primarily to invest emotionally in their relationship to the soil. "The point is (…) to alter existing relations of taking care through alternative modes of affectivity." (Puig de la Bellacasa, 2017b, p. 199) Taking care of the soil in permaculture requires taking the time, a time that respects the biological time and cycles of the soil, but which also includes the emotional time of creating attachment to the life in the soil.

Third, permaculture practitioners use their understanding of system design to foster plants and systems autonomy by enhancing cooperation between elements. These practitioners primarily rely on natural synergies between ecosystems, encouraging plant growth and yields. In the words of Patrick Whitefield, author of *The Earthcare Manual*, it is the art of

designing "beneficial relationships." (Whitefield, 2015) Permaculture provides ways of designing food production systems that fosters nature's independence, while relying on biological cooperation to do so. This is a good example of relational autonomy in practice. For instance, companion planting (Holmgren, 2002, p. 165; Parker et al., 2013) is one of the many ways permaculture uses design to enhance plant health by relying on cooperation.

Says environmental designer and co-founder of the permaculture concept David Holmgren:

The emphasis on building more mutual and co-operative relationships while reducing the impact of predatory and competitive relationships is a key permaculture strategy for more effective integration within and between systems. Companion planting of vegetables and herbs, originally based on observations of mutualistic effects by biodynamic researchers, has popularized the idea that plants do not necessarily compete and may have beneficial effects on one another. (Holmgren, 2002, p. 165)

Lastly, permaculture also takes part in fighting the very mechanisms of oppression in our agricultural system that lead to environmental destruction and social exploitation. Bill Mollison, considered to be the father of permaculture, defines it as:

A philosophy of working with, rather than against nature; of protracted and thoughtful observation rather than protracted and thoughtless labor; and of looking at plants and animals in all their functions, rather than treating any area as a single product system. (B. Mollison, 1997, p. 10)

Indeed, permaculture offers principles that allow humans to grow food in a way that can regenerate soils, depollute waters and reverse deforestation. For example, permaculture designer and consultant Geoff Lawton and his team lead a "Greening the Desert" project in the Dead Sea region in Jordan, where they have been able to grow trees and food by using a

system of swales and mulch to harvest the water and desalinate the ground (Geoff Lawton, 2016). Similarly, many permaculture practitioners oppose the exploitation of farmworkers by industrial agriculture, and develop alternative projects that emancipate producers and consumers. They recognize that social and environmental issues, along with care for the Earth, care for the people and fair share are inextricably interlinked. In Arizona's capital city of Phoenix, the nonprofit Tiger Mountain Foundation uses urban farming and permaculture knowledge to help community members come together, access food, learn new skills and support the reinsertion of young adults who have been behind bars (Tiger Mountain Foundation, 2020). The foundation manages three urban gardens located in communities with few supermarkets and high incarceration rates. For the community members and the volunteers that work in these gardens, the collective participation in growing food provides them a place to grow roots, learn about healthy foods and – for some – to break free from the prison cycle.

By putting "care" at the core of its practice and moral principles, by including emotions and attachment in decision making, by recognizing that humans and ecosystems are primarily relational, and by offering alternatives to an oppressive agricultural system, permaculture is an ethics of care. As such, permaculture allows urban food autonomy movements to design caring landscapes that enhance human and environmentally beneficial relationships and transform the moral fabric of our agricultural systems.

Urban Food Autonomy Supports the SDGs

Some research work has already discussed how permaculture design principles can address air pollution in urban areas (SDG #11 – Sustainable Cities and Communities), and increase universal access to renewable energy (SDG #7 – "Affordable and Clean Energy")

(Moran, 2019; Moran & Mempouo, 2019). Here, we argue that by promoting food self-reliance and using permaculture principles, urban food autonomy movements directly contributes to three of the UN's Sustainable Development Goals: "Zero Hunger," "Life on Land" and "Climate Action." Also, these movements support the moral transformation in our societies that is critical to address these goals. Indeed, placing "care" at the center of our public lives is necessary for the achievement of the SDGs. The quality of caring expresses the conscious commitment to support others and the natural environment and to extend one's own responsibility toward them (Biesecker et al., 2014). Without such quality, the SDGs cannot be achieved.

'Zero Hunger'

There are many ways in which urban agriculture can contribute to food access (Poulsen et al., 2015), even if it rarely fully removes the households' pressure for food availability (Badami & Ramankutty, 2015). First, urban agriculture (and especially direct household food production) can improve access to diverse and nutritionally rich fresh foods. Second, urban agriculture can free up some money by reducing food expenditures, taking into account the initial cost of setting up the garden. Urban agriculture can also protect families from food-price volatility. It is not always clear if urban agriculture efforts improve food access for low-income urban consumers, especially in developing countries (Badami & Ramankutty, 2015; Gudzune et al., 2015; Lucan et al., 2015; Misyak et al., 2014; Siegner et al., 2018). Moreover, urban agriculture presents the risk of neighborhood gentrification by beautifying spaces and attracting consumers willing to pay a higher price for locally grown food (Tornaghi, 2014).

However, many successful examples of urban agriculture have led to improved food security, especially for nutrition, diets and calorie intake (Poulsen et al., 2015). In Todmorden, urban agriculture was very efficient in improving food security (Paull, 2013). The same phenomenon happened in Brachoua in Morocco, where the inhabitants came out of deep poverty, thanks to permaculture design and agroecology (France 24, 2016). In these two examples, urban agriculture increased food availability, thanks to the geographic proximity of the production, but it also increased food access and utilization. Indeed, in Todmorden, the food grown in urban spaces was either offered to the population for free or sold in a local currency at a preferential rate. As a consequence, people had access to the food, regardless of their socio-economic status. Also, raised bed included cooking instructions and anecdotes to educate the population on how to cook the different vegetable, which improved food utilization. When implemented properly, urban food autonomy initiatives have the potential to contribute directly to reducing hunger and enhancing food security (SDG #2 – "Zero Hunger").

'Climate Action' and 'Life on Land'

The concept of food miles is often the first argument used to claim the environmental benefits of urban food production[19]. Food produced locally requires less transportation; hence the easy claim that it is more environmentally friendly. However, transport is not the only contributor to greenhouse gas (GHG) emissions. Christopher Weber and H. Scott Matthews (2008) conducted a life cycle assessment (LCA) of GHG emissions during all stages of food production and transport, and concluded that transport

[19] Food miles is the distance food is transported from the time of its production until it reaches the consumer, and is measured in GHG emissions as a proxy to climate change contribution (Engelhaupt, 2008).

accounts for only 11% of these emissions (Weber & Matthews, 2008). Production and harvesting methods account for 83% of GHGs in this sector. The "where" food is produced doesn't matter as much as the "how" when we consider GHG emissions. Urban food autonomy movements that embrace regenerative agriculture and permaculture principles reject the use of chemical pesticides and fertilizers. Instead, they promote soil restoration in reclaimed concrete spaces (Rouillay & Becker, 2020, p. 12), and biological intensification for pest management. These largely reduce emissions traditionally associated with non-organic agricultural production and promote soil carbon sequestration that contribute to Climate Action (SDG #13). Also, these food production techniques support biodiversity (SDG #15 – "Life on Land") by relying on the soil microbiome to enhance crop fertility, and by reintroducing a variety of plants and insects in urban spaces.

A Culture of Care

Beyond the three goals already mentioned, the development of urban food autonomy can support the achievement of several Sustainable Development Goals. When it uses permaculture, and especially centers its actions in the regular practice of "care," we argue that urban food autonomy participates in the moral transformation of our food systems, and the flourishing of a culture of care. Care is essential to autonomy, but in many cases, it is not recognized as such. It largely falls under the radar of policy making, and is performed by unpaid workers and women. The United Nations Research Institute for Social Development (UNRISD) identifies six policy areas for transformative change, and connects these areas to the 17 SDGs. Care is one of these policies areas, and according to the UNRISD, it contributes to seven of the stated SDGs: "No Poverty," "Good Health and Well-being," "Quality Education," "Gender Equality," "Clean Water and Sanitation," "Decent Work and Economic Growth" and "Reduced Inequalities." Notes UNRISD:

Care policies serve a range of different objectives, including poverty reduction, enhanced women's labor force participation, employment creation and the expansion of future generations' human capabilities. Because care policies mold the ways in which care is provided and funded, and can determine who provides and receives care, they have the potential to contribute to gender equality and mitigate other dimensions of inequality such as class, caste, ethnicity or sexual orientation. (UNRISD, 2016)

Indeed, care policies allocate money, services or time to caregivers and to people who need care. The current unequal distribution of care and domestic work between men and women is a driver of gender inequality, that contributes to poverty, reduced employment opportunities, lower education levels and their consequences on sanitation. Care policy recommendations stipulate that unpaid care and domestic work must be recognized to support the achievement of the SDGs. Caring for the natural environment and for the people by practicing permaculture and regenerative agriculture is also a form of unpaid

Conclusion

The concept of urban food autonomy brings together the ideas of local food self-sufficiency and the empowerment of local communities over their foods and territories. Many movements aim to build such urban food autonomy by encouraging food self-reliance and self-transformation. They directly contribute to several Sustainable Development Goals, namely "Zero Hunger," "Climate Action" and "Life on Land." In spite of different uses and political tones of the concept of food autonomy, we focus here on urban food autonomy as a grassroots movement that seeks to tackle the commodification of food by using and teaching permaculture principles to produce food, regenerate soil in the urban space and encourage self-transformation. These movements contribute to food security by increasing food

availability, as well as food access and food utilization. They also have climate mitigation potential, such as contributing to a reduction of GHG emissions and an increasing soil carbon sequestration. Additionally, these movements promote biodiversity by relying on biological intensification and supporting healthy soil microbiome.

Our paper contributes to the literature on Care Theory and develops examples of urban food autonomy movements to show how their embeddedness within care practices directly support the achievement of the SDGs. The direct implications of Care Theory for policy change are still marginally studied, and we hope that this article encourages more researchers to explore that connection. Especially, the relevance of Care Theory for food systems transformation could benefit from more exploration, considering that "care" for the land and for their communities is a direct preoccupation of the farmers who feed us. Our review of the literature reveals that "autonomy" and "care" are co-dependent outcomes that can be jointly advanced within urban food systems, especially through permaculture. Their advancement within food systems contributes to their advancement within our larger societies as well. We argue that urban food autonomy holds the transformative potential to restore the value and practice of "care" in our modern societies. Indeed, the revalorization of care is essential to break the boundary between the political and the moral sphere (Tronto, 1993), and to transform our relationship to food, to each other, and to the natural environment. The very idea of an achievement of the UN Sustainable Development Goals cannot come to fruition without such transformation. Permaculture stands on the pillars of its three "care" ethics, and it provides powerful principles of change in that direction.

CHAPTER 5

CONCLUSION

In the introduction (Chapter 1), I presented my overarching research questions: how to integrate care into food systems, and what are the outcomes of such an integration? I answered these questions across the three following chapters. Although each of these chapters has its own research question and methodology, and two of them were already published as journal articles, they are integrated to provide elements of answer to these questions (Table 9). Chapter 2 serves as the foundation for the following two chapters as it explores the meanings of care in a food systems context and identifies ways of integrating care in food systems grouped into the four categories. This chapter also explores how these caring practices contribute to food systems' adaptive capacity and resilience. Chapter 3 discusses cultural and policy transformations necessary to integrate Earth care practices into food systems, and it shows how Earth care practices support well-being. Chapter 4 studies how urban food autonomy movements are examples of grassroots initiatives that integrate Earth care, people care and fair share practices into food systems, and how these movements contribute to the UN SDGs via the development of a culture of care rooted in relational autonomy and interconnectedness.

Table 9

Chapter Responses to the Overarching Research Questions

	RQ1: how to integrate care into food systems?	RQ2: what are the outcomes of such an integration
Chapter 2	- reviews of the meanings of care in the context of food systems - identifies different ways of integrating care into food systems through 4 categories of practices - Internal dispositions - Earth care - People care - Fair share	- discusses how care practices enhance food systems' adaptive capacity - shows that caring practices result in health and bonding, and suggests that well-being might be an outcome of care integration
Chapter 3	- reaffirms the importance of revaluing growing food and farming skills as essential to society, and to protect farmers, farmworkers and arable land - identifies the importance of curriculums and policies that that recognize "growing food" as a core competency for society	- examines the effects of Earth care practices in growing food on the five dimensions of Food Well-Being using three case studies in Arizona - shows that "earth care" practices are associated with enhanced well-being
Chapter 4	- exemplifies urban food autonomy movements with permaculture inspirations as grassroots initiatives integrating earth care, people care and fair share practices into food systems	- examines the effects of Earth care, people care and fair share practices within urban food autonomy movements on the UN Sustainable Development Goals

Chapter 2 explores meanings of care in the context of food systems, different ways to integrate care into food systems, and the effects of such an integration on food systems resilience. Specifically, I asked "What does care mean in the context of food systems?" and "how can care enhance food systems resilience research and policy?" To answer these questions, I first reviewed the concept of food systems resilience, and explored some tensions within that concept. Second, I provided an overview of approaches to care found in academic literature, with a focus on food systems. Then, I analyzed the definitions of care according to 35 food systems experts using grounded theory, and next identified a set of care

practices in the context of food systems. I clustered these practices into four categories that I call internal dispositions (or virtues), Earth care, people care and fair share, borrowing the names of the last three categories to the three care ethics in permaculture (B. Mollison, 1990, p. 2).

In the last section, I first presented a conceptual map of care that synthesizes the findings. This map shared places the interconnection between all beings at the center, as it is from this ontology that stems the motives and the "moral obligation" (Engster, 2005) for caring, the caring practices and their effects on well-being. Finally, I discussed in the last section how these caring practices contribute to enhancing the resilience of food systems. Specifically, I have argued that the care practices identified by the everyday experts interviewed for this project contribute to enhancing adaptive capacity as a path to resilience, and that the health and bonding that results from these practices supports the reparation and healing of the trauma produced by food systems.

Chapter 3 focuses on a specific way of integrating care into food systems, using what I called "Earth care practices" in Chapter 2, and explores some of its effects on hedonic and eudemonic well-being, using the five dimension of the Food Well-Being framework developed by Florentine Frentz (Frentz, 2020): intellectual, emotional, social, physical and spiritual well-being. Through three case studies conducted in Arizona (interviews with teachers working in schools with gardening programs, interviews with local farmers using sustainable practices, and an online survey of 100 Arizona gardeners), my co-authors and I showed that growing food using environmentally caring practices contributes to these five dimensions, and especially that it enhances eudemonic well-being. Our studies also reaffirm the importance of revaluing growing food and farming skills as essential to society, by

protecting farmers, farmworkers and arable land and integrating food-growing skills as a core competency in school curriculums.

In Chapter 4, I explored the potentials of urban agriculture practices in relation to the development of an ethics of care, and how they support the achievement of the UN Sustainable Development goals. Published in the journal *Humanities*, this essay was informed by a review of the literature on urban food autonomy movements, the interviews of everyday experts involved in such movements, and by the work of ethics of care scholars. In this chapter, I first discussed what the concept of urban food autonomy unveils and the aspirations of urban food autonomy movements to local food self-sufficiency and political empowerment. I focused on the movements with permaculture inspirations, and those that adopt Earth care, people care and fair share practices. In addition to the Earth care practices detailed in the previous chapter (Chapter 3), these movements often use participatory governance, support to the most vulnerable, and commit to hyper-localism (Mudu & Marini, 2018; Rouillay & Becker, 2020; Simon-Rojo et al., 2018), which I listed as "people care" and "fair share" practices in Chapter 2. I then explored in Chapter 4 how these movements can serve as a catalyst for social change by placing care at the center of our food production spaces and our public lives, hence directly contributing to the achievement of the United Nations Sustainable Development Goals, and to the development of a culture of care that recognizes the relational ontology of all beings.

Recommendations

From this work, I offer a few recommendations to strengthen a culture of care in food systems. Many more could be made, what follows are those that appear most urgent to me.

1) Center growing food in school curriculums. Growing food is part of ecological literacy, and it is harmful for society not to teach young generations to work with nature to feed themselves.
2) Value farmers and farmworkers. For generations, farmers and farmworkers have been disrespected as lower class. As a result, the average farmer in the USA is 57.5 years old and there are not enough young people willing to replace them. Valuing farmers and their importance to our food systems means that we must fairly compensate them for their products, protect the land they farm, ensure they have access to health care and not minimize their contribution to society. This is especially important for small farmers who do not benefit from government subsidies.
3) Integrate food-growing spaces with public spaces in order to re-educate the urban populations and encourage them to come together to support local producers through grassroots and public initiatives.
4) Use the power of public purchasing to support farmers who use Earth care practices; organic farmers and organic and regenerative farmers. In line with the ASU Swette Center for Sustainable Food Systems 2021 report, I support public procurement of organic foods in schools through such assistance efforts as the National School Lunch Program and the Women, Infants and Children offerings provided by the U.S. Department of Agriculture (Merrigan et al., 2021). Similarly, I encourage large organizations to purchase organic food. For example, ASU could commit to purchasing a minimum of 25% of its food from local organic producers through Aramark, while also working with its food service providers to encourage them to do the same with their clients.

5) Facilitate land access and land redistribution for traditionally disadvantaged populations, especially BIPOC and women.
6) Include community health and well-being into the realm of political action. This recommendation is directly borrowed from J. Curry (Curry, 2002, p. 129).

Limitations

This dissertation follows a three-papers format, and they were written in reverse chronological order: Chapter 2 was written last, and Chapter 4 was written (and published) first. Although I believe that I have integrated these coherently and have shown how each of them contributes to answering my overarching research questions, it is a challenge to bring together pieces that are designed to be read independently.

Additionally, I started this dissertation adventure in 2017, defended my proposal in fall 2019, and gave birth to my daughter as COVID-19 exploded into a worldwide pandemic of epic proportions. The addition to our family and the challenges of COVID not only changed my world, but the pandemic has impacted our planet – both events compromised my original data collection and research plans in the process. This dissertation is the output of such structural adjustments.

This work is essentially transdisciplinary and interdisciplinary, which is both a strength and a limitation. I have made this research as accessible and inclusive as I could. I have interviewed everyday food experts in different languages and in different parts of the world, directly integrating their wisdom in the text of my dissertation. I have shared my research with them, and I have written blogs and spoken at a wide variety of events. I have stayed embedded in food communities throughout my experience as a doctoral student.

Additionally, I have sought to integrate ethics of care, food systems research, permaculture and resilience within my work, bringing together fields that often operate separately.

In all that has encompassed my research, I have been confronted by questions that would not have come to my attention if I was working in only one of these fields or without any transdisciplinary ambition. For example, permaculture research and practitioners are mainly concerned with the practical applications of its principles, while ethics of care – as a branch of moral philosophy – requires thinking critically about the theoretical, moral and ontological questions that underlie principles that guide the practices. Academic disciplines traditionally operate with and within their own modes of inquiry, scholarly references, traditions and worldviews. Doing interdisciplinary research requires having to repeatedly translate findings, methodologies and contributions in ways that can be meaningful and useful for the disciplines involved. In some ways, it is the academic equivalent of the United Nations; gathering people with different languages, cultures, faiths, and interests in the same room, and attempting to have a constructive and impactful dialogue. It can be messy, it is never perfect, but there is great value in the process.

There is a saying about people who learn to speak multiple languages fluently, above and beyond their native tongue: Not only can we never speak the new languages perfectly, but we also lose our ability to speak our native tongue properly. This is how I felt while writing this dissertation, trying to find a balance between exploring some theories further and refocusing the writing not to lose my focus on food systems. An important example is well-being research, which benefits from a very large body of literature across different disciplines (philosophy, economics, psychology and health care among them); it can be frustrating for a reader with a solid knowledge of well-being research to read a limited account of the research on a topic with such deep roots. Although this could not be

remedied within the context of this dissertation due to time constraints, I am currently working on a follow-up research project that builds on chapters 2 and 3 and investigates the effects of Earth care, people care and fair share practices on the well-being of caregivers in an assisted living facility and on hyperlocal food systems resilience (Annex C). This project follows an action research methodology and further integrates well-being, resilience theory and ethics of care.

Another limit of this work is that it does not discuss the necessary feedback loop and reflectivity to refine care practices. Although I have shown in Chapter 2 that health and bonding serve as a response to the care practices, ensuring that they are meeting their goals, there is more to say about the reflectivity, adaptation and continuous improvement always required to adjust the specific care practices to each unique context.

Lastly, I acknowledge that throughout this dissertation I do not discuss the limits of care and rather present it as an ideal whose value is both intrinsic and instrumental. This could be problematic as care may be "politically ambivalent" (Puig de la Bellacasa, 2017b, p. 7). Indeed, society – often through marketing – summons us to care for more things and spaces than we often can handle: our bodies, our nuclear and extended families, our co-workers, our work, nature, politics, our looks and perfect strangers. This is particularly taxing for those who are already performing so much of the care work necessary for society to function, particularly women and care workers, and is a disservice to what ethics of care aims to achieve. For more research on the political instrumentalization of care, I refer to the work of Michelle Murphy (Murphy, 2015) and Miriam Ticktin (Ticktin, 2011).

The Importance of Care for Sustainability

Despite the extensive research pointing to the limits and dangers of the industrial model of food production, it is unsettling to notice that this model is not only dominant but that it also appears to still grow and expand to parts of the world that had been preserved from its destructive forces. Moreover, movements that seek to directly oppose this model and propose healthier and more caring alternatives (i.e., organic agriculture, regenerative agriculture, permaculture) often get co-opted by the industrial machine and reduced to profound marketing claims with shallow impacts. Nevertheless, not all these claims stand equal, as some benefit from the boundaries of the law (i.e. organic agriculture) while others can be as easily claimed as they can be dropped, without being subject to any oversight to confirm their validity (i.e. regenerative agriculture, permaculture).

Although it is highly imperfect and subject to strong lobbying forces, the law provides a space to clarify and enforce these claims publicly and "democratically." In comparison, non-legal claims can be used to mean widely diverse things. For example, regenerative agriculture stems from traditional ecological knowledge, but some farms sell their product as regenerative although they use GMOs and spray more pesticides than conventional farms (Dobberstein, 2017). Although imperfect, the law is still one powerful tool to transform our agricultural system; we can exert pressure on our policy makers to demand phasing out harmful and damaging agricultural practices. Additionally, as mentioned earlier (p. 64) by one of the interview participants, functioning within hyperlocal food systems provides peer pressure and direct oversight of farming systems: "(When you organize the food system at a local scale) people must know one another, because they often go pick up their kids at the same school. It's much harder to screw somebody that we know" (Food policy analyst, France). As far as possible, taking the time to purchase food directly

from farmers is an excellent way to create connections, to gain respect for the food we eat and the work it takes to produce it and it will encourage farmers to use healthier methods of production.

I started this dissertation by introducing the journey that led me to start a doctoral program in sustainability. This journey is rooted in my ancestors' farming, a close experience of the devaluation of care work and of the arbitrary value system that establishes international relations. More importantly, this journey was sparked by a deep concern for mankind's dangerous impact on a world under the influence of the Western model of economic development. As I close this dissertation, I now reflect on what this Ph.D. in sustainability science with a focus on food systems has taught me about sustainability.

First, this process acquainted me with the importance of reflecting on the theoretical traditions that shape our thinking, our ways of measuring phenomenon, our understanding of what is and is not considered "data" and then informs the way we think of and implement solutions to a specific set of problems. Indeed, as we reminded in the introduction with the words of Kates and colleagues[20], sustainability science requires to combine different ways of knowing and learning, and to integrate different social actors to work together. This is why I integrated in Chapter 1 different knowledge traditions (TEK, feminist care theory, creation care, food systems resilience) and the voices of everyday food experts to consider the

[20] Sustainability science seeks to "understand the fundamental character of interaction between nature and society," encompassing "the interaction of global processes with the ecological and social characteristics of particular places and sectors," requiring "fundamental advances in our ability to address such issues as the behavior of complex self-organizing systems as well as the responses, some irreversible, of the nature-society system to multiple and interacting stresses," and "combining different ways of knowing and learning" to allow "different social actors to work in concert, even with much uncertainty and limited information" (Kates et al., 2001).

problem of the trauma produced by our global food systems through inter and transdisciplinary lenses.

Second, in their chapter "Sustainability as Transformation in Higher Education," A. Wiek and C. Redman list the "five basic elements of sustainability" they hope each graduate of the SOS can apply and demonstrate an understanding of in their thesis and career. They write:

Students should first possess an *awareness* of the challenges facing society and the interconnectedness of the world; second the *creativity* to deliver innovative solutions; third, they will be *stewards* of natural, cultural, and human resources; fourth, promote *institutions* that continuously learn, anticipate, and adapt; and finally, they should hold *values* that enhance inclusiveness, equity, and justice in all that they do. (Redman & Wiek, 2012, p. 217)

I believe I have worked toward these objectives in this dissertation by placing care at the center of my reflection on food systems. There is a lot of existing research and policy preoccupied with food systems transformation, reducing their negative environmental impacts, and making them more inclusive and successful at nourishing societies. Agroecology, permaculture, organic and regenerative agriculture are all excellent examples of such research and policy, and I am humbled and inspired by the work they accomplish. Nevertheless, there is something in the concept of "care" that is hardly translatable in any of these other terminologies – although they do integrate care in practice – and which is why I deeply believe it is important to integrate it into food systems: care has a very strong psychological resonance. We all have meaningful experiences of caring and being cared for, and we are able to physically, emotionally, intellectually and spiritually relate to what it means. As we know the urgency of transforming food systems, the notion of care resonates holistically within our selves, and reminds us of our interconnected nature.

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APPENDIX A

PREVIOUSLY PUBLISHED MATERIAL AND CO-AUTHORSHIP PERMISSION

Chapter 2
Is in preparation to be turned into two papers, one of which for submission in the journal Agriculture and Human Values. I declare that I have obtained permission from Alexandra Justesen, Rimjhim Aggarwal, and Scott Cloutier to use material in this dissertation.
Acknowledgement: The authors thank all the participants who took part in this research. They also wish to acknowledge Dr Hava Samuelson, Dr Netra Chhetri, Zain Abu Karash and Silvan Giraud for their intellectual contributions.
Funding: This research was partially funded by the Neely Foundation Food and Sustainability grant.

Chapter 3
Was published in the special issue "Advancing sustainability through well-being" in the journal Sustainability on August 28, 2021.
I declare that I have obtained permission from Sara Aly El-Sayed and Adenike Opejin to use material in this dissertation.
Acknowledgement: The authors thank all the participants who participated in this research, as well as the students and Hallie Eakin from the 2018 Food System Sustainability class at ASU. The authors also express their gratitude to Sarra Tekola, the Rocky Mountain Seed Foundation and Greg Peterson and the Urban Farm team for their support in our research study.
Funding: This research was funded by the School of Sustainability at Arizona State University, and by personal funds. The publication was funded by the ASU Graduate Professional Student Association.

Chapter 4
Was published in the special issue "Food cultures and critical sustainability" in the journal Humanities on March 11, 2021.
Funding: The publication was funded by the ASU Graduate Professional Student Association.

APPENDIX B

INSTITUTIONAL REVIEW BOARD EXEMPTION LETTERS

ASU Knowledge Enterprise Development

APPROVAL: MODIFICATION

Rimjhim Aggarwal
Sustainability, School of
480/965-6680
Rimjhim.Aggarwal@asu.edu

Dear Rimjhim Aggarwal:

On 5/30/2018 the ASU IRB reviewed the following protocol:

Type of Review:	Modification
Title:	A case study comparison of urban food autonomy and ethics of care in Cuba, France and the United States
Investigator:	Rimjhim Aggarwal
IRB ID:	STUDY00006391
Funding:	Name: ASU: Sustainability Consortium
Grant Title:	None
Grant ID:	None
Documents Reviewed:	• Interview guide, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Neely Notification_Esteve Giraud signed copy.pdf, Category: Sponsor Attachment; • Consent form (Spanish), Category: Consent Form; • Translation and backtranslation signed form Spanish-English.pdf, Category: Translations; • Recruitment script, Category: Recruitment Materials; • Consent form (interviews), Category: Consent Form; • Protocol_capacity-V6.docx, Category: IRB Protocol; • Interview guide Spanish, Category: Translations;

The IRB approved the modification.

When consent is appropriate, you must use final, watermarked versions available under the "Documents" tab in ERA-IRB.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

IRB Administrator

cc: Esteve Gaelle Giraud
Esteve Gaelle Giraud

EXEMPTION
GRANTED

Scott Cloutier
CGF-SOS: Faculty & Researchers
-
Scott.Cloutier@asu.eduDear

Scott Cloutier:

On 4/28/2021 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Supporting Food Justice to Attain Food Well-Being
Investigator:	Scott Cloutier
IRB ID:	STUDY00013751
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	• Collaboration letter, Category: Other; • Collaboration letter (Urban Farm), Category: Other; • compensation, Category: Other; • consent form, Category: Consent Form; • Protocol, Category: IRB Protocol; • recruitment, Category: Recruitment Materials; • survey questions, Category: Measures (Survey questions/Interview questions /interview guides/focusgroup questions);

The IRB determined that the protocol is considered exempt pursuant to Federal Regulations 45CFR46 (2) Tests, surveys, interviews, or observation on 4/28/2021.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

If any changes are made to the study, the IRB must be notified at research.integrity@asu.edu to determine if additional reviews/approvals are required.

Changes may include but not limited to revisions to data collection, survey and/orinterview questions, and vulnerable populations, etc.

Sincerely,

IRB Administrator

cc:
Esteve Gaelle Giraud
Sara Aly El Sayed
Esteve Gaelle Giraud
Adenike Opejin
Scott Cloutier

ASU Knowledge Enterprise Development

EXEMPTION
GRANTED

Hallie Eakin
Sustainability, School of
480/727-7764
Hallie.Eakin@asu.edu

Dear Hallie Eakin:

On 9/24/2018 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Elementary school teachers' perspectives on school gardens as tools for teaching
Investigator:	Hallie Eakin
IRB ID:	STUDY00008656
Funding:	Name: Internal Funding: Investigator Incentive Award (IIA)
Grant Title:	
Grant ID:	
Documents Reviewed:	• Principal Permission.pdf, Category: Recruitment Materials; • Interview Protocol, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Teacher Recruitment.pdf, Category: Recruitment Materials; • Form-Social-Behavioral-Protocol_Teachers Perspectives on Gardens.docx, Category: IRB Protocol; • HRP-502a - Teacher CONSENT SOCIAL BEHAVIORAL (1).pdf, Category: Consent Form;

The IRB determined that the protocol is considered exempt pursuant to Federal Regulations 45CFR46 (2) Tests, surveys, interviews, or observation on 9/24/2018.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

IRB Administrator

cc:

Dustin Weil
Brian Grant
Isabel Burdge
Esteve Gaelle Giraud
Caitlin Paulus
Ashley Mack
Nicholas Shivka
Mahir Yazar
Esther Kohlhase
Ashley Weisman
Guadalupe Beal Velderrain
Yamini Yogya
Nicolas Tress Molina
Adenike Opejin
Paul Tesarek
Marisa Manheim
Fiona Koehnke
Sara Aly El Sayed

APPENDIX C

RESEARCH GRANT APPLICATION

Title
Permaculture for Urban Food System Resilience

Ethical considerations.

The action research project with the Phoenix care home facility does not involve any contact with the residents. Their participation in the garden might be narrated via the caregivers, but if they refer to residents by their name, the audio files will be deleted upon transcription, and the name of the resident will be omitted in the transcripts. For example, residents names that would be mention will become "female resident" or "male resident". No picture of the residents will be taken either. Caregivers who will describe the interaction of the residents with the garden will sign an interview consent form.

Interviews are recorded with the consent of the participants, who sign the consent form soon to be approved by the IRB (see documentation attached). The audio recordings are stored on the secured ASU Dropbox. If participants request a copy of their interview transcription, I will share it with them. Considering that caregivers often have low income and face difficult financial situations, they will be compensated $25 per interview (approximately 30 minutes).

The same survey questionnaires will be administered to caregivers every 3 months to measure the evolution of their WB over time. The survey will last about 5 minutes, and they will be compensated $5 for each of them

Short project description and theoretical background
This project seeks to examine the relationship between permaculture and urban food systems resilience in a space dedicated to care.

I partner with a small senior assisted living facility in Glendale and where I will build a permaculture garden, following an action research approach. The purpose of action research is to develop projects that seek to serve the community they are embedded in, and while answering a specific research question. Here, I will support the assisted living by helping design and create a permaculture garden and water harvesting system, that will help them increase fresh food access and resilience to extreme weather events (drought and flood especially). Additionally, I hope the garden will provide mental health benefits for the caregivers.

In the academic literature, Care Theory and ecofeminist research focus on relationships among humans and with nonhuman entities, and on the effects of societal structures and policies on these relations (Cuomo, 1997; Gaard & Gruen, 1993; Macgregor, 2014; Manning, 1992; Noddings, 1984; Tronto, 1993). But there have been only a few studies linking Care Theory and ecofeminism with agricultural systems in general (Curry, 2002; Gottschlich & Bellina, 2017; Herman, 2015; Mallory, 2013; Maria Puig de la Bellacasa, 2017b; Shiva et al., 2014), and even less with a focus on the urban context and urban food systems resilience (Barthel et al., 2015). Yet, on the ground, many urban agriculture initiatives seek to reconnect the local population with their food, their community, and the natural environment (Paull, 2013; Roman-Alcalá, 2018; Tornaghi, 2014) and foster urban resilience (Rouillay & Becker,

2020). In particular, several initiatives use permaculture design and tools to create and regenerate soil, foster biodiversity, beautify landscapes and produce healthy food in urban spaces. The term "permaculture" was coined in 1978 by Bill Mollison. It is the contraction of "permanent" and "agriculture", and originally referred to perennial or self-perpetuating agro-systems which are resilient to external shocks (Ferguson & Lovell, 2014; D. Mollison & Holmgren, 1978). It also relies on three core principles or "three ethics": (1) care for the earth (the living soil, the forests and the freshwater), (2) care for the people (compassion and simplicity towards to human needs, self-reliance and personal responsibility), and (3) fair share (sharing abundance and setting limits to personal consumption) (Holmgren, 2002: 1).

In previous work, I have integrated the perspectives of 38 gardeners, farmers and "everyday experts" in food systems (Anderson et al, 2017) interviewed in Havana (Cuba), Phoenix and Tucson (Arizona), and several French cities. Many of them are trained in permaculture. Permaculture experts such as D. Holmgren or T. Hemenway have highlighted the role of homestead and home-scale permaculture garden to increase urban food systems resilience (Hemenway, 2009; Hemenway 2015). They use homes as the functional units to build larger community and city resilience. In this project, I propose build on the results of these interviews and on the work of permaculture experts, to study how permaculture design and practice can directly contribute to urban food systems resilience.

I use action research methodology to create a permaculture garden within a senior assisted living (also called "care home") in Glendale (Apollo Residential Assisted Living, 4719 W Harmont Dr, Glendale, AZ 85302). This place provides a home and care for 10 senior residents and serve as a workplace for 8 caregivers (6 day caregivers and 2 night caregivers). The site is particularly relevant to my research because it is designed on the practice of care for people, yet, such practice does not currently include food resilience or environmental care questions. Through this project I seek to support the work of care conducted in this site by creating a permaculture food garden, and show the interconnections of people care, environmental care, and food resilience are interconnected.

Purpose & Objective

I propose to implement the recommendations from both the permaculture literature and the 38 gardeners and food experts that I have interviewed between 2018 and 2021 into an action research project. The goal of this project (which is the sole focus of this grant application) is to examine the validity of the recommendations from the experts in a specific site designed for the practice of care.

The purposes of this studies is to:

1) Conceptualize the role of permaculture initiatives in building food systems resilience.
2) Explore the attempts to transform the urban food landscapes into a caring system of agriculture, and their relevance for food systems resilience
3) Identify the challenges to the implementation of a caring system of agriculture and in using permaculture for building food systems resilience.

Research Question: How and to what extent permaculture design and practices enhance the resilience of the food system?

Hypothesis:
The use of permaculture design and practices in urban areas enhances the resilience of its food systems by:

- increasing fresh food access,
- providing agricultural and culinary education,
- enhancing well-being,
- supporting the care workers,
- activating the collective memory of how to grow food (Barthel, 2015).

Significance & Project Impact

The pandemic has revealed the importance of care in building sustainable food systems and communities. Along with feminist philosophers and care theorists, we argue that the revalorization of care is critical for a sustainable economy, and we add that policies that aim to such revalorization supports the urban food systems resilience. My research highlights lessons learned from various grassroots communities. It is novel because currently we are not aware of any work that brings together Care Theory, permaculture and food systems resilience research, and these remain separated in spite of how much these actually support one another.

Generally, this research seeks to promote a greater recognition of permaculture as a field of inquiry and academic research as it remains currently mostly a form of agricultural practice. This research also contributes to care scholarship and seeks to highlight its potentials for food policy. Indeed, the COVID-19 pandemic has reminded us the importance of designing policies which promote a culture of care; that is a culture which encourages active empathy for one another and recognize the interconnected nature of our economic systems.

I will measure the well-being of the caregivers associated with the new garden. Existing research has already shown the psychological benefits of gardening and connecting to nature for seniors, but there is very little research on their impacts on care-workers. The purpose of this garden is to beautify the space, provide psychological benefits to caregivers, give fresh food access, and improve resilience to extreme weather events (drought and flood in particular).

Research Methods

I use action research methods, and qualitative methods for data collection and analysis. Data collection includes:

- Literature search engine queries relevant to permaculture, homestead and urban food systems resilience and studies on caregivers well-being
- Semi-directed interviews with caregivers on the action research site (about 30 minutes) - a maximum of 6 caregivers will be interviewed (only the day caregivers since we expect the night caregivers to only have very limited interaction with the garden)
- 3 surveys per caregivers between August 2021 and January 2022 (one every 2 months to measure the evolution of their well-being as the garden grows)
- Researcher's notes on the evolution of the permaculture garden, reflecting on the recommendations from the literature and expert interviews

The data consist of audio recordings, field notes, survey results, pictures and maps, permaculture course material, self-reflective notes on own biases, participants' reflections on the theoretical framework

I am coding using MAXQDA software to analyze transcripts of interviews, photo captions, and field notes, using the following variables as codes as per hypothesis 3 (H3 in question 25): fresh food access, agricultural and culinary education, caregivers' well-being, changes in care work environment, memory of growing food. Survey results and their evolution over time will be analyzed using excel.

Data analysis will use a mix of deductive and inductive strategies. I first use the literature review to predict certain interactions between elements of permaculture initiatives and food systems resilience (deductive strategy). Second, I observe the patterns emerging from the case study (inductive strategy) and compare the predictions with the data. I use the book Analyzing qualitative data: systematic approaches (Bernard, Wutich & Ryan, 2017) as a reference.

As of July 2021, I have already established a map of the premisses and suggested special sites for planting, composting, water harvesting, and shades.

Equipment/Materials

Permaculture garden material *(help requested):*

- Water harvesting and irrigation: drip irrigation system, rain water collection barrels, gutter system in strategic sites
- Composter
- Trees
- Mulch

The partner site will cover the following expenses:

- maintenance
- water bills
- seedlings and seeds
- future planting and garden improvement expenses

Interviews and survey

- recording: personal phone
- data transcription and analysis: personal laptop
- interview transcription: sonix.ai
- data analysis: MAXQDA (I already have a license)
- data analysis: excel (I already have a license through ASU)
- participants compensation *(help requested)*

Project & Outline

- August 2021: Work sessions between the researcher, the owner and caregivers to co-develop the design of the permaculture garden
- September 2021: Creation of the garden infrastructure on site, which includes water harvesting, composting, plantations and signs for the caregivers to recognize and use the edible plants (work hours will be conducted by the researcher EG, and with the support of the site owner. Neither caregivers or residents will be actively participating in that phase for safety reasons).
- September 2021 to January 2022: Daily maintenance of the site will be ensured by an employee of the site, and the researcher will conduct weekly visits to observe the evolution of the garden (22 weeks).
- August 2021 to January 2022: caregivers will be recruited and interviewed by researcher at their convenience (see **interview questionnaire– 27-07-2021**). Consent forms will be read and shared with the caregivers by researcher. Interviews should last approximately 30 minutes, they will be audio recorded on researcher's phone and identified with a number "interview X – DATEOFINTERVIEW" and will be uploaded on the online password protected platform sonix.ai for transcription. If the content of the interview includes names, any personal identifiable information of the interviewee or of the residents, it will be erased from the transcription. The file including the recording and transcription will be coded "interview #X – DATEOFINTERVIEW" and organized in order. For example, the first interview will be "interview #1 – DATEOF INTERVIEW". Only the researcher will have access to the online platform. As soon as they will be uploaded, the recording will be deleted from the researcher's phone. No caregiver's name will ever be associated with recordings and transcripts. Consent forms will be digitized and kept separately from the data, for up to 5 years, on ASU secured Dropbox.
- September 2021: first round of surveys with caregivers (see **survey question items – 27-07-2021**). The same survey questions will be used in each data collection round
- November 2021: second round of surveys with caregivers,
- January 2022: third round of surveys.
- February 2022: conclusions and reporting of the result

Note: Upon recruitment, caregivers will be given a unique letter (A, B, C, D, E, or F). Surveys will all be administered anonymously (the respondents' names will not appear on the paper) by researcher. Researcher will ask for the caregivers' letter before administering the survey, and will write a code on each survey for example A1 for the first survey completed by caregiver A. Surveys should take about 5 minutes. Survey results will be digitized and uploaded on researcher's ASU Dropbox that require duo identification. Nobody else will have access to the data.

Item Amounts

Please list the $ amount of each item you will be using for your project.

Human subject compensation

- Interview: $300
- Survey: $90

Material:

- water harvesting bins and gutter = $142.08
- drip irrigation water system = $140
- trees = $240
- mulch = $330
- compost bins = $86.16
- soil = $430
- shade = $241.76

TOTAL = $2,000

Budget Justification

Human subject compensation

- Interview: 1)$300, 2) 12 interviews x $25 per interview
- Survey: 1)$90, 2)18 surveys (administered every two months to 6 participating caregivers for 6 months) x $5 per survey

3) In order to encourage caregivers to participate to the survey, I have to compensate them because they are already receiving low wages for difficult work. The compensation rate is standard in terms of interview and survey.

Material:

- water harvesting bins and gutter = $142.08, 2) two 100 gal water harvesting bins from Hope Depot at $52.99 each, and a 19 ft gutter system with downspout connectors at $36.10, 3) In the price, I did not include taxes, screws and brackets costs
- drip irrigation water system = $140, 2) four 100ft Drip irrigation systems from the urban farm located in 4 strategic location on the garden site, 3) the cost does not include the connectors to the main faucets, neither the timer not the taxes
- trees = $240, 2) one lemon tree and one orange tree at $120 per tree from the urban farm, 3) trees at the urban farm are under warranty for the first planting season, and come with specific care instructions. Additionally, they have been selected for the specific Phoenix valley climate
- mulch = $330, 2 and 3) 40 bags of mulch (2 cubic feet per bag), with special price of buy 3 get one free, so the total price is technically for 30 bags ($11 each) with 10 additional bags for free. 4 bags are needed for 1 tree. Additionally, the remaining mulch will cover the other planting areas under the shade structure (24 ft x 24 ft). The cost does not include taxes
- composter = $86.16, 2) one composter from Home Depot 3) the price does not include taxes
- soil = $430, 2) 40 bags of soil (2 cubic feet per bag), with special price of buy 3 get one free, so the total price is technically for 30 bags ($13 each) with 10 additional bags for free. 4 bags are needed for 1 tree. Additionally, the remaining soil will cover the other planting areas under the shade structure (24 ft x 24 ft). The cost does not include taxes.

- shade = $241.76, 2) Cost of Wheat Shade Cloth - 90% UV Block at Hope Depot. It will be used to protect the South East corner area of the site (24 ft x 24 ft) from the intense afternoon sun

TOTAL = $2,000

For as many material and tree expenses as possible, I used the urban farm as a supplier because it already is an approved vendor in the ASU system, and its owner, Greg Peterson, is an expert in permaculture and Phoenix desert edible landscaping so he can provide highly valuable information in the design process. https://store.urbanfarm.org/

The costs not included in the budget justification will be covered by personal funds (transport and transcription) and by the owner of the assisted living (plants, seeds, maintenance, water bills, etc). As a typical action research project, the goal of this project is to support a community to set up the initial phase of the work, and the benefits will reach beyond the duration of my research. This garden aims to operate on the long run.