EXPLORING THE FACTORS OF NATURAL SPACE ON WELL-BEING OF URBAN-DWELLING CHILDREN

by

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This dissertation was prepared under the direction of the candidate's dissertation advisor, Dr. Patricia Liehr, the Christine E. Lynn College of Nursing, and has been approved by all members of the supervisory committee. It was submitted to the faculty of the Christine E. College of Nursing and was accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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ABSTRACT

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Research has suggested positive effects of *nature immersion*—a state of being or an act of doing in natural space—for urban children who were otherwise at risk of emotional or behavioral problems. However, few studies have systematically investigated natural space qualities that predict child well-being at the clinical level. The purpose of this study was to increase understanding of natural space qualities as factors of urban child well-being. Explanatory mixed-methods were used. Quantitative data (N = 174) included a survey and two parental-reports of child well-being. Interviews provided qualitative data (N = 15). Data were analyzed using: Generalized Linear Model and Content Analysis. Both data streams were merged into a point of meta-inference that contributed to parental assessment of enhanced child well-being: 1) Parental valuing of nature connection ($p < 0.001$) as a soothing and safe resource and 2) Shorter and more frequent nature-child space-time immersion ($p < 0.001$). Integration of natural spaces into urban environments may be a cost-effective and meaningful way to address urban child well-being.

DEDICATION

This manuscript is dedicated to my father, Yoshikiyo Nagata, and my mother, Noriko Nagata, who taught me how to see, smell, and sing a song of earthy materials of nature.

EXPLORING THE FACTORS OF NATURAL SPACE ON WELL-BEING OF URBAN-DWELLING CHILDREN

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CHAPTER ONE. INTRODUCTION

Phenomenon of Interest

Since around the year 2010, there have been an exponentially increasing number of research studies on the effects of nature or nature-based experiences on human health, healing, and well-being. A growing body of research evidence now recognizes the influence of natural spaces—including the green (vegetation) and the blue (beaches)—on human physiology and psychology. Such effects are most objectively observed in the psychoneuroendocrinoimmunology (PNEI) axis, wherein self-relaxation and restoration manifest via the functioning of the autonomic nervous (Kobayashi et al., 2015), thalamic (Fukushima et al., 2014), and cytochemical circuits (Kamioka et al., 2014). Humans' affinity for natural spaces is known as the Biophilia hypothesis (Wilson, 1984), and Biophilia appears to be an inherent driver of health and growth necessary in the earlier stages of human life (Louv, 2005). In fact, children's age-related developmental well-being now appears to accrue from their immersion or interactions with nature. Childhood exposure to natural spaces or the natural world helps children to buffer the deleterious effects of emotional stressors and to exhibit fewer emotional problems (Markevych et al., 2014; Flouri et al., 2014). This evidence opens a new avenue of integrative healthcare and nursing for children's well-being in both communities and clinical settings.

Recent novel research findings support the benefits of neighborhood green spaces for buffering childhood emotional and behavioral situations. Both short-term

(1 to 6 months) and long-term (1 to 3 years) exposure to green spaces within 1,000 meters surrounding one's residence has been associated with a decrease in aggressive behaviors among urban-dwelling adolescents (Younan et al., 2016). The benefit of increasing green space over the range commonly seen in urban environments (~0.12 in Normalized Difference Vegetation Index [NDVI]) was equivalent to approximately 2 to 2.5 years of behavioral maturation for these adolescents (Younan et al., 2016). Socioeconomic and sociodemographic factors such as age, gender, race/ethnicity, and neighborhood quality did not confound these associations, and the benefits remained after accounting for temperature (Younan et al., 2016). Likewise, the positive effects of green space are reported among children with autism spectrum disorders (ASD). Increases of 10% in the green space metrics of forest, grassland, average tree canopy, and near-road tree canopy were associated with a decrease in ASD prevalence of 10%, 10%, 11%, and 19%, respectively, among elementary school students (Wu & Jackson, 2017, p. 140).

In addition to aiding children's emotional and behavioral growth, natural space is found to contribute to childhood cognitive development. In one study, a forest environment with child-initiated learning promoted preschoolers' lexical diversity and quality of utterances to an extent not found in adult-led indoor or outdoor classrooms (Richardson & Murrary, 2017). Gardening-based learning, meanwhile, produced a positive effect on academic outcomes in math and language arts among students in multiple grades (Williams & Dixon, 2013) and it decreased school failure, with dropout rates reduced from an initial 30% to zero in some classes of secondary students (Ruiz-Gallardo et al., 2013). A longitudinal study conducted with sensitivity to individual characteristics showed that lifetime exposure to the

green spaces of public parks, from childhood through adulthood, appeared to slow the rate of cognitive decline in later life (Cherrie et al., 2018).

However, our unprecedented increasing distance from nature, resulting from an increasing amount of time spent with technological gadgets and from concern about safety issues in urban communities, prevents younger urban populations from fully reaping the benefits of nature (Rupprecht et al., 2015). Children living the furthest distance from green spaces (at a more-than-20-minute walking distance) watched TV 2 hours more weekly and had worse mental and general health compared to those within less than 5-minutes walking distance (Aggio et al., 2015). Distance from nature often develops into a condition known as *nature deficit disorder* (NDD) (Louv, 2005), which manifests as numerous emotional and behavioral problems, especially among urban children (Louv, 2005; Markevych et al., 2014; Flouri et al., 2014). The health consequences of NDD has triggered a new wave of public awareness and alarm, as more than a half of the world's population now lives in an urbanized area (United Nations Children's Fund, 2014, p. 65). Meanwhile, reconnect-children-to-nature movements are gaining media coverage, thus popularizing the notion of NDD in public, not healthcare professional, discourse. For instance, federal and state legislation has helped to facilitate children's contact with nature (Louv, 2005; Louv, 2016). Most recently (in 2017), New York State Assembly Bill A735 was passed for the purpose of "integrating an aggressive outdoor environmental education and recreation plan" (State of New York, 2017, p. A735) to address the impact of a lack of nature-exposure on children's wellness (State of New York, 2017).

Federally-funded research initiatives are also drawing more attention to epigenetic associations between humans and nature (National Institute of Environmental Health Sciences [NIEHS], 2017). Following the completion of "the

Human Genome Project," the National Institutes of Health (NIH) launched "the Integrative Human Microbiome Project (iHMP)" in 2014 (Winslow & Rockoff, 2012). The iHMP is the second phase of the fiscal years 2008-2012 Human Microbiome Project (HMP). The second phase was intended to reveal information about longitudinal human-microbiome interactions and actions beyond the diversity and distribution of the microbiome community that was found in the first phase (iHMP Research Network Consortium, 2014). An integrative view of the human-nature immersion—not solely human or nature but both—has, thus, become of significant interest to scientists as an element of human health, healing, and well-being. The increasing interests among scientists suggest that there may be a forthcoming paradigm shift.

The epigenetic consequences of NDD are even more pronounced among today's urban children, who have become increasingly out of touch with the benefits and bounties of the Earth. Microorganisms in the soil provide some of these benefits. Despite our negative attitudes toward microbes with experiences that they are sources of aliments such as infections, epidemics, and pandemics, microorganisms are now known to positively affect the development of human systems through the PNEI axis. Thanks to anti-microbe treatments in industrialized countries, there are fewer microbial infections now than in the past. Yet, there is also a higher prevalence of chronic non-infectious diseases and disorders in developed countries (Finlay & Arrieta, 2016). The types of non-infectious diseases and disorders in these countries encompass a range of inflammatory and metabolic presentations: allergies, asthma, autoimmune diseases, and autism spectrum disorders (ASD) (Finlay & Arrieta, 2016). As these diseases are not explained solely by genetics, this higher prevalence may, plausibly, be ascribed to the epigenetics of how humans and nature interact. The

underlying symptoms of non-infectious diseases and disorders manifest through the effects of the PNEI axis, possibly in association to NDD, by which less exposure to microorganisms through modern lifestyles and diets, over sanitization, or the excessive use of antibiotics increases the risk of these diseases. For example, low levels of a gut microbe called “FLVR” in newborns directly links to the onset of asthma (Naik, 2015).

A longitudinal epigenetic research study of an adult population, meanwhile, revealed a 12% lowered mortality rate in association with the most densely-vegetated residential areas as compared to the least vegetated ones (James et al., 2016). The study uncovered a 34% lower rate of respiratory disease-related mortality, a 13% lower rate of cancer mortality, and a 41% lower rate of kidney-disease mortality (James et al., 2016). Surprisingly, green spaces were noted to have played a more primary role in reducing mortality than other characteristics that could otherwise be considered contributing factors to mortality risk, such as sociodemographic and socioeconomic status (James et al., 2016). Correcting for differences in average household income, another research study showed that both the quantity and perceived quality of urban green spaces were positively related to neighborhood small-area life expectancy (LE) and healthy life expectancy (HLE) (Jonker et al., 2014).

The current evidence describes natural space’s multi-functionality—from cellular to cognitive to creative well-being—through PNEI dynamics. The beneficial multi-functionality of natural space appears to acknowledge nature’s capacity for a host of health, healing, and well-being benefits derived from exposure to nature as a whole, not just from an improved food supply. With more children diagnosed at younger ages with non-infectious diseases and disorders, younger populations appear

to be the hardest hit in human history by the current unprecedented distance of human beings from nature. Humanity has now launched into lifelong NDD consequences likely to be experienced from childhood through adulthood. Therefore, the protection and preservation of interactions between nature and youth indicate a significant positive influence on lifelong health, healing, and well-being.

Given the growing acknowledgement of the benefits of exposure to nature, one wonders what the specific effects of the most common ways of gaining exposure to natural space, such as gardening, would be on urban children's health, healing, and well-being. Gardening at community farms potentially contributes to public health (Soga, Gaston & Yamaura, 2016), promoting health, healing, and well-being among urban children. In this regard, the current research study is intended to make the best use of nature's beneficial multi-functionality. Its purpose is to examine the factors of natural space on well-being for children in an urban environment.

Problem Statement

Despite the widespread awareness of nature deficit disorder (NDD) and its impacts on the public, nature's beneficial effects for children are poorly understood at the clinical level. NDD is not formally recognized as a medical diagnosis by medical coding schemes (Dickinson, 2013) in the International Classification of Diseases-11 (ICD-11) and Diagnostic and Statistical Manual of Mental Disorders-5 (DSM-5), for example. Also, the mechanisms underlying nature's beneficial effects, especially for younger urban populations, remain poorly understood among healthcare professionals. Increasing interest in this problem at the public health level necessitates the need for investigation to understand the factors of nature on urban-dwelling children's well-being.

Recently, in January 2018, the World Health Organization (WHO) (2018) updated the ICD-11 by adding "gaming disorder." A "gaming disorder" is defined as "a pattern of gaming behavior characterized by impaired control over gaming (such as 'digital gaming' or 'video gaming') and increasing priority given to gaming to the extent that gaming takes precedence over other interests and daily activities" (World Health Organization [WHO], 2018). By definition, NDD appears to be in a situation related to "gaming disorder." As a gaming disorder is now a medical diagnosis considered evidence-based in many parts of the world, healthcare professionals should be more attentive to the seriousness and risks of the development of this disorder (WHO, 2018). Perhaps NDD should rise to an enhanced level of attention as well. Further, perhaps noninvasive and inexpensive approaches to enable exposure to natural spaces with their health providing capacities can provide treatment for both NDD and gaming disorder situations together. If this is the case, exposure to natural spaces may increase the possibility of self-sustainable well-being among children.

Purpose of the Study

The purpose of this study is to increase understanding of the qualities of natural spaces that contribute to childhood well-being for those at the risk for nature deficit disorder (NDD).

Significance of the Study Including Connection to Caring Science

Young children of today face challenges to their self-sustainability. The recognition that "the current generation of children may have shorter life expectancies than their parents" (Olshansky et al., 2005) has sent a warning to the public about the unprecedented prevalence of non-infectious diseases and disorders appearing among children at much younger ages. The importance of this warning was, in part, popularized by the former First Lady Michelle Obama's public health campaign

initiative called *Let's Move!*. Employing community gardening as a nature-based experience, the initiative demonstrated that the garden can function as a hub to reform children's behavioral and environmental factors that influence non-infectious morbidities, from allergies to asthma to attention deficit disorders (NIEHS, 2017). The initiative involves both children and parents together creating a path to a healthier future by empowering and ensuring them access to educational materials and activities at school-based, faith-based, or community-based organization (Let's Move, n. d.). In parallel with these public initiatives, the revival of ongoing urban community gardening movements (Birky & Strom, 2013) has reflected a renewed awareness of nature, which is increasingly seen as the answer to a host of well-being issues beyond the temporary solution of an improved food supply. Nature, in other words, has emerged as a potentially essential constituent of children's well-being and lifelong sustainability.

Caring

Many of the world's leading health visionaries have conjured a mysterious human-environmental connection and capacity for healing. In nursing, the concept of modification or manipulation of the environment for health benefits is found originally in the work and life of Florence Nightingale (1820-1910), known as an empiricist, environmentalist, and *integralist*. Nightingale is the founder of modern nursing as well as one of the first *Bioneers* (Dossey, 2005a, p. 21), a group that assembled to find innovative solutions to human-environmental challenges. She understood nature as the vastness of the human connection to the Divine and sustainability as maintaining the vitality of all the species and ecosystems in which humans can thrive and strive for the self (Dossey, 2005a).

Nightingale ([1860]1969) proposed that certain elements in nature—air, water, drainage, cleanliness, and light—were fundamental to human well-being. Her fundamental elements irrefutably match today's sustainable forest and river ecological infrastructures. An ecologically sound infrastructure intricately dovetails with human health and growth. An ecologically self-sustainable system functions as sustainable nature and also resides in human beings as a living system. The self-sustainable function is essential to all because it is integral to the vast wholeness to which all belong. Ecological sensitivity, then, is an act of caring, one that is now desperately in demand, especially for those who are vulnerable to NDD: urban-dwelling children. In the life and work of Nightingale, caring is clearly visionary, with its ecological sensitivity to vast interconnectedness and the interdependence of human-environmental entanglements.

Florence Nightingale ([1860]1969), therefore, considered it an act of nursing to modify and manipulate the environment so that nature could best act on a person to heal them from within. Modifying or manipulating the environment is also an act of caring to co-create the best conditions for a person to heal. Both nursing and caring, in other words, embrace the human and the environment alike, as integral for healing of humans. To Nightingale, a "calling" is a life of caring that includes the art, originality, and deep desire to serve with the involvement of one's whole being (Beck, 2005b, p. 157). Caring, as a calling, does not mean living an unquestioning life, in Nightingale's terms, but of pursuing life with sense of mystery.

Research Questions

There is one quantitative and one qualitative research question. The quantitative research question is:

How does *being* in natural environment predict parental assessment of urban-dwelling

children's well-being?

There are multiple natural environment factors that can contribute to parental assessment of urban-dwelling children's well-being. Five factors are being considered in this study: 1) Urban farm visiting (frequency of visit X time spent/visit X an overall time frame), 2) Green space visiting other than the urban farm visiting (frequency of visit X time spent/visit X overall time frame), 3) Blue space visiting other than the urban farm visiting (frequency of visit X time spent/visit X overall time frame), 4) Residential proximity from most visited (frequency X time X overall time frame) natural environment (farm, green or blue space), and 5) Parental assessment of importance of most visited (frequency X time X overall time frame) natural environment (farm, green or blue space). There is one outcome variable, parental assessment of child well-being, measured by two questionnaires, the PROMIS Positive Affect and Life Satisfaction (8-item version). Possible associations of the factors with child well-being are formulated into the following sub-questions:

1. What is the relationship between urban farm visiting and parental report of child well-being?
2. What is the relationship between green space visiting and parental report of child well-being?
3. What is the relationship between blue space visiting and parental report of child well-being?
4. What is the relationship between residential proximity to most visited natural environment and parental report of child well-being?
5. What is the relationship between parental assessment of the importance of the most frequently visited natural environment and parental report of child well-being?

6. How do urban farm visiting, green space visiting, blue space visiting, residential proximity to natural environment and parental assessment of importance of natural environment predict parental report of child well-being?

   The qualitative question is:

How do parents describe the natural environment that most effectively promotes well-being for their urban-dwelling child?

The qualitative question is an exploratory follow-up to the quantitative results to help explain the quantitative results. In the exploratory follow-up, the tentative question is formulated to explore the predictive factors of urban-dwelling children's well-being.

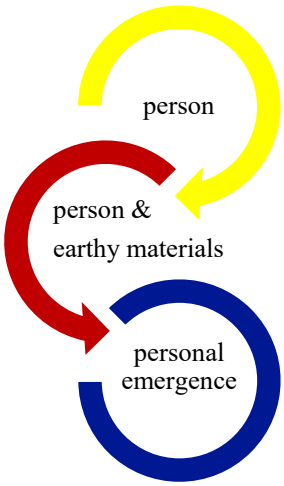
Theoretical/Conceptual Framework Including Definition of Terms

Humanity's natural affinity towards the elements of natural space is known as the Biophilia hypothesis (Wilson, 1984). The hypothesis suggests that human beings have evolved to connect with nature and other forms of life that are essential to their living and thriving (Wilson, 1984). Human beings' biological health and growth through the biophilical connection to nature are considered a phenomenon of *nature immersion*, defined as personal emergence occurring through the act of connecting with earthy materials (Nagata, 2018). Conceptualized from holistic nursing stories and theories, *nature immersion* is a dance or a *biodance* (Dossey, 1982) of the constant state of change and exchange between nature and a human being with all the organic and inorganic parts of nature participating at the atomic through the cosmic level. Personal emergence manifests as personally developing relationships with beings at all levels of living or nonliving systems, from the cellular to the cognitive to the spiritual. Individual synchronization of the rhythms of breathing, feeling, thinking, or healing with nature is epigenetically and empirically observable via the

psychoneuroendocrinoimmunology (PNEI) axis (Shields et al., 2016). Thus, personal emergence, evolving out of a state of connecting with earthy materials encompasses well-being of a person.

Figure 1

Nature Immersion Model (Nagata, 2018)



Nurses are 21st Century Nightingales, named so in the Theory of Integral Nursing (Dossey, 2008) and the Theory of Integrative Nurse Coaching (TINC) (Dossey, 2015b). As Nightingale was an integralist, 21st Century Nightingales are in a position to manipulate or modify natural spaces for well-being. Nature immersion as a conceptual structure allows for philosophical yet pragmatic perspectives. The nature immersion model shows that personal emergence takes place through integrating earthy materials with a person at the occasion of, for instance, a nature-based experience. The person is situated to heal from within through the integration of earthy material and the self. The nature immersion model is an epistemological standpoint from which 21st Century Nightingales who may continuously manage to

promote and empirically observe children's personal emergence. The desired outcome is children's ever-evolving personal emergence at all the levels, from the cellular to experiential level.

According to the nature immersion model, the independent variable of environmental manipulation or nature-based experiences can have an impact on personal emergence, which manifests as the dependent variable of well-being. Facilitating well-being through human healing environment is a *mus*t—a word that Nightingale often used for her local to global mission (Dossey, 2008).

Definition of Terms

Well-being

Well-being is defined in many different ways with similar meanings in nursing. According to the American Holistic Nursing Association, well-being is an inner attitude of acceptance of the wholeness of one's *Being*, which is an integrated, congruent functioning to achieve one's highest potential (Shields & Stout-Shaffer, 2016, p. 684). Likewise, with respect to the inner wholeness of a person, well-being is defined as "a state of being in balance and alignment in body, mind, and spirit" (Kreitzer, 2012, p. 707). The concept of well-being literally means "life-giving" (Kreitzer, 2012, p. 707). The life-giving signifies the power of the life-given to create, revitalize, or sustain the life of one's self through life-giving-and-given cycles of nature. In essence, well-being can be conceptualized as an inner harmonious state of the whole person who exerts power for the life sustainability of one's self as well as all around the self or others. The exhibition of well-being includes positive and prosocial emotions and behaviors: comfortableness, happiness, confidence, compassion, determination, perseverance, vitality, resilience.

Operationalization of Well-being

Children's well-being can be operationalized into the twofold features in currently available psychometric instruments: a short or long term state of well-being. Two instruments that measures both short and long states are available from Patient-Reported Outcomes Measurement Information System (PROMIS ®) as known as the Positive Affect and the Life Satisfaction instruments respectively. While the Positive Affect measures momentary positive or rewarding affective experiences such as feeling and mood associated with pleasure, pride, engagement, and happiness, the Life Satisfaction measures global evaluations of life (PROMIS, 2017a; PROMIS, 2017b). Children's well-being scores will be quantified with the Positive Affect and Life Satisfaction instruments as a dependent variable in this study.

Nature Immersion

Nature immersion is defined as personal emergence occurring through the act of connecting with earthy materials (Nagata, 2018). The definition of nature is broad and can range from encompassing anything natural to a virgin forest. The word nature has etymological roots in the Latin word *natura*, meaning "birth," and *nasci*, meaning "to be born" (Louv, 2005, p. 8). Nature is defined as "the phenomena of the physical world collectively, including plants, animals, the landscape, as opposed to humans or human creations" (Oxford University Press, 2010). Nature, thus, broadly encompasses natural spaces of green and blue that are covered with vegetation, such as plants and woods, and with water bodies, such as rivers and oceans. The definition of immersion is involving oneself deeply in an activity or interest as if one would submerge oneself in a liquid (Oxford University Press, 2010). The word immersion connotes the self being absorbed in elements such as the water, fields of energy, or consciousness. Together, nature immersion is a process of absorption or connection between the self

and elements of nature, which exhibits personal emergence or synchronization of thinking, feeling, or healing with nature.

Operationalization of *Nature Immersion*

Nature immersion is operationalized into a frame of time and space spent on connecting one's own self with elements of nature. The time and space frame varies since manifestation of personal emergence varies. Yet, nature immersion can be quantified into a time-frame of personal emergence by a space-frame of *being* or *doing* in natural spaces. A past study reported that positive psychological well-being significantly appeared at one week after participation in 4-to-7-day outdoor, nature-based programs among veterans ($p < 0.05$) (Duvall & Kaplan, 2014). In this proposed study, the frame of time and space is carefully estimated for a general pediatric population, urban-dwelling children. With respect to it, at least, a 4-week period of every-week *being* in natural spaces is considered nature immersion. Nature immersion is operationalized into the following three spatial-, two special-temporal, and three temporal-variables: an urban community farm visiting, green space visiting, blue space visiting, residential proximity from most frequently visited natural environment, parental assessment of importance of most frequently visited natural environment, frequency of visit, time spent on each visit, and an overall time-frame.

An urban community farm as a type of natural space in this proposed study is operationalized into New York City's Battery Urban Farm. Located at the southern tip of Manhattan, the farm is directly facing the Battery Park's woodland (green space) and New York Harbor (blue space). Battery Urban Farm provides a way for urban-dwelling children to contact with nature through a varied hands-on lessons or field trips at a vegetable farm, forest farm, and oyster farm (Battery Conservancy, n. d.). Those lessons are led by Battery Conservancy educators and seasonal in operation

from the beginning of April to the end of October, which allows more than a 4-week period of nature immersion.

Consideration of Assumptions

Assumptions of this study include: 1) A nature-immersion experience has impact on urban children's personally emerging well-being; 2) A survey questionnaire completed by parents will honestly reflect a child's true perspective; and 3) A selected instrument of well-being correctly measures the construct.

Summary

Given today's increasing distance of human beings from nature, the worldview on human health is shifting to include interactions with nature as an essential element of well-being. One health condition known as nature deficit disorder (NDD) appeared as challenging emotional and behavioral development in the earlier stages of human life, when a child is "out of touch with" nature. Urban-dwelling children appear to be the population most vulnerable to NDD. There has been an increasing awareness noted in recent literature of the multi-functionality of nature from both the biological and biophilical accounts, as shown in the revival of community garden movements as an emerging powerhouse of well-being rather than merely a food supply intervention. Despite the beneficial effects of nature and the detrimental effects of NDD, little about this condition is recognized in the healthcare system. Using the nature immersion model as a conceptual structure and Nightingale's empirical framework, this research study is formulated as an empirical, observational research study with explanatory sequential mixed method design applied to urban-dwelling children.

CHAPTER TWO. LITERATURE REVIEW

Nature as an Emerging New Path to Children's Well-being

Explorations of the benefits of natural space to children's well-being have exponentially increased in the peer-reviewed literature since around 2010, when the contemporary revival of community gardening movements and environmental awareness simultaneously came into being. Behind the scene was a whole new level of community garden activity as a powerhouse beyond the promotion of nutrient-rich foods and physical exercise. The new trail was blazed where nature immersion, a phenomenon occurring between a person and earthy materials, occurred intricately and generated personal emergence (Nagata, 2018). Within the nature immersion phenomenon, the person and earthy materials appear to be what Nightingale described: *micro* (individual) and *macro* (environmental or societal) (Beck, 2005a, p. 131) unity. Nature immersion literally immerses all the parts of the self, both the *micro* and the *macro*, into a sense of one's wholeness. The state of nature immersion appears to be the condition necessary for driving personal emergence (Nagata, 2018)––that encompasses well-being—and sparks the focus on children's well-being in this study.

Nightingale's Tenets and Nature Immersion

Personal emergence, in the nature immersion model (Nagata, 2018), is analogous to healing, in Nightingale's terms. Healing is not an end point but a process of rejuvenating, remembering, and reconnecting the self to all life aspects. Healing was Nightingale's ([1860]1969) major cause and ethical tenet. Healing, she believed, was an emergent process of the whole system bringing together all aspects of oneself

–body, mind, spirit, culture, and environment—in order to arrive at deeper levels of inner knowing, leading to the integration and harmony of one's wholeness, with each aspect of the self having equal importance and value (Dossey, 2005a, p. 7; Dossey, 2015c, p. 85).

Nightingale's worldview and epistemological viewpoints captured the unique and complex nature of healing. To Nightingale, healing was a driving force behind a spirituality that involved a sense of connectedness with the self, others, nature, and God/Life Force/Absolute/Transcendent, a power that is greater, wiser, and more majestic than the individual self (Dossey, 2005a). Spirituality gave meaning to and facilitated interconnectedness with life. Nightingale found no distinction between the boundaries of one's personal internal environment (the inner self) and external environment (outside of the self) (Dossey, 2005a). Each person is constantly interacting with the self, the environment, and society. Nightingale's health laws, which were faithfully aligned with the natural laws or God, described the Earth as a living, breathing system that constantly interacted with people (Dossey, 2005b, p. 50). The presence of universal natural laws that govern the way in which the world works is reflected in Nightingale's profound belief in God (Selanders, 2005, p. 100). She defined a natural law as "the thought of God" (Cook, Vol. 2, 1913, p. 396 as cited in Selanders, 2005, p. 100). Of course, the healing of the patient will, Nightingale believed, also manifest in empirical observation, which was a major function of nursing care: the nurse's capacity to maintain statistical data collection and analysis that documented healing (Selanders, 2005, p. 100).

As a classical Victorian scholar, Nightingale expressed her insight with the word "spirit" (Dossey, 2005b), which is derived from *spiritus* in the Latin and the counterparts *ruah* in Hebrew and *pneuma* in the Greek, meaning wind, breath, air, the

soul, or what gives life (Oxford University Press, 2010). The driving force of spirituality, for Nightingale, was a unifying force or Vital Force (Beck, 2005b, p. 158) that was the essence of being permeating all of life. Nursing is nurturing that "Vital Force," and nurses, in this respect, appeared to be nurturers of this life-spark (Beck, 2005c, p. 181). The "Vital Force" of the living impulse for health begins at the individual level (Beck, 2005c, p. 181) and forms from within the self. The drive for health then permeates both the *micro* (individual) and *macro* (societal) levels (Beck, 2005a, p. 131). The "Vital Force" is immanent in all living systems.

The emergence of healing is likened to self-organizing phenomena occurring in the natural world, such as germinating seeds, growing seedlings, and blooming buds by flow of ecological synchronization through environmental fields of energy. Healing can be facilitated by bringing forth the best condition available in nature, the matrices of the natural laws, or God to act on the person, healing them from within. Nature is universal and available to anyone, anything, and anytime, one can make best use of nature for bringing about a condition of one's own healing. The best conditions can be utilized to meet personal needs and forge the paths necessary for healing.

To Nightingale, surrender and union with God was not an end in itself. These were sources of strength and guidance for doing work in the world, and nursing, in her view, was service to God and to humanity (Dossey, 2005b, p. 49). Nightingale believed that the aim of human life was to create heaven—here and now—on the Earth. While the "kingdom of heaven is within," she held, "we must also create heaven without" (Dossey, 2005b, p. 49). In Nightingale's terms, unification into wholeness with the universe is a state of healing and also of living in heaven on Earth.

One's Being, Doing & Well-being

Nightingale ([1893]2005) stated that "health is not only to be well, but to be

able to use every power we have to use" (p. 289). Health is, in her view, not just a state of *being*, but also an act of *doing* in every aspect of life at a given time. Nightingale proposed that natural laws govern the conditions of the state of health (Selanders, 2005), yet those conditions are not static or passive. The wholeness of a person is possible when each aspect of life relates to and complements the other, and it represents the state of harmony in oneness or *well-being*. The condition is active for change by one's will to bring about a new whole level of well-being.

Well-being, meanwhile, is individual and defined by the individual. Nightingale portrayed disease with etymological accuracy as "dys-ease," or the absence of ease (Selanders, 2005), and not just as the presence of illness. Her portrayal of human health or well-being overlaps with the standard of health declared by the World Health Organization (WHO) (1946), which defined health as not merely the absence of disease or infirmity but as a state of complete physical, moral and social well-being. Disease, from Nightingale ([1893]2005)'s outlook, was a "reparative process" (as cited in Selanders, 2005, p. 103), indicating that the symptoms of disease alert one to the presence of disharmony, thus allowing for appropriate interventions or the use of one's will. As life aspects, including living with a dys-ease or death, which is considered a natural lifetime process (Dossey, 2015a, p. 3), are all interrelated or immersed in oneness, a new whole level of harmony or well-being emerges.

The state of well-being is a creative process and a product of one's will, by which a person reshapes the conditions, basic assumptions, and worldviews from all the aspects of physical, personal, and environmental well-being. Within the nature immersion model (Nagata, 2018), ever-emerging well-being as a personal emergence through connecting with earthy materials transforms the person-environmental

conditions into those that best allow nature to act on a person.

The Effects of Nature Immersion on Children's Well-being

The literature search was conducted via major academic databases including as follows: CINAHL Plus with Full Text (EBSCO Information Services, Ipswich, MA), Child Care & Early Education Research Connections (a joint project of Columbia University, New York, NY, the U.S. Department of Health and Human Services, Washington, DC, and the University of Michigan, AnnArbor, MI), PubMed/MEDLINE (National Library of Medicine, Bethesda, MD), and Web of Science (Thomson Reuters, New York, NY). Those which are major databases–CINAHL, PubMed/MEDLINE, and Web of Science–provide a comprehensive indexing of articles published in the fields of health science, medicine, and nursing. In addition, Child Care & Early Education Research Connections provides an in-depth listing of care and pedagogy pertaining to children's population.

The search strategy limits were restricted to peer-reviewed studies published from 2000 to 2017, during which most of the contemporary revival of gardening movements and environmental awareness came into records. It was considered to ensure the coverage of the literature relevant to the topic of the current study. The search was further refined by document types as journal articles and by web of science categories as public environmental health. The following terms were used in the keyword search: (Natural space* OR Green space* OR Blue space* OR Garden*) AND Children* AND (Well-being* OR Perceived Health* OR Emotion* OR Behavior*).

The databases returned a total of 4,866 records. The breakdown result of each database is as follows: 261 records in CINAHL, 2,336 records in Child Care & Early Education, 396 records in PubMed/MEDLINE, and 1,873 records in Web of Science.

Of them, 9 records were found of being duplicated and removed from the eligibility, resulting the total of 4,857 records to be screened.

In the first screening, the titles and abstracts of all the resulting research studies were read. To decide which studies would be read in their entirety, which would be included in the final sample, the following inclusion criteria were applied: 1) Original research study, 2) A sample of participants aged from 0 to 19, and 3) Relevant findings to the context of well-being. Some studies were excluded as the following exclusion criteria were applied: 1) Review study; 2) Any other age-group sample than indicated in the inclusion criteria, and 3) Findings outside the context of well-being for children.

Thirty-nine records remained for full-text article eligibility assessment through the inclusion/exclusion criteria. Further, some of the full-text articles were excluded with following reasons: 1) Participants mixed with adult samples [CINAHL (N = 6), PubMed/MEDLINE (N = 1), and Web of Science (N = 3)], 2) Organic or biochemical changes in outcome measures [CINAHL (N = 1) and PubMed/MEDLINE (N = 2)], 3) Mode choices on physical-activity or transportation as outcome measures [Web of Science (N = 2)], 4) Pedagogical protocol or proposal process [Child Care & Early Education N = 2)], 5) Systematic review reports [PubMed/MEDLINE (N = 2)], and 6) Research study protocol and proposal process [PubMed/MEDLINE (N = 1)]. As a result, nineteen articles were finally included in review that included relevant findings related to the nature immersion model (Nagata, 2018) and the context of well-being.

Nature Immersion as State of Being/Act of Doing in Natural Space

Immersing self in natural space, which may be defined as a state of *being* or an act of *doing* in a natural space, has been revealed to have a strong, positive effect on children's well-being. How this immersion takes place in detail influences

children's well-being differently. Many recent research studies showed that two prominent types of children's immersing—a state of being and an act of doing—in natural space appeared to be associated with their positive well-being: 1) A state of *being* through exposure to residential-surrounding green and blue spaces, including greenways, parks, school green fields, or beaches and 2) An act of *doing* through participation in nature-based interventions, including den-making, touching/picking plants or flowers, or playing on school green fields or in woodlands nearby school.

A State of Being in Natural Space

Research studies on the beneficial effects from a state of *being* in natural space have recently come into the peer-reviewed literature. Most of the studies were designed with quantitative research methodology measuring children's emotional and behavioral states as a type of well-being.

Emotions & Behaviors

A state of being in natural space has, from eight recent cross-sectional or longitudinal research studies, been statistically and significantly related to children's emotional and behavioral states in diverse parts of the globe as follows:

- Parents reported that emotional and behavioral states of 2,111 school children from 7 to 10 years of age were positively associated with residential surrounding green space ($p < 0.05$) as well as annual beach attendance ($p < 0.05$) in Spain (Amoly et al., 2014).
- Reports from 1,468 mothers of children aged from 4 to 6 years indicated that both residential environment and neighborhood had significant impact on children's emotional and behavioral states ($p = 0.001$) in Lithuania (Balseviciene et al., 2014).

- In Australia, 3,083 parents reported that exposure to higher (approximately 40 percent) neighborhood green spaces or parkland was related to the emotional and behavioral states of their children from 12 to 13 years of age (RR = 0.890, 95% CI = 0.815 to 0.972, $p < 0.001$) (Feng & Astell-Burt, 2017b).
- Among 1,932 10-year-old children living in the city of Munich, Germany, occurrence of their hyperactivity and inattention rated by the parents were positively associated with the longer distance between a child's residence and the nearest urban green space per 500m increase in distance (OR = 1.20, 95%, CI = 1.01 to 1.42) (Markevych et al., 2014).
- Without accessibility to green space, parental reports of 6,206 preschool children in Germany showed a 13% higher prevalence of borderline or abnormal mental health (OR = 2.74, 95% CI = 1.87 to 4.00) compared to children who had accessible to green space (Zach et al., 2016).
- A longitudinal cohort study with 6,384 children at ages 3, 5, and 7 in the United Kingdom showed that neighborhood green spaces were related to fewer emotional symptoms (r = -.04[3yr], -.05[5yr], and -.05[7yr], $p < .05$), conduct problems (r = -.04[3yr], -.05[5yr], and -.04[7yr], $p < .05$), and hyperactivity (r = -.04[3yr], -.04[5yr], and -.04[7yr], $p < .05$) (Flouri et al., 2014).
- In the United Kingdom, the most deprived natural space neighborhoods were longitudinally associated with poor well-being as indicated in hyperactivity problems (R = 0.35, CI 0.11-0.59, $0.001 \leq p < 0.01$), peer problems (R = 0.26, CI 0.12 to 0.40, $p < 0.001$), and conduct problems (R = 0.24, CI 0.10 to 0.38, $0.001 \leq p < 0.01$) among 2,909 urban dwelling children aged 4 at baseline (Richardson et al., 2017).

- Ninety-two students aged from 9 to 11 years of age who had neighborhoods with larger and more tree areas within a half-mile of their homes in Houston, Texas in the United States were likely to have higher self-reported health related quality of life ($R^2 = 0.431$ to 0.423, $p < 0.05$) (Kim et al., 2016).

The majority of the studies are focused on the state of being in natural space using several methodologies: 1) A state-of-the-art Geographic Information System (GIS) technology for quantifying natural spaces—distinguishing the green (vegetation) and blue (beaches) components (Amoly et al., 2014; Balseviciene et al., 2014; Feng & Astell-Burt, 20017a; Feng & Astell-Burt, 20017b; Feng & Astell-Burt, 20017c; Flouri et al., 2014; Huynh et al., 2013; Kim et al., 2016; Markevych et al., 2014; Richardson et al., 2017), 2) Governmental big-data information systems for retrieving the data at the national level (Amoly et al., 2014; Balseviciene et al., 2014; Feng & Astell-Burt, 2017a; Feng & Astell-Burt, 2017b; Feng & Astell-Burt, 2017c; Flouri et al., 2014; Huynh et al., 2013; Markevych et al., 2014; Richardson et al., 2017; Zach et al., 2016), and 3) The Strengths and Difficulties Questionnaire (SDQ), a psychometric instrument, for quantifying children's well-being (Amoly et al., 2014; Balseviciene et al., 2014; Feng & Astell-Burt, 2017a; Feng & Astell-Burt, 2017b; Feng & Astell-Burt, 2017c; Flouri et al., 2014; Markevych et al., 2014; Richardson et al., 2017; Zach et al., 2016) .

The Strengths and Difficulties Questionnaire (SDQ) has been used as a long-time gold-standard to measure emotional and behavioral problems among childhood populations. This focus on state of being in natural spaces was no exception, and as noted above, many studies in this review employed the SDQ. The SDQ has multiple versions for language, culture, and respondents, such as parents, teachers, and children (Goodman et al., 2010). The multi-linguistic and cross-cultural compatibility

of the SDQ allows it to fit the sample populations in internationally diverse research, and the studies in this review involved varied countries. There was only one study done in the United States (Kim et al., 2016), and it was conducted in a large metropolitan areas in the United States. This study outcome was quality of life measured by the Pediatric Quality of Life Inventory (PesQL TM) to assess self-reported well-being (Kim et al., 2016).

There are associations between children's positive well-being and a higher quantity of or the close proximity to natural space that appeared to be common to the findings of the most studies reviewed. However, a study by Feng and Astell-Burt (2017a) indicated that the parent-reported well-being benefits of natural space topped out at a 21% to 40 % green space coverage and were reasonably consistent across childhood (R = 8.75, CI = 8.82 to 9.71). Moreover, Feng and Astell-Burt (2017b) found an association between higher neighborhood *quality*, not just quantity, of green spaces and positive children's well-being (RR = 0.814, 95% CI = 0.747 to 0.887, $p <$ 0.001). The neighborhood *quality* in this study was assessed by the parents answering whether they strongly agreed, disagreed, or strongly disagreed with the following statement as: 'There are good parks, playgrounds and play spaces in this neighborhood?' (Feng & Astell-Burt, 2017b). The researchers ascribed the children's well-being collectively to both the green space quantity and quality together, indicating that higher quality green space was salient to children, particularly as they grow older (Feng & Astell-Burt, 2017a).

Likewise, a higher quality of green space was significant in association to children's well-being in a cross-sectional study by Kim and colleagues (2016). In this study, a specific landscape spatial pattern characterized a sense of safety that was beneficial for child engagement. The researchers examined urban natural spaces

associated with self-reported health-related quality of life among 92 students aged 9 to 11 from five elementary schools in the East End district of Houston, Texas (Kim et al., 2016). The urban natural spaces housed many mature trees that shaped the landscape spatial patterns (Kim et al., 2016). Longer distances between "patches," which are natural spaces with larger sizes and greater numbers of trees, typified a sense of safety due to clearer open-spaces and edges between the patches (Kim et al., 2016). This type of landscape was particularly associated with children's well-being ($R^2 = 0.431$, $p < 0.000$) (Kim et al., 2016) measured as quality of life. A perceived sense of safety can be a precursory condition to well-being when it comes to children's participation in both *being* and *doing* in natural space. The higher green space quality, thus, is important as one of the factors related to children's well-being that is generated from their acts of *doing* safely, not just *being*, in natural space.

The sample size in the Houston study was considerably smaller than that in the international studies, but it was adequate to share significance. For the majority of studies reported quantitative significance in a state of *being* in natural space, parental reports were used to operationalize child well-being. This approach is consistent with the plan for the proposed study. A sense of safety from landscape quality of natural space in the Houston study suggested not only *being* but also *doing* in natural space as a factor of children's well-being. With respect to the well-being factor, literature review on an act of *doing* in natural space follows in the next section.

An Act of Doing in Natural Space

Alongside the association with natural-space proximity, quantity or quality, an act of *doing* in natural space has significant associations with positive well-being of children. The quality time spent *doing* in natural space, not only exposure to or *being* in natural space in an immediate living environment, is considered a leading

determinant of well-being in the case of children (Huynh, Craig, Janssen, & Pickett, 2013).

Huynh and colleagues (2013) found that association between self-reported positive emotional well-being and natural space area (M = 27.2%) within a 5km radius circular buffer of school including both green (vegetation) (M = 17.4%) and blue (beaches) (M = 9.8%) spaces was not consistently significant (RR = 0.98 to 1.05, 95% CI = 0.88 to 1.06, $p > 0.11$ to 0.36) in a sample of 17,249 Canadian students (grades 6 to 10 with mostly 11 to 16 years old) from 317 schools. In this study, positive emotional well-being was defined as an awareness of one's well-being with a positive outlook on life and was measured using the Cantril ladder (Cantril, 1965) assessing subjective well-being, life satisfaction, quality of life, and overall happiness (Huynh et al., 2013). The study revealed that there were more significant associations between positive emotional well-being and other factors including demographic characteristics such as family affluence (RR= 1.30, 95% CI = 1.23 to 1.31, $p < 0.001$) and the students' perceptions of neighborhood natural space safety for playing (RR= 1.35, 95% CI = 1.28 to 1.41, $p < 0.0001$). The finding that the higher well-being resulted in association with a sense of safety of neighborhood natural space is consistent with that of Kim and colleagues' (2016) study. The higher quality natural space is ideal for *doing* or playing in natural space, which is confirmed as self-reports of the children in this study (Huynh et al., 2013).

Besides perception of natural space safety, time spent on playing in natural space was also related to well-being of children (Amoly et al., 2014). Amoly and colleagues (2014) reported that well-being was associated with time spent on playing in residential surrounding green spaces (95% CI = -8.6 to -0.9, $p < 0.05$) and annual beach attendance (95% CI = -7.2 to -0.4, $p < 0.05$) from 2,111 parental reports on

emotions and behaviors of children aged from 7 to 10 years old in Spain. The findings were aligned as evidence that the impact of natural space on children's well-being is associated with an act of *doing*, not only *being*, in natural space. Recently, how, what, and with whom children were *doing* when spent on playing in natural space has gotten more attention among researchers, revealing that natural space was indeed not just a place but phenomena. Natural space housed a variety of eclectic episodes, experiences, and endeavors of a child.

In the following sections, full of descriptions of phenomena of an act of *doing* in natural space were identified from the peer-reviewed research studies. Most of the studies were qualitative research studies using varied designs as follows: semi-structured interview (Ashbullby et al., 2013), non-participant observational (Canning, 2010; Canning, 2013), non-participant observational ethnographic (Griebling et al., 2015), and observational and interview (Zamani, 2016) designs. A few quantitative research studies also enlightened insights of *doing* in natural space from following varied designs: quasi-randomized controlled crossover experimental trial (Barton et al., 2014), longitudinal (Flouri et al., 2014; Richardson et al., 2017), and cross-sectional (Feng & Astell-Burt, 2017b; Soga, Gaston, & Yamaura, Kurisu, Hanaki, 2016) designs. From the review, three essential themes emerged: 1) Spontaneity, 2) Sustainability, and 3) Significant others. Each theme spelled out more detailed descriptions on children's well-being through an act of *doing* in natural space.

Spontaneity

Children's well-being through the act-of-doing in natural space has recently been explored in qualitative research studies. Children's well-being through the act-of-doing was characterized as spontaneity such as preschool child-initiated learning experiences, or "child-centered play" (Canning, 2013, p. 1045), which have been

found to be promoted by natural spaces. Canning (2013) explored well-being in a small sample of 5 to 11 preschoolers aged from 3 to 4. Those preschoolers engaged in den-making in a rural private day nursery on the border between England and Wales in the United Kingdom. There were large outdoor space and access to a secure woodland area with a small stream running through it and well-established trees and an abundance of leaves and other natural debris covering the woodland floor (Canning, 2013).

The den-making sessions lasted 2 hours per week, over a four-week period and were assisted by a practitioner who was always located at a central meeting point, engaging in possibility thinking with children by asking 'what if?' questions to support imaginary play (Canning, 2013). The children sustained their 'what if' curiosity extending the possibilities for their imaginary story (Canning, 2013). The research was designed with a non-participant observational method, and the researcher concluded that the combination of natural space, the den-making resources, the ability of practitioners to stand back, and use of possibility thinking nurtured children's imagination and creativity (Canning, 2013). Children's creativity was expanded and extended from one peer to another with new dimensions as this imaginative narrative was adapted each time different peers visited the woodlands (Canning, 2013). Children's imagination and creativity were identified as common themes in Canning's similarly designed previous research study (Canning, 2010). In this study, children found ways to use the environment to fulfil their own curiosity and motivation to play in "make-believe" circumstances, make their own choices, and solve their own problems with their confidence building as they kept independent from the practitioners (Canning, 2010).

Children's well-being was observed through their spontaneity in another non-participant observational study as it transformed four areas that were challenging to three children with special needs aged from 3 to 5 (Griebling et al., 2015): 1) Initiated learning experiences, 2) increased engagement, 3) Increased prosocial skills, and 4) The use of graphic arts for inquiry and representation. The researchers explored how children with challenging behaviors might be involved in a project called the *Trees and Things That Live in Trees*, which were conducted using a playground with trees and a large area of green space near a school in a metropolitan area in the United States (Griebling et al., 2015). The project work allowed these three children to participate at their ability levels and at their own pace, feel ownership of the curriculum, acting on their ideas, and interacting with peers throughout the project (Griebling et al., 2015). As a result, they had opportunities to view themselves as intellectually and socially competent and they challenged themselves to reach higher levels of knowledge and understanding without fear of failure (Griebling et al., 2015).

Children's spontaneity appeared to be a key to their well-being, especially benefited from natural space. A study designed with non-participant observational and interview methods by Zamani (2016) compared preschoolers' cognitive play in outdoor preschool zones with different proportions of natural settings. Fifty-eight children aged 4 to 5 years were grouped into three different outdoor free-playing settings: manufactured, mixed, and natural zones at preschool spaces (Zamani, 2016). The children's interviews were conducted and followed by their reporting photographic preferences and drawing favorite play at outdoor preschool spaces (Zamani, 2016).

Through explorative play opportunities in nature and natural playgrounds, children enjoyed improvising dramas and games with rules added to increase the

challenge (Zamani, 2016). For example, some accounts on the children's spontaneity that emerged from their *doing* in natural space were expressed in their own representative words as follows (Zamani, 2016, p. 178): 1) "You have to look for the caves in the back woods; there is just one cave that is really a house"; 2) I like to run in the woods and play 'Ninja Turtles'"; 3) "We usually play in one of the wood houses (stick piles) and you think you are a 'kiddy' and you live in the house"; and 4) "These are the trees out in the woods with lots of branches; where monkeys mostly swing on. I try to swing on it with rope to imagine"; 5) I like the trail in back woods: I play running to find a baby cheetah; 6) I like playing the rock area when there is water and when I have boots on. We find worms and we put them in the water and that means that dig and die or live." Children engaged in "risky behaviors" and independent mobility in natural and mixed playgrounds that offered diverse cognitive play and learning opportunities (Zamani, 2016).

Natural space appeared to inspire different sensations of the children which were expressed through spontaneity. One child said, "I like to feel (touch) the trees" (Zamani, 2016, p. 178). Another child said, "I love to take the bark off the trees. Because sometimes we use the bark to make something, and we crack the bark on the soft place and we pull it off" (Zamani, 2016, p. 178). Earthy materials of nature supported the children's spontaneity in *doing* constructive as well as imaginative play as expressed in their own words as follows (Zamani, 2016, p. 178): 1) "We make a big mountain, with lava coming out or make sand castles"; 2) "My friends and I collect sand and pretend it is pixy dust; some type of sprinkles that you think it is sprinkles that you use to make cake or cup cake"; and 3) I hide in the sand structure and we play 'snowy wolves' where we hide." There was continuity of creative,

cognitive, and constructive moments through the originality sprung from within the children.

Children's spontaneity, with or without parental supervision, brought them to the creative exploration that they called "exciting activities" (p. 142) in Ashbullby and colleagues' (2013) study. Ashbullby and colleagues (2013) conducted semi-structured interviews that showed that families' visits to blue spaces (beaches) promoted well-being or social interactions and encouraged other positive relationships with nature. The study was designed with two semi-structured interviews: one for children and one for parents from 15 families (24 parents consisting of 15 mothers and 9 fathers) with their 20 children from 8 to 11 years old living in coastal regions in Southwest England (Ashbullby et al., 2013). Parents and children were asked to talk through a trip to the beach with their family, while imagining that they had just arrived at the beach and reporting the things they and other family members would do. The children's well-being was manifested as feeling of happiness and enjoyment, experiencing fun, stress relief, and engagement with nature through their independent, spontaneous "exciting activities" in blue spaces (e.g., swimming, rock pooling, building sandcastles) (Ashbullby et al., 2013).

Sustainability

Some well-being benefits were reported to last even after the act of *doing* in natural space were ended. Preschoolers in Canning's (2013) study retrieved and re-applied lessons from a creative narrative that they had made in a woodland during den-making activities into everyday aspects of preschool life. There was a creative narrative from the children that emerged about a family of bears living in the woods. The 'bear in the wood' idea was adapted each time the children visited the woodland, with new dimensions added by different children (Canning, 2013). The narrative

about a friendship among an imaginary family of bears facilitated the preschooler's spontaneous ability to behave compassionately, prosocially, and morally with his or her peers (Canning, 2013). The preschoolers' well-being continued over a long temporal term, even at a spatial distance from the woodland experience. Natural space seems to exist as a phenomenon, not just a place; it expands individual consciousness and allows children to access to lessons at their own will and perpetuate their own well-being at anytime and from anywhere.

There were self-sustaining phenomena that occurred in relation to both natural space and children's well-being. The self-sustainable feature of natural space appeared, for example, as a landscape spatial pattern with many century-old mature trees in urban natural spaces in Houston, Texas in Kim et al.'s (2016) study. The sustainable natural space was positively associated to self-reported well-being of students aged from 9 to 11 (Kim et al., 2016). The self-sustaining natural space encouraged resourcefulness, with the continuously replenished and recycled materials of nature freely available to the children, thereby promoting preschoolers' spontaneous well-being in Canning's (2013) study. As one of the preschool teachers noted, "[T]he woodland area helps because we can leave the materials where they are and it doesn't matter. Each time we return, there is a reminder of what happened last time, and I think that has helped sustain the story and creativity" (Canning, 2013, p. 1048). This feature of nature's self-sustainable generosity continuously nurtured children's personal self-sustainability when fulfilling their own activities (Canning, 2010; Canning, 2013). They also interacted with peers who contributed to the sustainability of creativity through an imaginary narrative about a family of bears living in the woods: the "bear in the wood" idea (Canning, 2013). The bear theme helped the children to behave prosocially with the "what if" question, 'What would

Roger [imaginary bear's name] think about what you have just done [kicking at another child]?' (Canning, 2013, p. 1050). Natural space as a phenomenon is full of children's lived experience and allows them to access and relate the experience each time they continue to develop their own well-being.

Older children self-sustained differently through activity that nurtured the natural space such as pro-environmental and pro-biodiversity behaviors, beyond prosocial behaviors with their peers. Ashbullby et al.'s (2013) study noted that while children aged 8 to 11 were relaxing and restoring themselves in a natural space, they also took care of their surroundings. Litter-removal, an activity that the children engaged in at the beach, was described by one child as follows: "I do [litter picking] on my own. I normally bring a bag and I pick it up" (Ashbullby et al., 2013, p. 143). In response to the question by an interviewer, "How did you get the idea to do that [litter picking]?" (Ashbullby et al., 2013, p. 143), another child answered, "Just seeing loads of litter on the beach and just picking it up and taking it home."

This phenomenon was also found to occur in another study in which children's well-being and pro-biodiversity attitudes were significantly associated with their frequent sharing of a conversation about a family of creatures in nature with their parents. The study was conducted with a self-reported questionnaire answered by 397 children aged 9 to 12 in Tokyo, Japan (Soga, Gaston, Yamaura, Kurisu, Hanaki, 2016). Besides the effects of direct participation in nature-based activities in neighborhood natural spaces, Soga and colleagues' (2016) study revealed vicarious experiences of nature, such as reading and talking about nature or creatures, with the parents were associated with the children's positive affective attitudes toward biodiversity ($R^2 = 0.50$, $p < 0.001$) and willingness to conserve biodiversity ($R^2 = 0.49$, $p < 0.001$) (Soga et al., 2016). The parental presence appeared to be significant,

for the children to share their act of *doing* in natural space, or even vicarious space with their parents promoted the positive effects on their attitudes. The involvement of the parents can be another factor for sustainability of children's well-being expressed as creativity (Canning, 2010; Canning, 2013; Griebling et al., 2015; Zamani, 2016) and environmental concern (Ashbullby et al., 2013; Soga et al., 2016).

Significant-others

Children's quality time spent *doing* in natural space has context-specific impacts on well-being. Some researchers postulate that child-family relationships may have impacted the well-being benefits from natural space (Feng & Astell-Burt, 2017b). For instance, certain developmental ages may require family's assist for the child to be present at natural place. In one study, families played a key role in children's act of *doing* within natural space by enabling them to visit and by choosing to share natural spaces with their children (Ashbullby et al.'s, 2013). Although the families valued the opportunities for physical activity and active play afforded by beaches, the key health benefits emphasized were psychological aspects or well-being, including experiencing fun, stress relief and engagement with nature (Ashbullby et al., 2013).

Two longitudinal research studies (Flouri et al., 2014; Richardson et al., 2017), in fact, observed the family's role as an important factor as the nature's beneficial effects on well-being. These effects were strongest in early childhood at the young age of 3 to 5 (Flouri et al., 2014; Richardson et al., 2017). Flouri et al. (2014) examined whether green space 'protects' children (N = 6,384) from the negative consequences of family adversity and neighborhood disadvantage through assessment at the age of 3, 5, and 7 in the United Kingdom. The study revealed that indigent children in urban neighborhoods with more green space had fewer parent-reported

emotional problems from age 3 to 5 than their counterparts in less green neighborhoods (r = .108[England], -.160[Wales], and -.0073[Scotland], $p < .001$) (Flouri et al., 2014). The well-being benefits may occur more readily at younger ages as estimated in Richardson and colleagues' study (2017), which investigated whether neighborhood natural space and private garden access were related to urban dwelling children's (N = 2,909) developmental change over time in the United Kingdom. The researchers estimated the trajectory of any beneficial developmental change influenced from natural space and private garden access had occurred at younger ages than 4 and 6 years (Richardson et al., 2017).

There, thus, was a certain child-family significance that operated on children's well-being because these "young child" effects most likely requires that children come to the natural space with an adult. However, the adult who accompanied the child and reported well-being may have impacted outcomes. Feng and Astell-Burt (2017b) found that the significance of nature appeared in synchronicity of well-being scores between parent- and child-reported outcomes but not teacher-reported outcomes. The findings resulted from examining whether similar results would be obtained in analyses of neighborhood green space and well-being in 3,083 Australian children aged 12 to 13 when using the same outcome measure for the same sample but reported by different informants (Feng & Astell-Burt, 2017b). It is possible that parental reports may have been more affected by "social desirability" factors than teachers' reports, and this is an assumption that warrants further investigation.

Well-being beyond Being & Doing in Natural Space

Besides the family's role, there must have, however, been some other contexts specific to the individual child that operated to help them glean the benefits of well-being from the green space. One study found that there was no significant difference

in impact between playing on a playground and in a natural space on self-esteem (SE), despite significant SE benefits found in both locations among 52 children with the average age of 8.84 ± 0.45 from urban and rural schools in the United Kingdom (Barton et al., 2014). The researchers explained that the current generation of children, which has had less interaction with nature, may not receive the full benefits of natural spaces or may be differently impacted compared to previous generations (Barton et al., 2014).

Another study found that, unlike adult populations, there was no significant difference in impact on children's well-being between those who were from socioeconomically advantaged, compared to disadvantaged areas (Feng & Astell-Burt, 2017c). In other words, the green space did not produce greater health benefits due to parental socioeconomic status. This finding is contrary to the "equigenesis" hypothesis, which spells out how certain benefits can equalize the health inequality gap or disparity (Feng & Astell-Burt, 2017c). In this study, green space exposure for 10,088 children aged 0 to 13 in Australia did not affect parental reports of their children's well-being as related to socioeconomic variance in neighborhood green space (Feng & Astell-Burt, 2017c).

Likewise, green space did uniquely impact well-being of those children who were in an elementary school environment. Wood and colleagues (2014) found that altering school playtime environment to green space could promote school-aged children's well-being physically, not psychologically. Wood and colleagues (2014) replicated Barton and colleagues' (2014) study with a new design and implemented in an urban primary school in the United Kingdom, housing 575 children and extensive green space with a garden and grassed field. Of them, 25 children (12 boys aged 8.7 ± 0.3 and 13 girls aged 8.5 ± 0.3) were enrolled into the study and were allocated to

either play on the green space or the playground during morning and lunch time, in two consecutive weeks (Wood et al., 2014). The study resulted in an increase in moderate-to-vigorous physical activity in the children in green space ($F(1, 22) = 24.11$; $p < .001$; $n_p^2 = .523$) (Wood et al., 2014). However, there were no additive benefits for changes in self-esteem (SE) in both playground and green-field environments ($p > .05$; $n_p^2 = .000$). The authors interpreted on children's SE that the green space within the school environment which might be considered a direct source of stress for children might not provide the same impact on SE outside the school day (Wood et al., 2014). With regard to psychological developmental milestones in middle childhood (Centers for Disease Control and Prevention, 2018), SE may have allegedly been more sensitive to the personal- than social- or school-connection to natural space within the urban-dwelling elementary school environment.

There must have been a moment—here and now—that connected a child with nature in the personal context, if not in the context of school operation or obligation, when the child-nature connection via *being* or *doing* in natural spaces was significant evidence linking him or her to well-being, upon the peer-reviewed literature. The well-being impacts from natural space, therefore, are intricately and intimately woven into personal narration about the experience of natural space. The narration can be a more in structure concerning the circumstance of child well-being in relation to the experience of natural spaces. With the contextual meanings shared in more detail from the narration, the child's well-being phenomenon becomes rich in description enabling enhanced understanding. The qualitative stream of questioning proposed in this study will capture the complexity of the natural space-well-being connection to inform understanding.

Research Trends in Nature's Well-being Impacts on Children

Almost all the studies in this review were published in the last few years (Amoly et al., 2014; Balseviciene et al., 2014; Barton et al., 2014; Feng & Astell-Burt, 2017a; Feng & Astell-Burt, 2017b; Feng & Astell-Burt, 2017c; Flouri et al., 2014; Griebling et al., 2015; Kim et al., 2016; Markevych et al., 2014; Richardson et al., 2017; Soga et al., 2016; Wood et al., 2014; Zach et al., 2016; Zamani, 2016). There has only recently been more innovation and momentum in this research topic—child-nature interactions and well-being—in related disciplinary fields. The research involved a large number of varied academic fields of study from the following order: epidemiology (Amoly et al., 2014; Balseviciene et al., 2014; Huynh et al., 2013; Markevych et al., 2014; Zach et al., 2016), education (Canning, 2010; Canning, 2013; Griebling et al., 2015; Zamani, 2016), public health (Feng & Astell-Burt, 2017a; Feng & Astell-Burt, 2017b; Feng & Astell-Burt, 2017c), psychology (Ashbullby et al., 2013; Flouri et al., 2014), urban architecture & engineering (Kim et al., 2016; Soga et al., 2016), biology (Barton et al., 2014; Wood et al., 2014), ecology (Richardson et al., 2017). Many of studies came from the United Kingdom (Ashbullby et al., 2013; Barton et al., 2014; Canning, 2010; Canning, 2013; Flouri et al., 2014; Richardson et al., 2017; Wood et al., 2014), followed by Australia (Feng & Astell-Burt, 2017a; Feng & Astell-Burt, 2017b; Feng & Astell-Burt, 2017c), the United States (Griebling et al., 2015; Kim et al., 2016; Zamani, 2016), Germany (Markevych et al., 2014; Zach et al., 2016), Canada (Huynh et al., 2013), Japan (Soga et al., 2016), Lithuania (Balseviciene et al., 2014), and Spain (Amoly et al., 2014). Despite the globally growing interest in this area of study spreading over the numerous disciplines, it is still new to the discipline of Nursing in research and practice.

Gaps in the Literature

Almost all of the studies reviewed aligned well-being with a type of personal emergence, as described in the nature immersion model (Nagata, 2018), where a person and earthy materials are immersed in the *micro* (internal Self) and *macro* (external Self) described in Nightingale's epistemological worldview (Beck, 2005a, p. 131). There must, however, be an engine for the personal emergence (Nagata, 2018) of well-being from within a child in relationship with earthy materials. Such personal emergence is a spontaneous life spark (Beck, 2005c, p. 181). What, then, could be the engine that drives, guides, or sparks well-being to emerge within the reality of a child? It is still the mystery.

In the literature reviewed, there were certain types of connection between a child and the earthy materials of natural spaces that enabled well-being to emerge: a state of *being* or an act of *doing* in natural space. The connection between *being* and *doing* in a natural space must comprise a series of processes that streamlined for well-being as an engine generated from within a child. The well-being engine would have appeared to Nightingale as driving force of spirituality, which is a unifying force or Vital Force (Beck, 2005b, p. 158) permeating all of life. Therefore, the nature-child connection literally connotes a process of connecting or reconnecting the self to sources of all of life permeated with the spirit, or what gives life (Oxford University Press, 2010). This spirit may be linked to the engine for well-being, which is the necessary condition for natural law working to act on a child. In the midst of connecting, there must be a sense of connectedness of the self with source, in Nightingale's view, with no distinction between the boundaries of one's personal internal environment (the inner self) and external environment (outside the self) (Dossey, 2005a). However, the conditions necessary to drive for well-being during a

moment of the child-nature connection have been limited in neither quantitative numbers nor qualitative words of the research studies reviewed. How is a child's well-being driven during the very moment of connecting—*being* or *doing*—in a natural space?

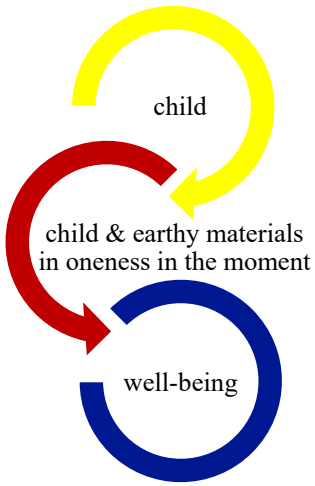
The life-spark (Beck, 2005c, p. 181) is a direct experience of the here and now in a child-nature connection. It can be momentary and transient, but it is existent enough to influence the well-being of a child. The notion of a direct moment-by-moment experience is what Nightingale believed to be the aim of human health: creating heaven—here and now—on the Earth (Dossey, 2005b). The connection between the self and all sources of all life in natural space appear to parallel access to heaven on the Earth, no matter how momentary or transient the experience. On Nightingale's terms, the life-spark (Beck, 2005c, p. 181) for well-being would be the very moment of unification between the self and the wholeness of the universe. The wholeness of a person represents the state of harmony in oneness, or *well-being* in the moment. The moment comprises a whole sense of *well-being*, which may even transcend the logical mechanisms of nature's beneficial effects when *being* and *doing* in a natural space. Inquiry into that moment should fill gaps in the existing literature, in which a direct here-and-now experience of heaven on the Earth has not been explored fully.

The well-being effects of nature manifest when the necessary conditions for a moment of oneness with the source of all life are met under natural laws (Selanders, 2005). The conditions that drive well-being transcend the socioeconomic contexts or school circumstances of a child, sparking an emergent process of reaching a whole new level of harmony and personal wholeness. This description of the well-being of a

child immersed in natural space is built on the original Nature Immersion model (Figure 2).

Figure 2

The Nature Immersion Model Built for Well-being of Urban Children



The model places emphasis on the here-and-now moment of connectedness between a child and the earthy materials of nature. This is a moment of connectedness during which well-being emerges, but it is also a process that allows well-being to flow and fluctuate, moment-by-moment, into the life trajectory stream of a child. The proposed study will be designed to explore that moment of connectedness.

Historically, such ideas about nature's beneficial effects on children have been dispersed through an eclectic range of sources from the literature on culture, although they have not been incorporated into peer-reviewed research studies until recently. Examples of the historical works include Dōgen Zenji's (1200-1253) the *Shōbōgenzō* (1231-1253), Jean-Jacques Rousseau's (1712-1778) "*Émile"* (1762 [1979]), and Rudolf Steiner's (1861-1925) *The Education of Children from the Standpoint of*

Theosophy (1911). Teachings from these philosophers all concurred about the importance of immersing a child in nature. Nature readily allows the Self to emerge and exercise free will in the earlier developmental stages of life (Rousseau, 1762 [1979]; Steiner, 1911). During the self-emergence stage, each child has one's own unique emotional and behavioral exhibitions. Individual variations can be considered to be natural, neither normal nor abnormal. Not all children precisely fit into the descriptions indicated on standardized psychometric standardized measurement scales. Children's well-being, from this perspective, cannot be pinpointed with conventional pretest and posttest categorization scores. Rather, each expression of a child, including even what is aggressive or hyperactive, can be a seminal condition necessary for the further unfolding of the child (Rousseau, 1762 [1979]; Steiner, 1911).

Standardized psychometric measurement scales do measure well-being at a point in time, but they do not capture the phenomenon of constant yet momentary change or exchange between a child and nature for the well-being process encompassed by the Nature Immersion model built for the well-being of children immersed in natural space (Figure 2). Therefore, in respect to the model as a lens, a moment of connectedness between nature and a child, which appears to be a seminal point in the emergence of well-being, will be explored in this proposed study.

Well-being impacts are context-specific and most readily captured with qualitative approaches. However, there has been no prospective study combining qualitative and quantitative methods to enrich our understanding of children's well-being derived from experiences of immersion in nature. It is highly possible to capture and translate children's well-being benefits from natural space into the body of the knowledge of nursing for praxis if it is approached with both quantitative and

qualitative research methodologies complementing each other to present more complete views.

Generating Nursing Knowledge

The mechanisms behind nature's effects on children's well-being are unclear in the literature. Still, natural space appears to impact certain populations of urban-dwelling children the most. The beneficial factors of natural space that promote children's well-being empirically existed from the literature review and should be investigated for possible application to nursing practice. The identification of nature's beneficial factors, such as space- and time-frame of immersing in nature, can fill the gap of today's effort to practically incorporate nature-based interventions in nursing.

The observed experiences become evidence: namely, empirical evidence. Observational, empirical research studies facilitate the identification of nature's beneficial factors. Based on the empirical findings to date, pragmatism can bridge the gaps between research and praxis because its philosophy is grounded in empiricism rather than mechanics, effectiveness rather than efficacy, and practical decision-making in everyday life rather than pursuing cause-and-effect relationships (Kalkman et al., 2017). Pragmatism, for instance, suggests the legacy of Nightingale's work, where keen observations on the healing of a person describes the effective modification or manipulation of the environment required for nature to act on the person. Wounded soldiers' lives, for instance, were dramatically saved by effective hygiene practices such as hand-washing even before an accountable mechanism was known to science.

Since pragmatism is viewed as a strong foundation for mixed methods research (Creswell & Plano-Clark, 2011), the proposed study is designed based on a pragmatic methodology. Used together, empiricism and pragmatism can produce new

nursing knowledge for the practical use of nature-based intervention on well-being among urban-dwelling children. Using them together reflects what Nightingale did with her statistical dexterity and keen observations to glimpse natural law, or "the thought of God" (Cook, Vol. 2, 1913, p. 396 as cited in Selanders, 2005, p. 100). A mixed-methods combination of quantitative statistics and qualitative engagement is innovative in this field, although traditional in the sense of Nightingale's original nursing knowledge, which was based in nature's effects on human well-being.

Summary

The exponentially increasing number of recent international and interdisciplinary peer-reviewed research studies indicates a globally growing interest in research focused on nature's effects on children's well-being. While the majority of these studies have occurred outside the United States with large numbers of participants and using retrospective time designs, there has been some focus on prospective designs, particularly those using questionnaire methods. However, no mixed methods studies have prospectively addressed childhood well-being in response to temporal and spatial factors of engagement with natural spaces. Quantitatively, a state of *being* in natural spaces has significant temporal and spatial impacts on children's well-being, and children's residential proximity or frequent visits to natural spaces provide a sense of safety that produces well-being benefits over time. There were gaps in the literature, however, of how the beneficial factors spark well-being of urban-dwelling children. As unprecedentedly distant from nature, the current generation of urban-dwelling children appeared to be impacted differently from the previous generation. The literature reviewed suggests that quantitative and qualitative methods, used together, may bridge the gaps, providing a more Wholistic

picture of this emergent phenomenon: the connection between nature immersion and well-being.

CHAPTER THREE. METHODOLOGY

The purpose of this study was to increase understanding of the qualities of natural spaces that contribute to childhood well-being. A growing body of evidence suggests that natural spaces have beneficial effects on children's well-being, yet the benefits are neither acknowledged nor applied into the health care system. A state of *being* in natural spaces is a non-invasive, inexpensive nature-based intervention that is sustainable in the community as well as in individual self-care practice for well-being. From the perspective of the nature immersion model, well-being is personal emergence from within the self through connecting with earthy materials (Nagata, 2018). The beneficial well-being factors of natural space needed to be investigated for urban-dwelling children who otherwise are likely to be distant from nature. This study, thus, was designed to build a foundation for integrating natural spaces into health care efforts when working with urban-dwelling children.

Research Method

This study used a mixed methods research design to address two research aims: 1) To identify factors predicting parental assessment of urban-dwelling children's well-being and 2) To explore the natural environment that promotes well-being of an urban-dwelling child. In mixed methods, the researcher mixes, links, or integrates both quantitative and qualitative data that are persuasively collected and analyzed based on research questions (Creswell & Plano-Clark, 2011, p. 5). The two study aims were pursued from the corresponding study streams of quantitative and qualitative data where participants were parents of the urban-dwelling children who immersed in nature at an urban community farm or other urban natural spaces. In the

quantitative stream, the parents completed a survey of children's demographic information and questions related to *being* in natural spaces and two questionnaires regarding children's well-being. In the qualitative stream, parents were interviewed by the researcher about children's well-being through *being* in the natural space that was most effectively linked to child well-being.

Research Design

The study used an explanatory sequential mixed-methods design (Creswell & Plano-Clark, 2011) to answer the research questions. The research questions from the quantitative and qualitative streams were as follows respectively: 1) How does *being* in natural environment predict parental assessment of urban-dwelling children's well-being?; and 2) How do parents describe the natural environment that most effectively promotes well-being for their urban-dwelling child?

The first research question was addressed using a quantitative analysis, and the second was addressed using a qualitative approach with a semi-structured interview. The sequential mixed methods design allowed empirical observations of the predictive factors and impact of the nature immersion phenomena on children's well-being in a sequence of quantitative to qualitative data collection and analysis. The design was sequential-explanatory as the quantitative phase of the study was followed by qualitative data that were explored to explain the quantitative findings. Quantitatively, a survey for parental report of children's demographic and nature immersion information and psychometric instruments for parental assessment of children's well-being were administered to assess how factors of nature immersion can predict well-being for individual children. Qualitatively, a semi-structured interview session (Creswell, 2013, p. 251) was used exploring significant factors from the quantitative results by interviewing parents about children's state of well-being in

connection with nature through a nature-based program in an urban farm, green space or blue space, whichever was identified by the parent as most effective in relationship to their child's well-being.

In explanatory sequential mixed methods design (Creswell & Plano-Clark, 2011), data collection and analysis is complete separately, and in sequential, until qualitative data collection and analysis which is based on the quantitative findings is complete. Both streams of data analyses are juxtaposed at a point where the quantitative and qualitative data will be merged for interpretation (Creswell & Plano-Clark, 2011). The point at which these two streams of data are merged is called their interface (Guest, 2012), which referred generally to any point in a study where two or more data sets are mixed (Guest, 2012). The interfaces are synthesized for data interpretation, or generation of the meta inference. Thus, the data, at the point of the interface are from both the qualitative and quantitative streams, which are two sides of the same coin (Chiang-Hanisko et al., 2016).

The mixed methods approach was being selected for this study because it could address both the quantitative and qualitative questions asked, each of which were of equal importance for this study. In this approach, the qualitative and quantitative data were treated as having equal value. As such, this is an ideal approach for investigating the factors of nature immersion as related to children's well-being as a holistic concept (Creswell & Plano-Clark, 2011).

The reasons for the selection of mixed methods were as follows: a) There was scarce peer-reviewed literature and research resources using both qualitative and quantitative methodologies to study children's well-being in the context of nature immersion, b) there were few well-constructed qualitative interview studies addressing children's lived experiences with well-being, c) there were currently few

quantitative instruments available and applicable for the measurement of well-being among young populations, and d) juxtaposing the two different perspectives brought by the qualitative and quantitative methodologies moved in the direction of a more holistic approach for studying of the phenomenon of nature immersion as related to children's well-being with more detail than might be apparent when using either methodology alone.

Procedures

Students' Farmers and *Staff-led Field Trips* were nature-based-intervention programs at Battery Urban Farm that were incorporated into this study as a resource for participant recruitment. A survey that the researcher developed for this proposed study and two well-being questionnaires were administered to those parents whose children registered for *Students' Farmers* or *Staff-led Field Trips*. The survey and questionnaires were administered both online.

Students' Farmers was a program available for students in grades 1 to 3 and was assigned to lower Manhattan public school classes, with regular visits to the Battery Urban Farm occurring throughout the school year (Battery Conservancy, n. d.). The students performed all the work of a farmer, from seeding to harvesting (Battery Conservancy, n. d.). The program was composed of lessons that were aligned with Core Curriculum State Standards and Next Generation Science Standards (Battery Conservancy, n. d.) and was guided by staff educators at the Battery Urban Farm.

Staff-led Field Trips were about 75 minutes long and available to the public for all ages from preschoolers to 12th graders, occurring from April through October (Battery Conservancy, n. d.). There were varied types of learning experiences, which were all led by Battery Conservancy farm educators. The learning experiences

accommodated a maximum of 32 children in each program (Table 1) (Battery Conservancy, n. d.). The program was composed of lessons that were aligned with Core Curriculum State Standards and Next Generation Science Standards (Battery Conservancy, n. d.) and was guided by staff educators at the Battery Urban Farm.

Table 1

Summary of the Types of Staff-led Field Trips and Objectives (Battery Conservancy, n. d.)

Names of Staff-led Field Trips	Objectives
Observing the Seasons	• Use the five senses to observe what is happening this season on the farm. • In the spring, find little sprouts starting to grow out of the soil. • In the summer, study butterflies visiting the sunflowers. • During the fall, learn why the leaves are changing colors.
Different Types of Farmers	• Explore an urban vegetable farm and learn about the different types of farmers that grow and raise all of the foods we like to eat.
Eating the Rainbow	• Find all the colors growing on the farm and what body parts will they help. • Tend the farm crops to help grow food to keep our community healthy.
Farm Exploration	• Learning all about Battery Urban Farm through your five senses. • Smell rosemary, taste mint, feel a worm, see a flower blooming, and hear birds chirping. • Practice recording these observations and share new questions like real scientists.

Insect Investigators	• Learn all about the tiny creatures that help us do our work on the farm.
The Job of a Seed	• Learn about the parts of a seed to understand how plants grow. • Participate in part of the plant life-cycle depending on the season. • Plant, harvest or even eat a seed.
Compost, Recycling, or Trash?	• Decide what to do with leftover banana peels and candy wrappers through fun games that teach us to manage our waste more responsibly. • Work with in-depth understanding of the decomposition process.
Aquatic Life of The Hudson	• Visit the Battery to investigate what is living under the surface of the Hudson River. • See what creatures are living in our oyster gardens and what role they play in this aquatic ecosystem.
Whole and Processed Foods	• Understand what happens to a potato when it becomes a potato chip and corn when it becomes corn flakes. • Discover the whole foods we are growing on the farm and learn how to take this fresh produce and turn it into a delicious snack.
Food Miles	• Use our own energy to demonstrate the fuel that is used to ship our food by airplane, ship, train and truck, and start a discussion about local food and what impact our foods origin has on the environment. • Participate in the local food movement by helping to grow the food we donate to local public elementary schools.
Arable Apple	• Understand the value of arable land by helping to nurture arable soil right here in Manhattan. • Determine what is putting arable land in danger on a global scale, and discuss ways we can prevent future loss through our own actions.

	• Learn about waste systems in New York City and participate in our farm practices that support soil life.
Water Quality of the Hudson	• Observe aquatic life in our oyster cages and measure the oysters to assist in monitoring their growth in the Hudson River.
Gut Microbiome	• Learn about the helpful microbes that live inside us, how gut microbiota fight disease, boost energy and improve brain function, and how they can support a healthy gut microbiome by eating fresh produce and high-fiber foods.
Forest Farm Tour - Native Plants & Medicinal Herbs	• Learn about the Lenape tribe and how they hunted, scavenged and cultivated the island of Manhattan before the arrival of European settlers.
Plant Doctors	• Understand how plants can be hurt by diseases and pests, explore how plants chemically defend themselves against threats, and practice diagnosing plants by observing them on our farm.
Plant Anatomy	• Learn what plants need to survive and how they move nutrients through their bodies. • Simulate these processes and understand how plants grow, reproduce and adapt to new surroundings.
Green Space Study	• Explore the Battery and observe how people and other living things are using this green space. • Learn about the benefits of green spaces to people, the environment, and our ability to protect ourselves against natural disaster. • Design a new green space for our own community and learn how to make our dreams a reality.

Setting

The study was conducted recruiting participants from Battery Urban Farm programs. The Farm was an urban community farm on the southern tip of Manhattan,

New York, surrounded by both green (Battery Park's woodland) and blue (New York Harbor) spaces. Permission to access participants from the Farm Program was obtained from farm administrators through a letter of cooperation before the beginning of any phases of the study. Once permission was obtained, the farm educator made email contact with individuals whose children registered for *Students' Farmers* or any programs of *Staff-led Field Trips* to invite them to participate in the online study. A link to the study was placed on the Battery Urban Farm website. A convenience sample was recruited from the parents of the child registrants in at least one of these programs.

Recruitment

Flyers announcing this proposed study was sent by Battery Urban Farm staff educators via email and on the farm's program-registration website to recruit parents of children who had registered for *Students' Farmers* or *Staff-led Field Trips*, Battery Urban Farm's nature-based-intervention programs. The survey and well-being questionnaires were hosted online on a secure Research Electronic Data Capture service (REDCap) for those parents who agreed to participate in the study. A link to the survey and well-being questionnaires was provided via email to parents who were interested in participating. Willing participants proceeded to anonymously answer the survey questions and the well-being questionnaires.

Among the participants who completed the survey and well-being questionnaires, a sample of parents was recruited for semi-structured interviews. Interested parents as noted at the end of the survey contacted the researcher via email. Those parents who agreed to participate in the qualitative component study were meeting with the researcher on-site at the farm or another public venue that allowed privacy.

Informed Consent

For the online survey and well-being questionnaire component of the study, there was an online study description with indication that proceeding to complete the survey and questionnaires, and submitting them was implied consent. The online study description explained the study procedures and processes, including its risks and benefits. The contact information of the researcher was provided should any issues arise.

For the qualitative component, participation was described, and questions were answered during a face-to face engagement with the researcher. Before signing the consent form, the participants were encouraged to raise any questions that they had and they were informed of their ability to terminate their participation at any time without any penalty. Only after questions about the study were addressed and answered successfully was the informed consent signed by the parents. A hardcopy of the signed consent form was retained with the researcher, and a copy of signed consent form was given to each parent who signed it. The hardcopy was kept in locked file cabinet. The semi-structured interview was conducted with the parents after the informed consent process was completed.

Sample

The participants were parents of children enrolled in *Students' Farmers* or *Staff-led Field Trips*' program, nature-based intervention programs at Battery Urban Farm. The participants' residential location was a convenient distance from the farm so they could easily reach the study site by foot or via Metro. The farm functioned as a hub for connecting potential participants and the researcher.

Eligibility Criteria

Inclusion Criteria

- Adults who were parents of preschool to preteen children (3 to 13 years old) who had registered for a nature-based intervention at Battery Urban Farm.
- Those who were able to speak and read English.
- Those who had ability to participate in data collection activities, like responding to the demographic survey, well-being questionnaires, or interview.
- Those who were living in urban areas.

Exclusion Criteria

- Adults who were not parents of preschool to preteen children (3 to 13 years old).
- Those who were not able to speak and read English.
- Those who were not living in urban areas.

Sample Size

Power Analysis for Quantitative Stream

The total sample size was calculated for this proposed study, using G Power (3.19), with the alpha level of 0.05, the power level 0.8, a value of 10 as the total number of independent variables, and the value of proportion of variance accounted for by all the independent variables together which was considered an alternative measure to the effect size (Coe, 2002). With precaution regarding occurrence of a type 1 error, the alpha-level was set at 0.05 over 0.025 or 0.001 to consider even subtle well-being factors which might be detectable. Simultaneously, the level of power at 0.8 was chosen in this proposed study in regard to a 0.2 probability of failing

to detect a genuine effect of the subtle well-being factors or a type 2 error if one genuinely existed (Cohen, 1992, cited in Field, 2013).

Different values of effect size could be applied into the calculation based on the past research studies which were similarly designed to this proposed study in examining beneficial factors of connection to natural space. A value of effect size 0.239 [$R^2 = 0.239$, F (52.37), $p < 0.001$] (Zhang et al., 2014) or 0.61[$R^2 = 0.61$, F (7,195), $p < 0.01$] (Lumber et al., 2017) yields a number of 78 or 37 as a total sample size respectively. Alternatively, a moderate effect size of 0.15 ($f^2 = 0.15$) (Cohen, 1998) yields the total sample size of 118. To account for incomplete or missing data, an additional 10% of the sample size was recruited to bring the total recruited sample to 130. A sample of 130 parents appears to ensure what is necessary for a moderate effect in the quantitative stream of this proposed study. Since there were a minimum of 500 individuals on the email list of the Battery Urban Farm, and an invitation to participate in the study also was posted on the website, a sample of 130 participants was expected to be reasonable.

Data Collection

As the study was planned as a mixed-methods design, the research included data collection of both quantitative and qualitative data. Quantitative data were collected from parents at an online registration website for Battery Urban Farm's nature-based intervention programs. There were two types of quantitative data that will be collected: a survey that incorporated demographic information and questions related to *being* in natural spaces and two parental-reports of children's well-being as observed for momentary well-being over the past 7 days and general well-being over the past 4 weeks. Qualitative data were collected using semi-structured interviews at the completion of the quantitative data collection and analysis. The data from both the

quantitative and qualitative streams were collected by the researcher and merged into a point of interface (Guest, 2012) for analysis and interpretation as meta-inferences.

Quantitative Streams

Quantitative Measures

The participating parents completed an online survey and two well-being questionnaires after their child had registered for Battery Urban Farm's nature-based programs.

Survey

A survey was constructed for this proposed study based on the research findings from the peer-reviewed literature to investigate linearly independent variables (state of *being* in natural space) with predictive effects on a dependent variable (urban-dwelling children's well-being). The choice of variables should be determined by a body of knowledge or a theoretical framework (Pedhazur, 1997), and independent variables were chosen as following spatial and temporal environmental factors of state of *being* in natural space shown in the review of literature: 1) Urban farm visiting, 2) Green space other than the urban farm visiting, 3) Blue space other than the urban farm visiting, 4) Residential proximity from most visited natural environment, and 5) Parental assessment of importance of most frequently visited natural environment, 6) Frequency of visit, 7) Time spent on each visit, and 8) An overall timeframe.

For other relevant parental information, the following demographic variables as covariates were indicated from the review of literature: 1) Parental employment status and 2) Parental socioeconomic status. The literature indicated that the current generation of children, who were unprecedentedly distant from nature, appeared to glean well-being benefits from natural spaces differently from previous generations

(Barton et al., 2014) or outside the context of social and household affluence (Feng & Astell-Burt, 2017c). Thus, the demographic information was covariated to investigate if this would be applicable to the sample of this proposed study.

As a result, the survey provided the total of 10 linearly independent predictors and covariates (Table 2). Description of the sample was obtained with demographic data from the survey including age, gender, ethnicity, religion, and regions of living.

Table 2

Table of Measures for Linear Independent Predictors and Covariates

Variables	Measures	Numbers of Items/Dimensions	Level of Measurement
Urban farm visiting	Survey	2 (yes/no)	Nominal
Green space other than the urban farm visiting	Survey	2 (yes/no)	Nominal
Blue space other than the urban farm visiting	Survey	2 (yes/no)	Nominal
Residential proximity from most visited natural environment	Survey	6 Categories	Ordinal
Parental assessment of importance of most frequently visited natural environment	Survey	5 Categories	Ordinal
Frequency of visit	Survey	5 Categories	Ordinal
Time spent on each visit	Survey	6 Categories	Ordinal
Overall time-frame	Survey	6 Categories	Ordinal
Parent’s employment status	Demographic	2 (yes/no)	Nominal
Parent’s household income	Demographic	9 Brackets	Interval

Well-being instrumentation

The term "well-being" can be instrumented in twofold aspects: momentary and general state of feelings and moods associated with well-being. Momentary state can be rewarding affective feelings, such as pleasure, joy, elation, contentment, pride, affection, happiness, engagement, and excitement, while global one can be general feelings about a child's life, such as overall life satisfaction (PROMIS, 2017a; PROMIS, 2017b). The National Institute of Health's Patient-Reported Outcomes Measurement Information System (PROMIS®) has developed multi-item scales for subjective well-being encompassing such twofold aspects of well-being of children (Table 3). Currently, three scales measuring subjective well-being are available in PROMIS® for parental proxy report of well-being of children aged 5 to 17 years old. Two out of the three scales called Positive Affect and Life Satisfaction scales demonstrated an excellent level of internal consistency reliability of 0.90 (PROMIS, 2017a; PROMIS, 2017b) and an acceptable level of convergent (construct) validity (Forrest et al., 2015) (Table 4). The Positive Affect scale measures momentary well-being whereas the Life Satisfaction scale measures global well-being (PROMIS, 2017a; PROMIS, 2017b). These two scales were used to quantify parental assessment of children's well-being. There are 4- and 8-item short forms of both scales, which were available for manual scoring as an administration option (PROMIS, 2017a; PROMIS, 2017b). Of them, the 8-item forms were more informative than the 4-item forms based on Standard Error (SE) (N = 782) (PROMIS, 2017a; PROMIS, 2017b) and these 8-item forms were administered in this study.

Table 3

Definition of Scales and Sample Items of Subjective Well-being Measures (PROMIS, 2017a; *PROMIS, 2017b)*

Scales	Definition	Sample Items

Positive Affect	Momentary positive or rewarding affective experiences, such as feelings and mood associated with pleasure, pride, happiness, and engagement, based on the past 7 days.	My child felt happy. My child felt calm. My child felt refreshed.
Life Satisfaction	Global and context-specific evaluations of a child's life, including assessments of life conditions, and comparisons of one's life with others' lives, based on the past 4 weeks.	My child was satisfied with his/her life. My child had what he/she wanted in life. My child enjoyed his/her life.

Both the scales have 8 question items and are scored from 1 to 5, with each question item grouped into a 5-point Likert scale (Table 4). Higher scores indicate higher well-being. The total lowest possible raw score is 8; the total highest possible raw score is 40. The total raw scores are converted into a standardized score using the applicable score conversion table with a mean of 50 and a standard deviation (SD) of 10 (PROMIS, 2017a; PROMIS, 2017b). A score of 50 is the average for the United States general population with a SD of 10 because calibration testing was performed on a large sample of the general population (PROMIS, 2017a; PROMIS, 2017b).

Table 4

Table of Item Dimensions, Reliability, and Validity of Well-being Measures (PROMIS, 2017a; *PROMIS, 2017b)*

Measure/ Variable	Number of Items/Dimensions	Internal Consistency α	Convergent (construct) validity
Positive Affect	8 items/a 5-point Likert scale questions (1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, and 5 = Always).	0.9	0.74
Life Satisfaction	8 items/a 5-point Likert scale questions (1 = Not at all, 2 = A little bit, 3 = Somewhat, 4 = Quite a bit, 4 = Often, and 5 = Very much).	0.9	0.72

Qualitative Streams

Semi-structured interviews

After the completion of quantitative data analysis, qualitative data collection was conducted using semi-structured interview session(s). The informants in the study were parents who completed the survey/questionnaire component of the study. The interviews were set up with a focus on in-depth and broad insight into the impact of nature immersion on children's well-being. The space (farm; green; blue) that achieved the highest score (frequency of visit X time spent/visit X an overall time frame) was the starting point for the interview. The researcher identified the highest scoring space prior to the interview and began by asking the parent what it was about the space that made it rank higher than the other two as related to child well-being. The semi-structured interviews were tape-recorded and analyzed with NVivo version 11.4.0 (qualitative data analysis software).

The interview session was held individually for about a 20-30 minutes in length, on-site at Urban Battery Farm where the interviewees could be relaxed and calm in the quietude and shade of a large tree or another public place such as a private room in a library that allowed quiet and privacy.

In this way, the semi-structured interview session facilitated discussion based on the factors of natural space contributing to children's well-being as reported in the quantitative stream of the study. An open-ended question was followed by targeted questions, such as 1) How does the highest scoring (frequency of visit X time spent/visit X an overall time frame) natural environment promote well-being of your child?; and 2) What should we know about the natural environment factors that promotes your child's well-being?. The questions were tentative as to follow up and explain the quantitative results (Creswell & Plano-Clark, 2011). The researcher's

follow-up questions were guided by the lead of the semi-structured-interview participants, and was directed to clarify comments, which are not immediately understandable to the researcher.

Data Analysis

Quantitative data analysis involved a process of organizing raw data collected from the survey and questionnaires into information that was useful for helping the researcher to analyze, interpret, and answer the first research question and address the hypotheses. Qualitative data analysis involved a process of inductive content-analysis following quantitative data analysis. The data from both streams were merged for interpretation at the point of interface (Guest, 2012), and the interface was synthesized into a meta-inference (Creswell & Plano-Clark, 2011). Each component of the quantitative and the qualitative data analysis is delineated in detail below.

Quantitative Stream

Description of the Sample

Quantitative raw data were collected from participating parents of the children who had registered for a natural environment activity at the Battery Farm. There was one survey with demographic information and relevant facts about natural space and two well-being questionnaires, the Positive Affect and the Life Satisfaction measures.

The quantitative data in this study were analyzed by the software, IBM SPSS Statistics version 25.0. Data cleaning started with identifying any data that were out of the expected value range and validating their correct value. After data were validated, missing data analysis was conducted using SPSS missing data analysis and pattern analysis to determine the randomness and patterns of the missing values (Kellar & Kelvin, 2013). Total scores for the Positive Affect and the Life Satisfaction measures were calculated and reported along with internal reliability estimated for each scale

using Cronbach's Alpha. With descriptive statistics, continuous variables, such as children's age was presented as a measure of central tendency of mean and standard deviation. Discrete variables were presented in frequencies and percentages; these include children's gender, ethnicity, religion, etc.

The quantitative research question: How does *being* in natural environment predict parental assessment of urban-dwelling children's well-being?

There are eight spatial-, spatial-temporal-, and temporal-predictor variables and two demographic covariate variables that were accessed using the survey data. Each spatial-temporal variable was created as a single data point by multiplying three factors:

1) Frequency of visit – number of time the designated space (urban farm; green; blue) was visited in the last month from "less than once a month" to "more than once a week" (survey questions 19, 26, 34).
2) Time spent/visit – approximate time spent on each visit ranging from "less than half an hour" to "more than three hours" (survey questions 20, 27, 35)
3) Overall timeframe – period of time that natural environment visiting had persisted ranging from "one time" to "more than three months" (survey questions 21, 28, 36).

The spatial-temporal variables were: 1) Urban farm visiting (frequency of visit X time spent/visit X an overall time frame); 2) Green space visiting other than the urban farm visiting (frequency of visit X time spent/visit X overall time frame); 3) Blue space visiting other than the urban farm visiting (frequency of visit X time spent/visit X overall time frame); 4) Residential proximity from most frequently visited (frequency X time X overall time frame) natural environment (farm, green or blue space); 5) Parental assessment of importance of most frequently visited (frequency X time X

overall time frame) natural environment (farm, green or blue space); 6) Frequency of visit; 7) Time spent at each visit, and 8) Overall time-frame. Parental employment status and parental socioeconomic status were the demographic covariate variables.

There was one outcome variable, parental assessment of child well-being, measured by two questionnaires, the PROMIS Positive Affect and Life Satisfaction (8-item version). Well-being was assessed over the past seven days with the Positive Affect and the past four weeks with Life Satisfaction.

Specific Research Questions (RQ) with Associated Hypotheses (Hy)

RQ 1: What is the relationship between urban farm visiting and parental report of child well-being.

Hy 1: There will be a significant relationship between urban farm visiting and parental report of child well-being.

RQ 2: What is the relationship between green space visiting and parental report of child well-being.

Hy 2: There will be a significant relationship between green space visiting and parental report of child well-being.

RQ 3: What is the relationship between blue space visiting and parental report of child well-being.

Hy 3: There will be a significant relationship between blue space visiting and parental report of child well-being.

RQ 4: What is the relationship between residential proximity to most frequently visited natural environment (most highly rated space when calculating frequency X time X overall time frame) and parental report of child well-being.

Hy 4: There will be a significant relationship between the residential proximity to the most frequently visited natural environment and parental report of child well-being.

RQ 5: What is the relationship between parental assessment of the importance of the most frequently visited natural environment (most highly rated environment when calculating frequency X time X overall time frame) and parental report of child well-being.

Hy 5: There will be a significant relationship between parental assessment of the importance of the most frequently visited natural environment and parental report of child well-being.

RQ 6: How do environmental factors (urban farm visiting, green space visiting, blue space visiting, residential proximity to natural environment and parental assessment of importance of natural environment), compared to parental socioeconomic factors, predict parental report of child well-being?

Hy 6: Factors related to being in a natural environment rather than parental socioeconomic factors will predict parental report of child well-being.

Research question and hypothesis 6 will be addressed while controlling for parental employment (survey question 9) and socioeconomic status (survey question 10).

Generalized Linear Model

To answer the hypotheses, Generalized Linear Model, a flexible generalization of ordinary multiple linear regression (MLR), was used. Parental assessment of urban-dwelling children's well-being was the dependent variable. A type of natural spaces and a type of connection to natural spaces were the independent variables. Generalized Linear Model was used in analyzing the probability when predicting the criterion variable (well-being) from the treatment variable (spatial and temporal types) while controlling for (covarying) demographic variables. Generalized Linear Model is the most general case of the maximum likelihood estimation, and this technique was selected because it is more flexible than traditional analysis of

variance. With Generalized Linear Model one can write models that reflect the specific research questions being asked (Field, 2013). This makes every test of significance a test of a specific hypothesis. In addition, McNeil, Newman and Fraas (2012) and Pedhazur and Schmelkin (1991) pointed out that with MLR one can test relationships between continuous variables, categorical variables that are binary coded, interaction between continuous and categorical variables, as well as categorical-categorical interaction and continuous-continuous interaction.

Before the analysis began, the following assumptions were tested: 1) Normal distribution of the dependent variable, 2) Existence of outliners, 3) Linearity of bivariate relationship, and 4) Multicollinearity of the independent variables. Normal distribution of the dependent variable was assessed by using a histogram of the standardized residuals on which the normal curve was interposed (Kellar & Kelvin, 2013). Linearity of bivariate relationship was checked on homoscedasticity where scatter diagrams were used to visualize the relationship between each pair of variables (Kellar & Kelvin, 2013). Plotting residuals showed against each independent variable (Kellar & Kelvin, 2013) and visualized outliners which could also be detected by measuring influence with centered leverage. Multicollinearity was assessed by treating each independent variable as a dependent variable and regressing it on the other independent variables (Kellar & Kelvin, 2013). Higher correlations between variables ($p > 0.85$) indicate an indication of violation. Variance Inflation Factor (VIF) was used to identify potential multicollinearity. If multicollinearity occurs, the most parsimonious model would be used.

If residual analysis indicated violation of the assumption of normality, alternative analysis was considered as options: a different linear model or a nonlinear

model, a weighted least squares linear regression, transformation of the X or Y data, or an alternative straight-line regression method.

After all of the assumptions were met, Generalized Linear Model was selected using SPSS for obtaining the regression equation. First, the SPSS outputs from a generalized linear model were interpreted by analyzing the following relationship (Kellar & Kelvin, 2013): 1) Between each independent variables and dependent variable and 2) The relative strength of the association of each independent variable on the dependent variable. Then, covarying demographic predictors (per dimension or each bracket as a cut-point) was performed and analyzed on the relationship described in 1) and 2). Finally, a succinct summary of the findings was presented to answer the research question.

Qualitative Stream

The information gathered in the qualitative data collection phase using tape-recordings was transcribed. The transcribed data, then, were mapped using a software, NVivo version 11.4.0.

The Qualitative Research Question: How do parents describe the natural environment that most effectively promotes well-being for their urban-dwelling child?

Content Analysis

Conventional or inductive content analysis—an approach to describe a phenomena by allowing categories to emerge from the data (Hsieh & Shannon, 2005, p. 1279)—was used for qualitative data analysis. The analysis in this study was aimed to explore the data related to the context of well-being.

The approach with conventional analysis started with reading all data repeatedly to immerse the researcher in the data until a sense of the whole emerged and added new insights (Hsieh & Shannon, 2005, p. 1279). Then, open-ended

participant's comments, word by word, were probed by first highlighting the exact words from text that appeared to be key thoughts (Hsieh & Shannon, 2005, p. 1279) related to well-being supporting dimensions of natural environments. Labeling for the thoughts as a code was then performed by making notes of the researcher's first impression or initial analysis (Hsieh & Shannon, 2005, p. 1279). Finally, the codes were related or linked into categories or clusters (Hsieh & Shannon, 2005, p. 1279) as emerging themes.

Meta-inference

The qualitative themes resulting from interview exploration of quantitative results were examined for similarities and differences inherent in generation of the meta-inference (Creswell & Plano-Clark, 2011). The themes from the qualitative and the results from the quantitative component were compared and contrasted to determine how they were linked and to determine how the merged results contribute to understanding the overall research interest: qualities of natural spaces that contribute to childhood well-being. The resulting meta-inference would represent a more wholistic view of the factors of the nature immersion phenomenon operationalized as a state of *being* in natural space on children's well-being.

Ethical Considerations

The study was approved by the Institutional Review Board (IRB) at Florida Atlantic University prior to any participant recruitment. All the adult stakeholders (parents) interested in semi-structured interview in this proposed study signed informed consent. A copy of the signed consent form was given to each participant, and another copy of the signed consent form was retained with the researcher. All participants were free to access the researcher for help and to discontinue the study at

any time without penalty. The participants were given a $10.00 gift card for semi-structured interview in gratitude for their participation in the study.

Confidentiality of Information

Participants who do not engage in an interview remained anonymous. For those who participate in an interview, confidentiality was assured. In order to assure privacy, data that were collected from the survey, two questionnaires, and interviews used in this study were reviewed and approved by Information Technology (IT) department at Christine E. Lynn College of Nursing, Florida Atlantic University (FAU). A protocol regarding data management plan (DMP) specific to this study was collaboratively developed by the IT department and the researcher as follows: 1) Data were accessible to the investigators on FAU's secured infrastructure, Biomedical and Health Research (BHRIC); 2) Encrypted email or Filelocker was used between the investigators if the data had to be shared; 3) The survey form and the two well-being questionnaires were hosted on a secure Research Electronic Data Capture service (REDCap); 4) Tape recorded interviews using a tape recorder belonging to the researcher were transcribed onto a Word document in her BHRIC profile; 5) The recordings from the tape recorder were deleted by the researcher after the transcriptions verified; 6) All the data related to this proposed study were stored on the BHRIC; 7) Consent forms signed by parents who agreed to join interview sessions were stored in a locked file cabinet by the researcher; and 8) The IT director would revoke the investigators' access once research and analysis of the data stored on the BHRIC had been concluded.

Benefits

There might not be a direct benefit from this study. However, a possible benefit might be that the findings from this research become a resource for teachers,

parents, and healthcare professionals to promote urban-dwelling children's well-being.

Risks

There was the potential risk of loss of privacy resulting from participation in this study. The researcher assured participants confidentiality. The participants were encouraged to contact the researcher throughout the study project if they had any questions about participating. The potential risks from participation in this research study were minimal. If any, there might be a sense of exhaustion that resulted from answering the survey, well-being questionnaire, or semi-structured interview.

Methodological Rigor and Persuasiveness

There are essential issues regarding rigor that arise in mixed methods research studies: validity in quantitative research and trustworthiness in qualitative research (Creswell & Plano-Clark, 2011). These issues were acknowledged and addressed by the quantitative and the qualitative streams, respectively.

Quantitative Rigor

Validity

In this study, the possible threats to rigor were identifiable by the following effects of both internal validity and external validity (Tappen, 2016):

Internal Validity

- *Selection*: The parents who might be eager to participate in a nature-based intervention would be easier to recruit for this study. However, Urban Battery Farm's nature-based programs were open to the public, and multiple public sectors in New York City were recruited.
- *Instrumentation*: The findings might be observed due to the nature of the instrument or instrumental bias. However, the qualitative stream of this study

provided in-depth interview with semi-structured questions about the phenomenon supplementing the quantitative stream.

- *History effect*: The findings might result from the parents of those children who had already immersed in nature-based experiences in the past. However, the purpose of this proposed study was to explore the phenomenon of nature immersion including the effects from history, and the effects themselves did not compromise but might benefit to gain a new insight about the phenomenon which might not be possible without them.

External Validity

- *Selection effect*: The criteria of participant selection from within New York City, a city like no other in terms of demographics, might limit the replicability of this research in other urban cities. Also, given the fact that participants had self-selected, it was likely that they valued the benefits of natural environments. This valuing would limit the external validity of the study. Findings cannot be generalized beyond the population of parents who enroll their children in the Battery Urban Farm Program. However, this study will serve as foundational information that may be useful in other studies in other urban cities as well as other parents who value natural environments.

Qualitative Rigor

Trustworthiness

The following threats to, as well as strategies for ensuing, the trustworthiness of this study were identified (Creswell, 2013):

- *Transferability*: The findings are more *transferable* if there is a necessary thick description of the phenomenon being studied. This occurred with direct quotes that support the thematic findings.

- *Confirmability*: Peer debriefing with the research committee members who are professional research experts at Florida Atlantic University provided appropriateness of the data collection and analysis processes. Ten to twenty percent of data interpretation was reviewed with the dissertation chair and further corroboration were sought from committee members as necessary.
- *Credibility*: The process of auditing the participating members within the semi-structured interview session make the findings confirmable. In this case, auditing offered to ongoing questioning to assure understanding of participant descriptions.

Strength and Limitation

Given the selection of immersing in nature, extraneous or confounding factors from the children's backgrounds could impact the well-being outcomes. For instance, previous or current exposures to and experiences with any outdoor-based programs, their home and school environments, or their parents' preference for or against the ideas of immersing in nature might affect or effect nature-based impacts. Those factors presumably existing in the participating parents' children compromise the quantitative data to associate the well-being impact of the concurrent state of *being* in urban natural space. Nonetheless, such raw quantitative data helped exploration rich in description, together with "descriptive evidence" (Hsieh & Shannon, 2005, p. 1282) from the qualitative data collection employed in this study. The interview method provided a qualitative view that could not be captured by solely using quantitative methods. An innovative, mixed methods approach strengthened and signified the originality of this study.

Another limitation would be that children in the sample might not have "immersed" in nature by the four-week timeframe as operationalized in this proposed

study. However, the timeframe allowed for exploration to see if that was the case through both quantitative and qualitative analyses. As this type of study appeared scarce in the field of research, on the beneficial factors of natural spaces on childhood well-being, the account from both quantitative and qualitative streams constituted a strength to give rise to a foundation to understand the nature immersion phenomenon effects on urban-dwelling children's well-being as a seminal stage for the research in future.

Summary

The data for this research study were collected and analyzed using quantitative and qualitative approaches. Through careful data preparation, the quantitative results and the qualitative themes were interfaced into meta-inferences. This methodology allowed explanatory notes regarding the factors of natural space that contributed to urban-dwelling children's well-being. The study also facilitated a preliminary examination of the existing model of nature immersion, which was built upon tenets of Nightingale.

CHAPTER FOUR. FINDINGS/RESULTS

This chapter presents as overview of the data analysis process and the findings. Data were processed sequentially with quantitative analysis first and qualitative analysis next. The data analysis addressed the study aims: 1) Identify factors predicting parental assessment of urban-dwelling children's well-being and 2) Explore the natural environment that promotes well-being of an urban-dwelling child. The quantitative stream of data presents socioeconomic information of the study sample using descriptive statistics and hypothesis testing to answer the specific research questions (RQ) with associated hypotheses (Hy) using Generalized Linear Model. Based on data from the quantitative findings, the qualitative data resulted in emerging themes that identify qualities of natural spaces that contribute to well-being for urban-dwelling children. Finally, the findings from both streams were linked to synthesize a meta-inference.

Quantitative Stream

Data Preparation

The data analysis initiated with inspecting frequencies for each variable and cleaning any missing cases using the Statistical Package for Social Sciences (SPSS) software version 25.0. A total of 192 cases were collected and scrutinized for potential errors. Cases with entry errors and missing values were identified and these cases were eliminated from the data set. Several cases met exclusion criteria related to children's age and living environment; those cases were also eliminated. As a result, there were 174 cases in the final data set.

Reliability analysis of the two instruments, Positive Affect and Life Satisfaction, was performed using Cronbach's alpha; both instruments had internal consistency of 0.98 (Appendix H, Table 5). The means of both scales' scores were slightly below the national level of 50 for Positive affect (M = 47.50) and Life Satisfaction (M = 45.87). Assumptions for Generalized Linear Model (GLM) were tested for normal distribution, outliers, linearity, and multi-collinearity. Normal distribution was observed in the histogram and the Q-Q plot of the standardized residuals for both scales, Positive Affect (Appendix H, Figure 4) and Life Satisfaction (Appendix H, Figure 5). Although slightly skewed, the plot has acceptable values of skewness and kurtosis. Likewise, normality can be assumed given the plot depicted in Figures 3 and 4. Outliers were detected on the standardized residuals for Life Satisfaction only (Appendix H, Figure 6) and eliminated from the data set. The residuals tended to bunch together (Appendix H, Figure 6). The plotting of the predicted values and residuals on the scatterplot showed curves in both scales. However, the residual dots remained in rectangular shape, indicating that equal variance is met. Nonetheless, the diagonal lines appeared to indicate the responses being bounded at the upper limit. About a 35 percent of the participants rated the maximum scores corresponding to the upper limit of both scales. In contrast, only a 0.6 percent of the responses were at the minimum scores, the lower limit of both scales. The responses thus were arbitrary in distribution. Still, the standardized-residuals were robust to the violation to other assumptions, and GLM that covers linear/non-linear and continuous/discrete responses would be employable in this study as descriptive data. The Multi-collinearity was tested with Variance Inflation Factor (VIF) (Appendix H, Table 6). The tolerance values were all above 0.2 except 4 variables (< 0.2 and > 0.1), and therefore, precaution for violation is necessary.

However, all VIF values were above 1 and below 10 indicating that the assumption is met (Field, 2013). Overall, the series of tests indicated that assumptions were generally met enabling ongoing analysis with a final dataset of 174 cases.

Demographics and Description of the Sample

The participants were the responders to the survey and well-being questionnaires from December 1, 2018 to March 31, 2019. Demographic characteristics of the sample were analyzed using descriptive statistics (Table 7). Most participants were females or mothers (84.5%) over males or fathers (15.5%). The ages of the participants ranged from 26 to 59 years with the mean age of 41.9 (SD = 6.8). Children of the participants were mostly males (73.6%) over females (26.4%). The mean age was 9.25 ranging from 3 to 13 years old. Whites (59.8%) outnumbered Blacks (29.9%) followed by Hispanics (5.7%) and Asians (4.0%). Most participants speak English (98.3%) primarily, and a few participants speak other languages: Spanish (4%), Chinese (1.8%), and German (1.7%). Christianity (73.0%) was identified most frequently, Judaism (17.8%) followed next, and Buddhism (2.9%) appeared least. The educational level varied among bachelor (44.3%), high school (20.1%), masters (19.5%), and doctoral (13.2%) level of education. Most were married (69.5%), followed by divorced (19%), widowed (2.3%), and partnered (0.6%). Socioeconomic status showed that the majority were employed (72.4%) over unemployed (21.8%). Household income dispersed widely from a value below 10,000 (0.6%) and above $210,000 (13.8%) with 29.3% reporting incomes between $30,000 to 60,000.

Table 7

Sociodemographic Characteristic of the Sample

Demographic Variable	Parents				Children			
	n	%	M	SD	n	%	M	SD
Gender								
Female	147	84.5			46	26.4		
Male	27	15.5			128	73.6		
Age			41.9	6.76			9.25	2.94
Ethnicity								
White	104	59.8			99	56.9		
Black	52	29.9			49	28.2		
Hispanic	10	5.7			11	6.3		
Asian	7	4			8	4.6		
Other	1	0.6			6	3.4		
English literacy								
Yes	171	98.3						
Primary language								
Spanish	7	4			9	5.2		
Chinese	3	1.8			2	1.1		
(Cantonese)	1	0.6			1	0.6		
(Mandarin)	1	0.6			1	0.6		
German	3	1.7			2	1.1		
(Swiss German)	2	1.1			1	0.6		
Other					1	0.6		
Religion								
Christianity	127	73			125	71.8		
Judaism	31	17.8			5	2.9		
Buddhism	5	2.9			30	17.2		
Islam	0	0			0	0		
Other	11	6.3			13	7.5		
Highest Education								
High school	35	20.1						
Bachelor	77	44.3						
Master	34	19.5						

Doctorate	23	13.2
Other	4	2.3
Marital status		
Married	121	69.5
Divorced	33	19
Widowed	4	2.3
Living with partner	1	0.6
Other	15	8.6
Employment		
Yes	126	72.4
No	38	21.8
Household income		
Below 10,000	1	0.6
10,000 to 30,000	25	14.4
30,000 to 60,000	51	29.3
60,000 to 90,000	16	9.2
90,000 to 120, 000	8	4.6
120,000 to 150,000	12	6.9
150,000 to 180,000	8	4.6
180,000 to 210,000	28	16.1
Above 210,000	24	13.8

Battery Urban Farm (BUF) Programs Joined by Children

Children of most participants joined Staff-led Field Trips (99.3%) over Self-led Field Trips (0.7%) at BUF, according to survey respondents (N = 142) (Appendix I, Table 8). “Water Quality of the Hudson” was the most visited BUF program with

16% of participants reporting this program. “Oyster Farming” (9%) and “Aquatic Life of the Hudson” (2%) were among other blue space related BUF programs visited by children in this study. For green space related programs, “Summer Exploration” (11.3%), Different Types of Farmers (10.6%), and Eating the Rainbow (8.5%) were the three most highly visited.

Green Spaces Visited by Children

Respondents of the survey question regarding green space (N = 138) reported numerous different parks and places (Appendix I, Table 9). “Central Park” appeared to be the most visited green space by children (9.8%), which was followed by “Battery Urban Park” (5.7%) and “Teardrop Park” (4.6%). However, about 32.6% of respondents did not specify the name of parks or places, answering the question as public parks of New York City.

Blue Spaces Visited by Children

Compared to BUF and green space, less respondents (N = 58) answered the survey question regarding blue space (Appendix I, Table 10). “Hudson River (Promenade)” appeared to be the most single outstanding blue space visited by children (13.2%), followed by “East River (Esplanade),” the second most visited blue space (5.1%). Due to the smaller number of responses, blue space was presumed to be less popular for the sample of this study. The number of responses (n = 75) surpassed the number of participating parents (N = 58) who addressed blue spaces, which indicates that children had a tendency to visit more than one blue space.

Quantitative Findings

Specific Research Questions (RQ) 1 with Associated Hypothesis (Hy) 1

RQ 1: What is the relationship between urban farm visiting and parental report of child well-being.

Hy 1: There will be a significant relationship between urban farm visiting and parental report of child well-being.

Generalized Linear Model was used to answer this question. First, children's well-being measured by Positive Affect was analyzed. There were three independent variables: frequency of visit to Battery Urban Farm (BUF), length of each visit time at BUF, and overall timeframe for visits to BUF. These urban farm environmental factors (*frequency of visit; length of each visit time; overall timeframe for visits*) had a significant relationship with probability of Positive Affect (Likelihood $\chi^2 = 74.79$, df = 3, $p < 0.001$) (Table 11). Shorter length of each visit time ($p < 0.001$) and longer overall timeframe for visits ($p < 0.001$) significantly contributed to predicting higher child well-being as measured by Positive Affect.

Table 11

Parameter Estimates of a Battery Urban Farm Visitation Model for Parental Assessment of Child Well-being in Positive Affect

			95% Wald CI		Hypothesis Test		
Parameter	β	SE	Lower	Upper	Wald χ^2	df	Sig.
(Intercept)	69.55	5.98	57.84	81.27	135.43	1	0
Frequency of visit	-2.78	1.95	-6.6	1.04	2.04	1	0.15
Length of each visit time	-10.16	1.75	-13.58	-6.74	33.89	1	0
Overall timeframe for visits	6.28	1.18	3.96	8.6	28.13	1	0

Note. Likelihood $\chi^2 = 74.79$, df = 3, $p < 0.001$

Post-hoc analysis (Appendix J, Table 12) indicated that significantly lower Positive Affect was predicted by the factor of overall timeframe for visits ranging from only one time ($p < 0.001$) to less than one month ($p < 0.05$).

Second, children's well-being measured by Life Satisfaction was analyzed. These urban farm environmental factors (*frequency of visit; length of each visit time; overall timeframe for visits*) had a significant relationship with Life Satisfaction (Likelihood $\chi^2 = 71.08$, df = 3, $p < 0.001$) (Table 13). Shorter length of each visit time ($p < 0.001$) and longer overall timeframe for visits ($p < 0.001$) significantly contributed to predicting higher Life Satisfaction.

Table 13

Parameter Estimates of a Battery Urban Farm Visitation Model for Parental Assessment of Child Well-being in Life Satisfaction

			95% Wald CI		Hypothesis Test		
Parameter	β	SE	Lower	Upper	Wald χ^2	df	Sig.
(Intercept)	62.31	5.26	51.99	72.63	140.16	1	0
Frequency of visit	-1.8	1.65	-5.03	1.44	1.18	1	0.28
Length of each visit time	-8.06	1.54	-11.08	-5.04	27.33	1	0
Overall timeframe for visits	5.09	1.01	3.1	7.07	25.2	1	0

Note. Likelihood $\chi^2 = 71.08$, df = 3, $p < 0.001$

Post-hoc analysis (Appendix J, Table 14) indicated that significantly lower Life Satisfaction was predicted by more than three hours of the length of each visit time ($p < 0.001$) and only one time visit of the overall timeframe ($p < 0.05$).

In summary, shorter length of each visit time and longer overall timeframe for visits to the urban farm were the impactful predictors of higher child well-being in both Positive Affect and Life Satisfaction.

Specific Research Questions (RQ) 2 with Associated Hypothesis (Hy) 2

RQ 2: What is the relationship between green space visiting and parental report of child well-being.

Hy 2: There will be a significant relationship between green space visiting and parental report of child well-being.

These green space environmental factors (*frequency of visit; length of each visit time; overall timeframe for visits*) had a significant relationship with Positive Affect (Likelihood $\chi^2 = 70.52$, df = 3, $p < 0.001$) (Table 15). Higher frequencies of visit ($p < 0.001$) and shorter length of each visit time ($p < 0.05$) significantly contributed to predicting higher Positive Affect.

Table 15

Parameter Estimates of a Green Space Visitation Model for Parental Assessment of Child Well-being in Positive Affect

			95% Wald CI		Hypothesis Test		
Parameter	β	SE	Lower	Upper	Wald χ^2	df	Sig.
(Intercept)	36.42	7.35	22	50.83	24.52	1	0
Frequency of visit	7.86	1.01	5.87	9.85	60.03	1	0
Length of each visit time	-3.31	1.25	-5.76	-0.86	7	1	0.01
Overall timeframe for visits	-0.71	1.09	-2.85	1.43	0.43	1	0.51

Note. Likelihood $\chi^2 = 70.52$, df = 3, $p < 0.001$

Post-hoc analysis (Appendix J, Table 16) indicated that higher Positive Affect was predicted as the frequency of visit to green space increased from once a month ($p < 0.001$) to once every two weeks ($p < 0.001$) to once a week ($p < 0.001$).

These green space environmental factors (*frequency of visit; length of each visit time; overall timeframe for visits*) had a significant relationship with Life Satisfaction (Likelihood $\chi^2 = 63.8$, df = 3, $p < 0.001$) (Table 17). Higher frequencies of visit ($p < 0.001$) significantly contributed to predicting higher Life Satisfaction.

Table 17

Parameter Estimates of a Green Space Visitation Model for Parental Assessment of Child Well-being in Life Satisfaction

			95% Wald CI		Hypothesis Test		
Parameter	β	SE	Lower	Upper	Wald χ^2	df	Sig.
(Intercept)	28.54	6.96	14.9	42.18	16.82	1	0
Frequency of visit	6.66	0.89	4.92	8.4	56.09	1	0
Length of each visit time	-1.9	1.11	-4.07	0.27	2.95	1	0.09
Overall timeframe for visits	0.29	0.99	-1.65	2.24	0.09	1	0.77

Note. Likelihood $\chi^2 = 63.8$, df = 3, $p < 0.001$

Post-hoc analysis (Appendix J, Table 18) indicated that higher Life Satisfaction child well-being was predicted as the frequency of visits to green space increased from once a month ($p < 0.001$) to once every two weeks ($p < 0.001$) to once a week ($p < 0.05$).

In summary, higher frequencies of visit and shorter length of each visit time to green space were the impactful predictors of higher child well-being in Positive Affect whereas higher frequencies of visit to green space solely was the impactful predictors in Life Satisfaction.

Specific Research Questions (RQ) 3 with Associated Hypothesis (Hy) 3

RQ 3: What is the relationship between blue space visiting and parental report of child well-being.

Hy 3: There will be a significant relationship between blue space visiting and parental report of child well-being.

These blue space environmental factors (*frequency of visit; length of each visit time; overall timeframe for visits*) had a significant relationship Positive Affect (Likelihood $\chi^2 = 18.54$, df = 3, $p < 0.001$) (Table 19). Higher frequencies of visit significantly contributed to predicting higher Positive Affect ($p < 0.05$).

Table 19

Parameter Estimates of a Blue Space Visitation Model for Parental Assessment of Child Well-being in Positive Affect

			95% Wald CI				
Parameter	β	SE	Lower	Upper	Wald χ^2	df	Sig.
(Intercept)	35.27	6.67	22.2	48.34	27.96	1	0
Frequency of visit	3.61	1.05	1.546	5.68	11.74	1	0
Length of each visit time	1.23	1.24	-1.197	3.66	0.99	1	0.32
Overall timeframe for visits	0.99	1.11	-1.191	3.16	0.79	1	0.38

Note. Likelihood $\chi^2 = 18.54$, df = 3, $p < 0.001$

Post-hoc analysis (Appendix J, Table 20) indicated that significantly lower Positive Affect was predicted by the visitation frequency factor ranging from less than once a month ($p < 0.05$) to once a month ($p < 0.001$).

These blue space environmental factors (*frequency of visit; length of each visit time; overall timeframe for visits*) had a significant relationship with Life Satisfaction

(Likelihood $\chi^2 = 16.7$, df = 3, $p < 0.001$) (Table 21). Longer overall timeframe for visits significantly contributed to predicting higher Life Satisfaction ($p < 0.05$).

Table 21

Parameter Estimates of a Blue Space Visitation Model for Parental Assessment of Child Well-being in Life Satisfaction

			95% Wald CI		Hypothesis Test		
Parameter	β	SE	Lower	Upper	Wald χ^2	df	Sig.
(Intercept)	28.77	6.38	16.26	41.27	20.32	1	0
Frequency of visit	0.79	0.88	-0.94	2.52	0.8	1	0.37
Length of each visit time	1.76	1.09	-0.37	3.89	2.63	1	0.11
Overall timeframe for visits	3.18	0.1	1.22	5.14	10.14	1	0

Note. Likelihood $\chi^2 = 16.7$, df = 3, $p < 0.001$

Post-hoc analysis (Appendix J, Table 22) showed that the factor of overall timeframe for visits indicated lower Life Satisfaction when visits ranged from less than one month ($p < 0.05$) and two months ($p < 0.05$).

In summary, higher frequencies of visit to blue space was the impactful predictor of higher child well-being in Positive Affect whereas longer overall timeframe for visits to blue space were the impactful predictor in Life Satisfaction.

Specific Research Questions (RQ) 4 with Associated Hypothesis (Hy) 4

RQ 4: What is the relationship between residential proximity to most frequently visited natural environment (most highly rated space when calculating *frequency X time X overall time frame*) and parental report of child well-being.

Hy 4: There will be a significant relationship between the residential proximity to the most frequently visited natural environment and parental report of child well-being.

In order to answer this RQ, a frequency table for visitation to each natural space was created (Table 23). As a result, green space turns out to be the most frequently visited natural environment (Multiplied Mean = 75.22, Multiplied Median = 81) over Battery Urban Farm (Multiplied Mean = 20.66, Multiplied Median = 13.5) and blue space (Multiplied Mean = 65.98, Multiplied Median = 72).

Table 23

Mean, Median and Standard Deviation of Visitation to the Farm and Natural Spaces

Variable	n	Mean	Median	SD
Frequency of visit to Battery Urban Farm	163	1.6	1	1.1
Length of each visit time at Battery Urban Farm	164	3.26	3	0.63
Overall timeframe for visits at Battery Urban Farm	163	3.96	4.5	1.25
Frequency of visit to green space	138	3.96	4.5	1.25
Length of each visit time at green space	139	3.38	3	0.97
Overall timeframe for visits at green space	127	5,62	6	1.11
Frequency of visit to blue space	61	3.51	4	1.58
Length of each visit time at blue space	61	3.52	3	1.15
Overall timeframe for visits at blue space	61	5.34	6	1.45

The residential-proximity-to-green-space factor had a significant relationship with Positive Affect (Likelihood $\chi^2 = 59.34$, df = 1, $p < 0.001$) (Table 24). Shorter residential distance to green space significantly contributed to predicting higher Positive Affect ($p < 0.001$).

Table 24

Parameter Estimates of a Residential-Proximity-to-Green-Space Model for Parental Assessment of Child Well-being in Positive Affect

			95% Wald CI		Hypothesis Test		
Parameter	β	SE	Lower	Upper	Wald χ^2	df	Sig.
(Intercept)	71.55	2.68	66.3	76.8	713.65	1	0.00
Residential proximity to green space	-6.98	0.81	-8.57	-5.39	74.27	1	0.00

Note. Likelihood $\chi^2 = 59.34$, df = 1, $p < 0.001$

Post-hoc analysis (Appendix J, Table 25) indicated that significantly higher Positive Affect was predicted as the residential proximity to green space shortened from three miles ($p < 0.001$) to two miles ($p < 0.001$).

The residential-proximity-to-green-space factor had a significant relationship with Life Satisfaction (Likelihood $\chi^2 = 57.57$, df = 1, $p < 0.001$) (Table 26). Shorter residential distance to green space significantly contributed to predicting higher child well-being in Life Satisfaction ($p < 0.001$).

Table 26

Parameter Estimates of a Residential-Proximity-to-Green-Space Model for Parental Assessment of Child Well-being in Life Satisfaction

			95% Wald CI		Hypothesis Test		
Parameter	β	SE	Lower	Upper	Wald χ^2	df	Sig.
(Intercept)	66.58	2.25	62.16	70.1	871.99	1	0.00
Residential proximity to green space	-5.89	0.69	-7.25	-4.53	72.03	1	0.00

Note. Likelihood $\chi^2 = 57.57$, df = 1, $p < 0.001$

Post-hoc analysis (Appendix J, Table 27) indicated that significantly higher Life Satisfaction was predicted as the residential proximity to green space shortened from three miles ($p < 0.001$) to two miles ($p < 0.001$).

In summary, shorter residential proximity to green space was the impactful predictor of higher child well-being in both Positive Affect and Life Satisfaction.

Specific Research Questions (RQ) 5 with Associated Hypothesis (Hy) 5

RQ 5: What is the relationship between parental assessment of the importance of the most frequently visited natural environment (most highly rated environment when calculating *frequency X time X overall time frame*) and parental report of child well-being.

Hy 5: There will be a significant relationship between parental assessment of the importance of the most frequently visited natural environment and parental report of child well-being.

From RQ 4, green space (GS) was the most frequently visited natural environment, and parental importance of GS was analyzed to answer RQ 5. The parental-rating-of-importance-of-green-space factor had a significant relationship with Positive Affect (Likelihood $\chi^2 = 173.50$, df = 1, $p < 0.001$) (Table 28). Higher parental rating of importance of green space significantly contributed to predicting higher Positive Affect ($p < 0.001$).

Table 28

Parameter Estimates of a Parental-Rating-of Importance-of-Green-Space Model for Parental Assessment of Child Well-being in Positive Affect

			95% Wald CI		Hypothesis Test		
Parameter	β	SE	Lower	Upper	Wald χ^2	df	Sig.
(Intercept)	2.16	2.72	-3.18	7.49	0.63	1	0.43

Parental Rating of Importance of Green Space	13.64	0.74	12.19	15.09	339.87	1	0

Note. Likelihood $\chi^2 = 173.50$, df = 1, $p < 0.001$

Post-hoc analysis (Appendix J, Table 29) indicated that significantly higher Positive Affect was predicted as parental rating of importance of green space rose from slight importance ($p < 0.001$) to importance ($p < 0.001$).

The parental-rating-of-importance-of-green-space factor had a significant relationship with probability of Life Satisfaction (Likelihood $\chi^2 = 169.74$, df = 1, $p < 0.001$) (Table 30). Higher parental rating of importance of green space significantly contributed to predicting higher Life Satisfaction ($p < 0.001$).

Table 30

Detailed Parameter Estimates of a Parental-Rating-of Importance-of-Green-Space Model for Parental Assessment of Child Well-being in Life Satisfaction

			95% Wald CI		Hypothesis Test		
Parameter	β	SE	Lower	Upper	Wald χ^2	df	Sig.
(Intercept)	7.75	2.35	3.15	12.34	10.91	1	0.00
Parental Ratings of Importance of Green Space	11.51	0.63	10.28	12.75	334.13	1	0.00

Note. Likelihood $\chi^2 = 169.74$, df = 1, $p < 0.001$

Post-hoc analysis (Appendix J, Table 31) indicated that significantly higher child Life Satisfaction was predicted as parental rating of importance of green space rose from slight importance ($p < 0.001$) to importance ($p < 0.001$).

In summary, higher parental rating of importance of green space was an impactful predictor of child well-being in both Positive Affect and Life Satisfaction.

Specific Research Questions (RQ) 6 with Associated Hypothesis (Hy) 6

RQ 6: How do environmental factors (urban farm visiting, green space visiting, blue space visiting, residential proximity to natural environment and parental assessment of importance of natural environment), compared to parental socioeconomic factors, predict parental report of child well-being?

Hy 6: Factors related to being in a natural environment rather than parental socioeconomic factors will predict parental report of child well-being.

The main factors (urban farm visiting, green space visiting, blue space visiting, residential proximity to natural environment and parental assessment of importance of natural environment) were entered for analysis with parental socioeconomic status, another impacting factor that was noted from literature review. The two variables related to parental socioeconomic status, parental employment (survey question 9) and household income (survey question 10), were entered for the second step of this analysis.

All environmental factors and parental socioeconomic status factors had a significant relationship with Positive Affect (Likelihood χ^2 =53.86, df = 17, $p <$ 0.001) (Table 32). Higher parental rating of importance of the urban farm ($p < 0.001$) was the most contributive factor to predicting higher Positive Affect, followed by higher frequencies of visit to green space ($p < 0.05$), shorter residential proximity to blue space ($p < 0.05$), and higher parental household income ($p < 0.05$).

Table 32

Parameter Estimates of a Natural Space Visitation Model for Parental Assessment of Child Well-being in Positive Affect

			95% Wald CI		Hypothesis Test		
Parameter	β	SE	Lower	Upper	Wald χ^2	df	Sig.
(Intercept)	19.22	13.95	-8.13	46.56	1.90	1	0.17

Frequency of visit to urban farm	-1.71	2.06	-5.73	2.32	0.69	1	0.41
Length of each visit time to urban farm	-1.94	1.95	-5.75	1.88	0.99	1	0.32
Overall timeframe for visits to urban farm	0.13	1.39	-2.60	2.86	0.01	1	0.93
Residential proximity to urban farm	-0.89	1.11	-3.06	1.29	0.64	1	0.43
Parental rating of importance of urban farm	5.53	1.79	2.01	9.04	9.50	1	0.00
Frequency of visit to green space	5.20	1.83	1.61	8.80	8.04	1	0.01
Length of each visit time to green space	3.64	2.12	-0.52	7.80	2.94	1	0.09
Overall timeframe for visits to green space	-2.31	2.45	-7.11	2.50	0.88	1	0.35
Residential proximity to green space	0.51	1.17	-1.79	2.81	0.19	1	0.67
Parental rating of importance of green space	-1.82	2.67	-7.06	3.41	0.47	1	0.50
Frequency of visit to blue space	0.07	1.26	-2.39	2.54	0.00	1	0.95

Length of each visit time to blue space	2.18	1.33	-0.42	4.79	2.69	1	0.10
Overall timeframe for visits to blue space	-1.03	1.75	-4.45	2.40	0.35	1	0.56
Residential proximity to blue space	-3.09	1.34	-5.70	-0.47	5.34	1	0.02
Parental rating of importance of blue space	4.92	2.75	-0.48	10.32	3.19	1	0.07
Parental employment	-5.08	3.42	-11.77	1.62	2.21	1	0.14
Household income	1.71	0.61	0.51	2.91	7.75	1	0.01

Note. Likelihood $\chi^2 = 53.86$, df = 17, $p < 0.001$, Pearson $\chi^2 = 2019.63$, df = 27

The environmental factors altogether rather than parental socioeconomic status factors alone contributed to predicting significantly higher Positive Affect (Pearson $\chi^2 = 22644.99$, df = 129, $p < 0.001$) (Appendix J, Table 33). The result was computed from an online software, "*p* value from Chi-Square calculator" which was available at a public domain, https://www.socscistatistics.com/pvalues/chidistribution.aspx (Social Science Statistics, n. d). The deviance values of Goodness of Fit (Pearson χ^2) and df between the environmental factors altogether and parental socioeconomic status factors were entered at the significance level for this computation.

All environmental factors and parental socioeconomic status factors had significant relationship with Life Satisfaction (Likelihood $\chi^2 = 63.2$, df = 17, $p < 0.001$) (Table 34). Higher parental rating of importance of the urban farm ($p < 0.001$)

and higher household income ($p < 0.001$) significantly contributed to predicting higher Life Satisfaction.

Table 34

Parameter Estimates of a Natural Space Visitation Model for Parental Assessment of Child Well-being in Life Satisfaction

			95% Wald CI		Hypothesis Test		
Parameter	β	SE	Lower	Upper	Wald χ^2	df	Sig.
(Intercept)	-14	13.03	-39.54	11.53	1.16	1	0.28
Frequency of visit to urban farm	-0.7	1.66	-3.94	2.55	0.18	1	0.67
Length of each visit time to urban farm	0.01	1.69	-3.31	3.33	0	1	0.1
Overall timeframe for visits to urban farm	-0.19	1.12	-2.38	2	0.03	1	0.87
Residential proximity to urban farm	-0.64	0.89	-2.39	1.11	0.51	1	0.47
Parental rating of importance of urban farm	4.67	1.44	1.85	7.49	10.52	1	0
Frequency of visit to green space	2.49	1.47	-0.4	5.38	2.86	1	0.09
Length of each visit time to green space	1.3	1.73	-2.08	4.69	0.57	1	0.45
Overall timeframe for visits to green space	3.22	2.24	-1.17	7.6	2.07	1	0.15

Residential proximity to green space	1.27	0.94	-0.58	3.12	1.82	1	0.18
Parental rating of importance of green space	3.29	2.27	-1.16	7.74	2.11	1	0.15
Frequency of visit to blue space	-1.16	0.94	-3	0.683	1.521	1	0.21
Length of each visit time to blue space	1.72	1.08	-0.39	3.83	2.56	1	0.11
Overall timeframe for visits to blue space	0.19	1.41	-2.57	2.95	0.02	1	0.89
Residential proximity to blue space	-1.17	1.1	-3.32	0.99	1.12	1	0.29
Parental rating of importance of blue space	-0.13	2.47	-4.96	4.71	0	1	0.96
Parental employment	-2.06	2.73	-7.4	3.29	0.57	1	0.45
Household income	1.55	0.49	0.58	2.52	9.78	1	0

Note. Likelihood $\chi^2 = 63.2$, df = 17, $p < 0.001$, Pearson $\chi^2 = 1303.17$, df = 27

The environmental factors altogether rather than parental socioeconomic status factors alone contributed significantly higher Life Satisfaction (Pearson $\chi^2 = 15780.98$, df = 126, $p < 0.001$) (Appendix J, Table 35). The result was computed following the same procedure which was employed in Positive Affect.

In summary, higher parental rating of importance of the urban farm was the single most impactful predictor of higher child well-being in both Positive Affect and Life Satisfaction. Higher parental household income was impactful yet the environmental factors altogether rather than parental socioeconomic status alone contributed to probability of predicting significantly higher child well-being in both Positive Affect and Life Satisfaction.

Inferences from Quantitative Results

The following report of inferences identified child well-being when both Positive Affect and Life Satisfaction were impacted. Significant factors related to green space were taken into account as green space was the most frequently visited natural space.

- Higher parental rating of importance of the urban farm or green space
- Shorter length of each visit time to the urban farm or green space
- Longer overall timeframe for visits to the urban farm
- Higher frequencies of visit to green space
- Shorter residential proximity to green space

Qualitative Stream

Data Preparation

The qualitative data were collected from semi-structured interviews guided by one Qualitative Research Question: How do parents describe the natural environment that most effectively promotes well-being for their urban-dwelling child? The qualitative data using tape-recordings was transcribed. The transcribed data were, then, mapped using a software, NVivo version 11.4.0.

Demographics and Description of the Participant

Fifteen participants or 8.6 % of the quantitative sample population completed the semi-structured interviews. All of the participants engaged in the face to face interview at the urban farm where the participants could be comfortable and relaxed. The children of the participants were aged from three to twelve years old. The breakdown of the children's age is: five 8-year-old children, two 5-year-old children, two 12-year-old children and one 3-, 4-, 6-, 7-, 9-, and 10-year-old child.

Qualitative Findings

Conventional or inductive content analysis was used to explore the data related to the context of well-being. Three themes emerged (Appendix K): Short-lived but Expansive Nature Exposure, 2) Learning and Caring Hubs, and 3) Integration that Creates Oasis.

Short-lived but Expansive Nature Exposure

Short-lived but Expansive Nature Exposure is convenient immersion in natural spaces that enables a healthy breather even if short lived. Natural spaces where urban children could visit at will for even a brief moment appeared to contribute to child well-being. A short time visiting to near-by natural environments appeared to be most convenient for urban lifestyles and settings. One participant who was talking about a day camp said that "it allows campers to go home each afternoon. She can experience and expose to nature in the morning and be back to the urban life in the afternoon. She doesn't need to spend a whole week or a month by a mountain or river. Only a few hours of time. Disconnecting from the daily routine a bit can help her grow in something that she cannot do so otherwise." Short time visits to natural spaces conveniently met the daily schedule of urban children for temporary relief from every day intensity. One mother, when speaking about a most beautiful space said, "I think

this park has the most shrubberies, trees with plenty of green foliage providing temporary relief from the purgatory blazing heat and sun for shade. I don't know why, but this park is probably at least not widely known even by native New Yorkers. So, it is quiet to have a short comfy break or rest." Contrasting with urban asphalt, natural spaces temporarily relieved urban children from physical and psychological stresses.

Some participants said that a short period of time to visit natural spaces prevented a hyperactive child from getting physically exhausted. A father of an 8-year-old boy said, "hyperactive persons like my son can get easily exhausted by spending too much in nature. So, being longer in a natural environment doesn't mean to give him higher quality of well-being." A participant called a short time visiting to natural spaces "a small dose of exposure to nature." "You want well-being but not exhaustion from being in nature. Like some folks said, it's good to have a small dose of exposure to nature, little by little, everyday rather than big doses. Little things do the big things. That makes more sense to me." The small dose of exposure to nature literally rescued some children according to their parents.

The short time visiting to natural spaces brought some adolescent children a brief but effective experience of well-being. A mother of a 12 year-old boy expressed her son's transient well-being experience from briefly visiting a park. The park was filled with blossoms of cherry trees that to her symbolized the son's transient well-being like the transient existence of cherry blossoms. "But when it comes to the season of blossom, oh my…it is wordless. It is so beautiful. And it is so transient. Its beauty is just lasting in a few days. Lasting only for a short time makes us think of anything so impermanent. That is like my son's well-being, too. It is very brief. Transient. But he gets the well-being when he goes across the park. I can read that from his face. Maybe that his well-being, happy, really relaxed face lasts for a few

moments with the cherry trees with lots of blossoms." The short time visiting brought a sense of well-being in spite of the short time.

The school-aged children's well-being appeared to be more complicated with life- and school-related situations. "But real happiness isn't that simple, is it? Maybe the best way to say about that is a temporary well-being. If my son has some difficult situations at home or school, for instance, he cannot be easily refreshed even after contacting with nature. He can be refreshed a bit a while, though, during the time he spent on nature." The statement implies that the child well-being occurred briefly while the child was disconnected from the situations involving stressful time that may have happened at school or home.

Some school-aged students preferred to have a nature exposure outside of school time. One mother said, "I think that only brief time spending at the natural space like the esplanade makes his day a bit smoother. Oh, I almost forgot… I have to say. Another thing that I noticed about this, his routine business to the esplanade is that he goes there alone." On the contrary, other school-aged students preferred to have a short nature exposure within school activities. A 12 year-old student had "a dose of well-being" when he had an opportunity to have a microscopic observation of natural space. He was interested in microscopic views of natural materials that his class offered. The class activities fit his interest in nature. His parent shared, "He was using elementary microscopes to see the organisms close up and identify their energy source and how it is transformed into energy. It was really cool. There was a micro world within the macro world of our own in this cosmos…It really gives my son a dose of well-being. Even it is occurring temporarily." Even small doses of exposure to natural spaces, whether inside or outside the school, were capable of generating child well-being if the child stay tuned to natural materials.

Learning and Caring Hubs

Learning and Caring Hubs are community natural spaces capable of organically integrating teaching, learning, and love. Natural spaces where there were interactive, hands-on, and direct interplays of teaching-learning between adults and children had the capacity to generate child well-being. These natural spaces were supportive and promoted ease for visiting children. One parent said, "The natural environments like the Riverside Park are taking a new role of parenting my daughter, on behalf of us. I mean that the natural environments literally are taking care of my daughter. The natural environments can raise and refresh my daughter." The caring capacity of natural spaces appeared to be an element of child well-being. One suggested that the caring capacity of natural spaces could be beneficial to not only individuals but collective well-being of urban-dwelling children. Natural spaces could function as a communal network as a hub for educational information for children and parents: "If natural environment like the one at the Battery farm can support more kids around the city, the place becomes a hub for health education and information. If the farm is the hub for well-being, isn't it great?" An urban natural space that functioned as a hub for parental education was desired for both individual and communal well-being.

More participants identified the "caring" capacity of natural spaces beyond individual benefits. One participant said, "Nature can be taking a new age parenting role. I am hoping this way of parenting can be some sort of initiation to build a community for children's well-being." One parent said that the natural environments can even be building blocks of a caring community, "a gift." "That was a gift from the Battery. Like my daughter, there might be a child who in addition to the parents can be helped. I think the existence of a caring community, a compassionate community is

really important." The urban natural space with a spirit of caring could generate quality child well-being.

The children started to touch a spirit of caring by learning about interconnection of all natural materials around natural spaces. "The lesson was about the situation that we humanely interact with live animals from Hudson River…with fish, mud crabs, shrimp, snails, and so on…As we know that we all are interconnected in the food web or some webs in this cosmic universe." Some school aged children noticed the interconnection of nature and humans, which were reinforced by nature's secret patterns found in blue space. One father commented, "The students collected many shells at the beach. The shells are formed in spiral pattern. Then they were wondering why they can find those patterns in nature here and there…noticing Fibonacci patterns everywhere. It was mystery to them hidden deeper in nature. Secret." The patterns shared with all natural materials were evident to children's eyes indicating interconnectedness within and beyond natural spaces.

There was increasing awareness of co-existence and interconnectedness of nature and humans, which cultivated children's way to think about a spirit of caring. "Nature and humans are similar in respect to their precious existence. Both help each other. Teamwork. The children are now learning about that complex network of teamwork from nature, too. Battery Urban Farm's program with insect study taught the children about how different bugs do the different jobs to help gardens grow. There are works of pollinators, predators, aerators and so many others." Children became more aware that they were part of a community: "After all, the natural environments really gave her a sense of being part of something….something bigger than herself, that is even beyond my husband and I, the community and society."

Children's immersion with nature was a "something bigger" experience, which was reported as "unconditional love" that promoted child well-being. Nature's unconditional love was expressed as it encompassed a child in harmony. The mother of the 8 year-old girl reported, "Her new harmony was allowed to bring about in the natural environments. With yes unconditional love. That was as if she was hugged by love from nature. Love of harmony or bigger and higher dimensional worlds like the natural worlds that allowed her to behave anything she wants. That was a really big love." The children could be inspired in wonder, awe, and the totality of love from nature. The harmony appeared to be an essence of child well-being, and the natural space was found to be capable to generate the harmony.

Some parents expressed the nature of unconditional love in different words. One reported that "nature never asks us in return. It is absolutely unconditional. Always nature welcomes. Wholehearted, absolute, complete. People in this today's generation are missing this type of love. That is invisible but may be more visible in nature or natural environments. Maybe some sensitive persons or kids can feel it. Especially those who are vulnerable needs desperately the unconditional love." The urban natural space appeared to be a pleasant and peaceful zone that could nest children in the midst of a difficult situation. Another said, "Nature is so luxury. It is free to anyone. It is gentle to be available for everyone. Children feel this greatness, a gift from nature in some levels. That is why my daughter is a frequent flyer to the Riverside Park. She is only 5 years old, but she goes by herself or with my wife so often. Just like it is the place of oasis in the midst of a desert. Every time she goes to the park, her thirsty is quenched enough to make another adventure in her life." The child's vulnerability was allowed to express and welcomed in nature immersion.

Children also learned to share love with natural materials. A 9 year-old girl learned unconditional love in a cycle of raising and harvesting plants and vegetables, which in turn nourished humans. Her father said, “Of course, the food preparation from harvesting takes lots of love to take care and spend with them. It all includes continuous and meticulous work of how to prepare the soil for new plants. It’s a continuous cycle of preparation and attention. It requires a type of love to pour over the soul of natural materials like the water to pour over the plants and soil. She always asked me how much time to take care of the veggie to grow into adults. But she knew the answer. She said to me, how to take care is how much to love because she thinks nothing can grow well without love.” The feelings of love from nature harmonized a way for the child to connect with natural materials. Taking care of natural materials reciprocally took care of the child. Nature immersion allowed a nature-and-child mutual interplay of unconditional love to occur.

Nature-child mutual interplays appeared to continue and endure with a hub that was performed with farm educators. The farm educators’ performance was interactive rather than instructive. “We need that kind of interactive environments that have supporters. Someone with experience is good, not necessarily someone with education. Again, it’s not about righteousness or religious preach, you know. It is about life story – the storytelling. I love love this.” The farm educators’ performance was age-appropriate and sensitive to different developmental stages of children with all the sensory system utilized. “The Battery farm teachers really did wonderful jobs. If they didn’t demonstrate how the lavender leaves would give us a scent between the kids’ fingers rubbing them, they couldn’t have known anything about it. My daughter cannot learn without them.” Another child experienced a joy of gastronomy. “This whole process of grabbing the harvests to serving them in the plate really shocked her

out…The salad was made of a variety of colors of nature. That was very appealing. That was so very like a rainbow."

There were unique, interactive hubs at urban natural spaces. Nature-child mutual interplays at the hubs sprouted children's surprise and sensitivity. The organic quality of nature-child mutual interplays was made possible with those natural spaces that were well-organized and according to the report of parents: "The program itself was organized even though it did not seem to be. That was not just to let kids play. No, no, no. It was organized in a way that kids reflected on what they have made in learning." A well-organized program that fostered nature-child mutual interplay appeared to be critical for building a caring hub for child well-being in the urban community.

Integration that Creates Oasis

Integration That Creates Oasis is the coexistence of city elements with natural elements to create a gentle oasis that provides a sense of acceptance, safety, and connection. Participants mentioned the integration of natural and urban spaces as well as blue and green spaces. The integration was found to be promoting child well-being. Further, the integration was characterized by three qualities: urban oasis, safety and cleanness, and eco-gentleness.

First, the urban-nature integration occurred in one of the most bustling urban cities. "While enjoying the convenience of living in the urbanized space, we also can enjoy the natural space. Not either one, but both. This kind mixture is apparently demanded." Another said, "My daughter is lucky enough to get exposed to the hint of a good mixture of nature and urbanized civilization, per se." This participant noted a park of urban-nature integration in Manhattan called Teardrop Park. "Rockefeller Park is usually compared to Teardrop Park in parallel. "I heard that Teardrop Park

was constructed with an emphasis of nature, compared to its counterpart park, Rockefeller Park. So, you see lots of reservation and conservation of nature. It is very integrative of nature and urbanization." Teardrop Park is intentionally integrated with natural materials. "The park provides natural materials – the water fall, plants, rock, sand, and more…The park is usually jammed with many children and parents. It is almost always impressive with its architect design and (it is) loved so much as one of the successful parks I believe. For instance, there are shadier areas with active playground featuring many interesting, beautiful materials of nature, like a broad lawn, a small wetland path, a water source running through rock walls…With its artistic style and aesthetically pleasing to the mind and eye, you and your child can spend a whole day there without even realizing that you are in New York City."

The well-built and well-planned urban-nature landscape integration had elements of eco-conscious philosophy and science, which allowed children safe and clean natural spaces. The aspect of safety and cleanliness appeared to promoted child well-being. One parent said, "Always, safety is critical and becomes issue in school for kids like my son's age. Safety is the priority." Another participant mentioned about a New York City's park called Sakura Park that typified the spirit of cleanliness. "The park is really treated well. You can tell. It is clean. No littering around with trashes that you can see the streets. It is historical. Some time ago, the emperor of Japan also donated a garden lantern made of stone…That stood solitarily. The New York City is a sister city of Tokyo."

Well-integrated natural spaces in hustle and bustle streets appeared to become a refuge or an oasis for urban children. One parent said, "I would say, this is an awesome spot when you wanna step off the faux bustle streets and into nature but don't wanna make a commitment of going along the Hudson. It's certainly a nice little

refuge." Many identified Teardrop Park as an oasis. "But in terms of my daughter's well-being…Teardrop Park may be better. It is an original and signature park in New York City. It is a hidden gem. Or it is a hidden oasis. Hidden in the deep inside the Wall street buildings, the hub of business, and yuppie residential high-rise apartments. Here it is, the park of nature." The hidden oasis seemed to be well fitted to serve some immediate needs of urban children. From the parents' perspective, it thus promoted child well-being.

The idea of integration was not only with green space but blue space, too. Manhattan's urban landscape that is surrounded by water in all directions generated varied types of integration of natural spaces. A few participants described the powerful combination of blue and green spaces. "It's not only the blue space on the esplanade walkway. The pathway meets a wonderful green space, too. So, the blue meets the green. There are connections of both spaces, an integration of blue and green spaces along this Eastside Esplanade." The green-blue landscape created a space that provoked a sense of well-being. "Picturesque views of the East River. Sun shining off the water in the morning. The Queensborough bridges, the lighthouse on Roosevelt Island. You can rest there for a few minutes. There are lots of nameless small parks along the pathway with benches located throughout. So you can sit down wherever you like." The unique land and water availability of Manhattan made it possible for rich green-blue and urban-natural integration to happen, thereby promoting the urban children's well-being, according to the parents who were interviewed.

Inferences from Qualitative Results

The qualitative inferences for natural space qualities to promote child well-being were:

- Short-lived but Expansive Nature Exposure: a quality as convenient immersion in natural spaces that enables a healthy breather even if short lived.
- Learning and Caring Hubs: a quality of community farm capable of organically integrating teaching, learning, and love.
- Integration that Creates Oasis: a quality of the coexistence of city elements with natural elements to create a gentle oasis that provides a sense of acceptance, safety, and connection.

Meta-inference

Two meta-inferences emerged as the quantitative inferences and qualitative inferences were synthesized:

- Parental valuing of nature connection as a soothing and safe resource
- Shorter and more frequent nature-child space-time immersion

Meta-inference was drawn to achieve the purpose of the study by synthesizing inferences from the quantitative results and themes from the qualitative interview exploration. The purpose of this study was to increase understanding of the qualities of natural spaces that contribute to childhood well-being with the following quantitative and qualitative purposes respectively: To identify factors predicting parental assessment of urban-dwelling children's well-being and To explore the natural environment that promotes well-being of an urban-dwelling child.

Parental Valuing of Nature Connection as a Soothing and Safe Resource

Parental valuing of nature connection as a soothing and safe resource for urban children was the most important for child well-being. Quantitatively, stronger parental rating of importance to immerse the child into urban natural space was the single most predictive environmental factor for child well-being in the sample of this study. One of the quantitative inferences, longer overall timeframe for visits to the

urban arm, appeared to be a consequential manifestation of this meta-inference since parental preference to nature-child immersion would make it more possible for children's urban farm visitation to continue over longer timeframe. Qualitatively, many parents expressed strong preference for the natural space of the urban farm or green space, recognizing that the children's quality well-being was obtained through the nature-child interaction. The quantitative inferences of higher parental rating of importance of the urban farm or green space was identified in the contexts of the all qualitative inferences, Short-lived but Expansive Nature Exposure, Learning and Caring Hubs, Integration that Creates Oasis. Each inference encompassed the aspects of parental preference to the two types of urban natural spaces: the urban farm and green space.

In the inference Short-lived but Expansive Nature Exposure, most parents had intentionally made choices for the children to visit the urban farm or green space which, the parents believed, enhanced the child well-being. Parental thoughts, hopes, and desires for nature-child immersion at the urban farm or green space were noted in the inference Learning and Caring Hubs, through which there were meaningful child-nature interactions to foster child well-being. Lastly, in the inference Integration that Creates Oasis, parents depicted a unique urban landscape of Manhattan's natural spaces, such as the urban farm and green space, were contrasted yet well-integrated with urban spaces, which the parents recalled as an essential quality to produce quality child well-being.

Shorter and More Frequent Nature-child Space-time Immersion

Shorter and more frequent nature-child space-time immersion contributes to urban child well-being. Shorter and more frequent visits to urban natural space appeared to be the space-timeframe operationalization of nature immersion for urban

child well-being in the study sample. The quantitative inferences of shorter length of each visit time and higher frequency of visit to green space were interfaced with the qualitative inference of Short-lived but Expansive Nature Exposure. Quantitatively, another inference, shorter residential proximity to green space, corroborated this meta-inference where even short yet frequent nature immersion would be invaluable and convenient to an urban-dwelling child. Qualitatively, parents called a brief yet frequent visit to natural space "a small dose of visiting," which appeared to be convenient to urban-dwelling children's life, thereby promoting quality well-being. If convenient to the children, their visiting is presumed to last longer as a habit over time. In this regard, the quantitative and qualitative inferences of the short and frequent visiting, namely "a small dose of visiting," to the urban natural spaces can be merged to a point of nature immersion space-timeframe as meta-inference.

Conclusion

An explanatory-sequential-mixed-method design guided data analysis of quantitative and qualitative data streams of this study. There were 174 participants included in the final data set for Generalized Linear Model analysis of predictive factors of natural space contributing to child well-being. Sequentially, 15 participants completed semi-structured interviews for exploration of the factors that promote well-being. Five quantitative inferences of the predictive factors resulted: Higher parental rating of importance of the urban farm or green space, Shorter length of each visit time to the urban farm or green space, Longer overall timeframe for visits to the urban farm, Higher frequencies of visit to green space, and Shorter residential proximity to green space. Three qualitative inferences emerged: Short-lived but Expansive Nature Exposure, Learning and Caring Hubs, and Integration that Creates Oasis. Through a process of comparing and contrasting the quantitative and qualitative inferences, two

meta-inferences were synthesized as merged results to understand a more wholistic view of the factors of the nature immersion phenomenon that contributed to child well-being: Parental Valuing of Nature Connection as a Soothing and Safe Resource and Shorter and More Frequent Nature-child Space-time Immersion. The resulting meta-inferences represent the nature immersion phenomenon as operationalized related to urban child well-being.

CHAPTER FIVE. DISCUSSION

In this chapter, a review of the research methodology and results pertaining to the research questions, literature, and theoretical framework is presented. Limitations are discussed. Implication for nursing practice, policy, education, caring science, and future research concludes the chapter.

Review of the Methodology

The purpose of this study was to increase understanding of the qualities of natural spaces that contribute to childhood well-being for those urban-dwelling children who otherwise are likely to be distant from nature and at the risk for nature deficit disorder (NDD). The purpose was pursued with an explanatory sequential mixed-method study design to accomplish two research aims: 1) To identify factors predicting parental assessment of urban-dwelling children's well-being and 2) To explore the natural environment that promotes well-being of an urban-dwelling child. Upon the approval from the Florida Atlantic University Institutional Review Board (IRB), data collection and analysis were performed sequentially as a quantitative survey and two well-being questionnaires were sequenced by qualitative semi-structured interview exploration. The participants were parents of urban-dwelling children who had participated in any programs of Battery Urban Farm, a community farm in Manhattan, New York. The farm's educators functioned to connect the researcher with the parents.

An explanatory sequential mixed-method design was chosen to explore factors of urban natural space on child well-being in quantitative statistics and to explore about those findings in qualitative narrations. The quantitative and qualitative

approaches were merged to more wholistically address the phenomenon of nature immersion among urban-dwelling children. This wholistic perspective may have not been achievable with either the quantitative or qualitative approach alone. Since the nature immersion research study was unprecedent in nursing, this study brought preliminary understanding of the phenomenon. In this regard, the mixed method design was ideal.

Discussions of the Findings

The findings of the study spelled out nature immersion phenomenon among urban children by describing beneficial qualities of natural space on urban child well-being. Meta-inferences showed two major findings:

- **Parental valuing of nature connection as a soothing and safe resource enhances child well-being.**
- **Shorter and more frequent nature-child space-time immersion enhances child well-being.**

Urban child well-being is expected to rise as parental valuing of the urban farm or green space rises. It was revealed that parental testimonies of optimal child well-being were narrated with their strong preference to the idea of children's *being* in the urban farm or green space. The operationalization of nature immersion of urban children is expressed as "a small dose of exposure to nature" in parental words and estimated as the shorter length of each visit with a higher frequency of visits to green space ranging from once a month to once a week. The operationalization relates children's residential proximity to natural space. Shorter residential proximity to green space indicated higher urban child well-being. The indication of the shorter proximity typifies nature immersion of urban children by making it more practical for them to visit frequently, thereby often *being* in natural space even if it is a short period of

time. The quantitative and qualitative findings in detail are separately reviewed in the following sections in this chapter.

Findings Pertaining to the Demographic Data

There was a total of 174 participating parents in the quantitative study stream. Female parents (84.5%) predominated whereas their children were mostly males (73.6%). How female gender predominance occurred for caregivers of male children may have influenced the outcomes is unclear. However, there had been boys' schools rostered in the list of the past programs of the community farm, and it is possible that the mothers of those schools may have predominated in this study. Fifteen participants or 8.6% of quantitative sample population completed the semi-structured interviews. The children's mean age was 9.25 in the quantitative data stream and 7.53 in the qualitative data stream.

Most participants were English speakers (98.3%), Whites (59.8%), Christians (73.0%), and held bachelor's degrees at the highest educational level (44.3%). Most were married (69.5%) and employed (72.4%). Household income was dispersed to both limits below $10.000 and above $21,000 ranging between $30,000 to 60,000 for 29.3% of the sample. The demographic characteristics are comparable, according to the United States Census Bureau's (2018) report, to the population of New York City, NY. The report indicates the following percentages: Whites (42.7%), bachelor's degree holders (37.4%), and median household income ($60,762).

Findings Pertaining to the Quantitative Inferences

In the quantitative stream, four inferences were drawn from the data, which were collected using parental responses to a researcher-developed survey and two questionnaires of child well-being, the PROMIS Positive Affect and Life Satisfaction scales, and analyzed with Generalized Linear Model. The two instruments were first

evaluated for reliability and showed acceptable internal consistency reliability. The inferences were drawn as factors affecting urban child well-being:

- **Higher parental rating of importance of the urban farm or green space**
- **Shorter length of each visit time to the urban farm or green space**
- **Longer overall timeframe for visits to the urban farm**
- **Higher frequencies of visit to green space**
- **Shorter residential proximity to green space**

Higher parental rating of importance of the urban farm was the single most impactful predictor of higher child well-being in both Positive Affect and Life Satisfaction with all environmental factors and parental socioeconomic status factors combined. Green space, which was the most frequently visited natural space by children in this study, was also highly rated as important for better child well-being. Although higher parental household income was impactful, this study revealed that the environmental factors altogether contributed more significantly to predicting higher child well-being in Positive Affect and Life Satisfaction.

Length of each visit time is a type of nature immersion timeframe. Shorter length of each visit time to the urban farm was significantly related to higher child well-being in both Positive Affect and Life Satisfaction. In contrast, shorter length of each visit time to green space was significantly related only to Positive Affect, short-term affect of well-being, rather than long term or general affect of well-being as Life Satisfaction. Immediate well-being might be gained in the immediate presence to the green space. The well-being did not last longer enough to impact Life Satisfaction. In terms of the timeframe, this study left some challenges since how exactly to shorten the length of each visit was not revealed from post-hoc analysis. This requires further study of the dose of nature immersion which promises the biggest effect.

Frequency and overall timeframe for visits are other two types of nature immersion timeframe. These two timeframe factors were significantly related to higher child well-being. To be specific, higher frequency of visits to green space ranging from once a month to once a week significantly contributed to predicting higher Positive Affect and Life Satisfaction. A one-time visit to the urban farm was not enough to significantly contribute to predicting higher Positive Affect and Life Satisfaction. Those who repeated the urban farm programs more than one time tended to have higher child well-being. In this study, about a half of the sample of children (N = 60) joined the farm program only one time, and there might have been different outcomes if there were more children with longer periods of overall timeframe of farm visiting.

Children's residential proximity to green space is a particular type of nature immersion in this study. Shorter residential proximity to green space, typically ranging from two to three miles, was significantly related to higher Positive Affect and Life Satisfaction. The two-to-three-mile residential proximity to green space is considered to be the most convenient space-frame for urban children, making it easy to visit more frequently over longer periods of time. The space-frame and timeframe of nature immersion, which were combined together from the results, are now operationalized as a space-time frame of nature immersion particular to urban children in the sample of this study.

Those timeframe variables related to the urban farm and green space were revealed as predictive factors of well-being for urban children. However, the variables related to blue space were significantly related to all timeframe factors (*frequency of visit, length of each visit time, and overall timeframe for visits*) but differently for Positive Affect and Life Satisfaction. Higher frequency of visits to blue space was

related only to higher Positive Affect whereas longer overall timeframe for visits to blue space was related only to higher Life Satisfaction. Since participants' responses to the blue-space related questions were almost half (N = 60) of the number of responses to other two natural spaces, there was a risk of Type II error, and possible connections of blue space to well-being may not be detectable in this sample.

In summary, the quantitative findings as a whole correspond to the two meta-inferences. The meta-inference, Parental valuing of nature connection, is consistent with the finding of the most impactful factor for higher urban child well-being in this study. Another meta-inference, Shorter and more frequent nature-child space-time immersion, is consistent with the nature immersion operationalization for urban children in this study.

Findings Pertaining to the Qualitative Inferences

In the qualitative stream, parental reports related to the context of well-being synthesized from the semi-structured interviews were analyzed using conventional or inductive content analysis. Three inferences emerged as important to urban child well-being:

- **Short-lived but expansive nature exposure**: a quality as convenient immersion in natural spaces that enables a healthy breather even if short lived.
- **Learning and caring hubs**: a quality of the community farm capable of organically integrating teaching, learning, and love.
- **Integration that creates oasis**: a quality of the coexistence of city elements with natural elements to create a gentle oasis that provides a sense of acceptance, safety, and connection.

Each qualitative inference embraces some level of nature immersion characterized by dichotomies like: short-lived and expansive, learning from and

caring for nature, and city and oasis. The parents appeared to value these dichotomies and respect not either one alone but both sides of them. The dichotomous contrasts are very distinctive between natural and urban spaces and more pronounced when it comes to immersing in both sides or nature immersion. Urban children indeed live in the contrasting environments, and integration of the both sides seemed to promote well-being of urban children. Nature immersion transcends the dichotomies. In fact, the parents expressed that *being* in natural space created a unique space that was tailored for each individual child who still was engaging in the urban life. Thereby, well-being could emerge for each child from within the individualized, unique space of nature immersion. The qualitative findings from this study pictured transcendental well-being of urban children beyond the dualism of nature and urbanity.

This study revealed that nature immersion of urban children could take place in a matter of moments as urban children's well-being was generated in a shorter, not longer, period of time of *being* in natural space, which parents called "a small dose of exposure to nature." No matter how "small the dose of exposure to nature," nature immersion is transcendental to impact urban child well-being as some extension of everyday life, indicating the qualitative inference, "short-lived but expansive nature exposure." Although children's developmental psychological and physical situations may have contributed to an individual variation or pattern of nature immersion or the transcendental experience in *being* in natural space, the parental narration clearly visualized that nature immersion could occur across urban children.

The urban farm was functioning as a hub for organic, beyond urbane, interactions where the farmer's lessons were cycled from learning to caring for nature and children. There were dialogues, wonders, and adventures for those children who connected to nature that conveyed a sense of unconditional love, which was expressed

as “a really big love” in parental words. From parents’ perspectives, nature immersion to some children appeared to be a spirited experience that moved beyond daily routine and life, allowing children to touch invisible connection to higher providence of energies or spirits in the universe. Once touched by this invisible connection, some children started better taking care of themselves, as they learned to care for nature or natural materials at the community level. The urban farm resides within the heart of children’s well-being, indicating the qualitative inference, “learning and caring hubs.”

The latest innovation on urban infrastructures, according to parental testimonies, allowed natural and city elements to be integrated into a space for wilderness with a spirit of oasis in the city. A few urban parks in the city now made it available for more nature immersion of urban children to occur with help from technologies of urban landscape architect and engineering. Some of the parks were transformed into safer and cleaner urban infrastructures with natural materials embedded. Children freely touch, feel, and step on the spots covered or paved with pieces of genuine natural materials at the city park, given opportunities to connect with authenticity of nature. This type of exposure to nature epitomizes urban children’s nature immersion or experience of *being* in nature. The space and time, which were integrative of natural and urban elements, served as a sanctuary for urban children’s spirits, denoting the inference, “integration that creates oasis.”

In summary, the qualitative inferences corroborate the two meta-inferences of this study. The meta-inference, Parental valuing of nature connection, is consistent through all the qualitative inferences where parents respected and reported about how children’s transcendental experience occurred beyond the contrasting environments of natural and urban spaces. Another meta-inference, Shorter and more frequent nature-

child space-time immersion, is recognized as a "a small dose of exposure to nature" in parental narration that epitomizes urban children's nature immersion in this study.

Findings Pertaining to the Literature

The synthesized twofold meta-inferences of this study have some correspondence and congruence and some incongruence to findings from the literature review.

Parental valuing of nature connection as a soothing and safe resource

The meta-inference "parental valuing of nature connection" corresponds to the quantitative and qualitative findings of the past research studies. From the past two longitudinal research studies (Flouri et al., 2014; Richardson et al., 2017), positive parental standpoint on nature immersion was noted as an important factor that enabled the child to practice *being* in natural space, which impacted the well-being benefits. The positive parental standpoints on nature immersion as a child well-being factor was explored in a qualitative research study (Ashbullby et al., 2013). The qualitative narration showed family-child relationship that was indeed sensitive to the child developmental stages where a child required parental assistance for visiting to natural space (Ashbullby et al., 2013). The series of *being* or *doing* at natural space especially among younger children depends on parental valuing of nature-child immersion as a predictive factor to generate child well-being.

Followed by the findings from this and the past studies, the parental factors are presumed to impact child well-being. However, parental factors related to socioeconomic status were not critical in this study. However, there was null association in one study (Feng & Astell-Burt, 2017c) and positive association in another study (Huynh et al., 2013) when considering parental income and child well-being. The findings from this study were not totally incongruent with the results in the

past studies. In this study, all environmental factors combined more significantly contributed to predicting higher child well-being than parental socioeconomic status alone. Socioeconomic status was comprised of parental household income and parental employment status. Parental household income alone, not parental employment status, had a significant relationship with higher child well-being, although less significant than the environmental factors altogether. As parental socioeconomic status itself is not the single most predictive factor for higher child well-being in this study, nature immersion can be offered as an intervention for well-being to those across socioeconomic status, thereby possibly addressing well-being disparities for urban youth.

Shorter and more frequent nature-child space-time immersion

Although some levels of *being* and *doing* in natural spaces were significantly related to child well-being in the literature review, the nature immersion timeframe for urban children was not precisely specified in previous studies. In this study, the shorter *being* in and the frequent visit to natural space, the higher the child well-being. The frame of shorter and more frequent nature immersion is now known to us from this study as an important space-timeframe and a predictive factor of higher urban child well-being. In this study, the timeframe factor was revealed as visiting to green space ranging from once a month to once a week, whereas the space-frame factor was revealed as children's residential proximity to green space ranging from two to three miles. The space-frame as a child well-being factor was common to the findings of the most past studies (Amoly et al., 2014; Balseviciene et al., 2014; Feng & Astell-Burt, 2017b; Flouri et al., 2014; Kim et al., 2016; Markevych, et al., 2014; Richardson et al., 2017; Zach et al., 2016). Since the space-frame and timeframe were not covered together in past studies, this study is the first known research study that

identified the nature-child immersion space-timeframe as a first-line predictive factor to well-being of urban children.

Originally, this study was driven by a finding from the literature that a larger amount or quantity of green-space coverage (more than a 21% to 40%) was not necessarily impactful to child well-being (Feng & Astell-Burt, 2017a). Natural space *quality*, not just quantity, was associated to positive child well-being (Feng & Astell-Burt, 2017b). The quality of natural space was explored in the qualitative stream of this study and synthesized in three inferences. The quality natural space brought urban children quality nature immersion by: *visiting* the integrated environment that creates an oasis of urban elements with natural elements, *being* in short-lived but expansive nature exposure, and *doing* at learning and caring hubs. The emerged qualities of urban natural space and time from this study is the new findings known to the literature for those urban children who might have otherwise been at risk of Nature Deficit Disorder (NAD). The qualities of nature immersion, which were revealed from both quantitative and qualitative inferences of this study, enlightened some structures of the whole picture of urban children's nature immersion phenomena, which could link back to the literature in terms of NAD situations.

Findings Pertaining to the Theoretical Framework

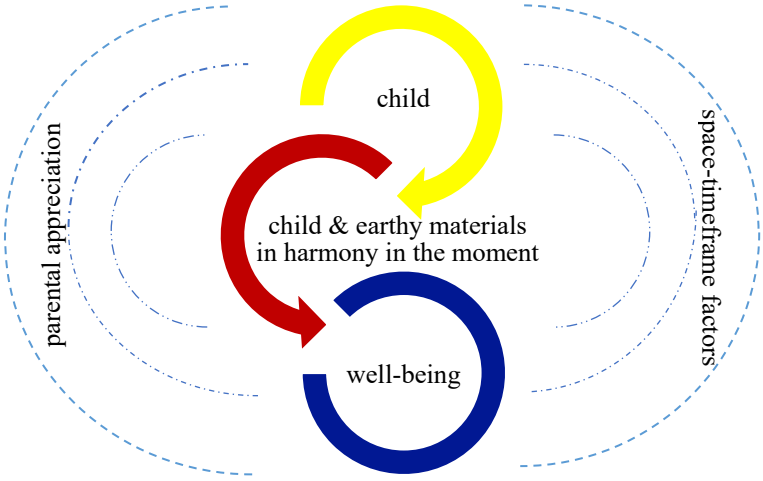
This study was guided by the Nature Immersion Model and tenets of Florence Nightingale. The major elements of the model are Person, Connecting with Earthy Materials, and Personal Emergence. The model describes the nature immersion phenomena where the elements interact to generate Personal Emergence evolving out of the Person through Connecting with Earthy Materials. In the quantitative stream of this study, the elements are operationalized in urban-dwelling preschool to preteen children for Person, *being* in urban natural space for Connecting with Earthy

Materials, and child well-being for Personal Emergence assessed by parental report of two psychometric scales, PROMIS Positive Affect and Life Satisfaction. The predictive factors of urban natural space and time on child well-being were explored in the quantitative stream. The qualitative stream of this study explored parental narration regarding the qualities of urban nature immersion that promote child well-being.

The findings of the study are congruent with the model indicating that there are significant predictive factors and certain qualities of urban natural space and time that contribute to Personal Emergence or well-being of urban children. The predictive factors, found from the quantitative stream, indeed promoted higher well-being. The certain qualities of urban natural space and time, which emerged in the qualitative stream, tie in how Connecting with Earthy Materials, as an integrated dimension of well-being (Figure 3).

Figure 3

The Nature Immersion Model Integrated for Well-being of Urban Children



The modified model has elements that are correspondent to and articulated for urban children in the sample of study as follows: Child, Connecting with Earthy Materials in Harmony in the Moment, and Well-being. Nature immersion in the sample of this study occurred in the moment described in the inference, "short-lived but expansive nature exposure," which corresponds with the element, "connecting with earthy materials in oneness in the moment," in the modified model. Another inference, "learning and caring hubs," corresponds to the circular direction of how the child connects with nature in the modified model. Finally, the last one, "integration that creates oasis," sparks of "oneness" that symbolizes the state of harmony from which well-being emerges in the bottom circle in the model.

The framework model of nature immersion evolved into a new dimension of depth and breadth from the meta-inferences from this study. The evolved version of the model is preliminary in clearer articulation of urban children's nature immersion phenomena with the essence of each element still grounded in the original nature immersion model. This study contributed to a stronger foothold of the framework for nature immersion research.

Limitations

The findings of this study are generalizable only to a certain population: those children who are living in urban areas. Additionally, the ages are limited from preschool to preteen. The limitations affect applicability to other children's age groups below preschool and above preteen. Consideration of developmental stages is very important in ongoing research. The eligibility for the age bracket from preschool to preteen could result in more generalization regarding on well-being than either one, preschoolers or preteen alone would generate. Also, parental assessment of child well-being may have not exactly reflected what could be self-reported by the child on his

or her own. Especially, those children who are older or preteen in this study may have their own views on well-being which may be different from what their parents thought. Additionally, the sample did not represent current or past child conditions in terms of health, emotional, or behavioral problems. The conditions may have affected the results of child well-being in the first place.

Agreement between child self-reports and parent proxy-reports becomes an issue. While parents may be providing valid information for younger children due to the developmental limitation, it is less likely in the case of adolescents. Parent proxy-reports tend to be significantly different from adolescents' self-reports (Chang & Yeh, 2004). When there was incongruence between proxy-reports and self-reports among adolescents, the study findings might have been affected. In this study, parental proxy-reported well-being was trending down from: children between 3 and 6 years (M = 65.9 in PA; M = 60.5 in LS) to those who were between 6 and 9 years (M = 57.6 in PA; 56.6 in LS) to those between 9 and 13 years (M = 34.1 in PA; 34.6 in LS). From this, it is known that the parental proxy-reported well-being is sensitive to child age brackets. Yet, the accuracy of adolescents' well-being as reported by parents is still unknown. Because of this, child age sensitivity should be considered categorically, and both proxy-reports and self-reports may need to be conducted among adolescents.

Furthermore, the sampling method was possibly biased recruiting from the roster of the past participants in the urban farm's programs. Participating parents may have had been more health conscious, supportive of the nature immersion idea, and they may have spent more time in nature than those who did not participate in the study. A greater number of responses with higher well-being found in this study may indicate the recruiting bias, not only due to parental nature-immersion preference but

also due to social desirability which was assumed in a caretaker role for well-being of their own child.

Despite the limitations, this study was designed to overcome the biases by: utilizing instruments with high parental-report of internal consistency and validity, recruiting the number of parents higher than the one indicated in the sample size calculation, and by incorporating both quantitative and qualitative data collection and analysis. The approaches were intended to buffer limitations of this study.

Implications

This study was a preliminary effort for building the foundation of nature-immersion research with the population of urban children. Beyond the initial effort, ongoing work with other age-groups, in other geographic areas, or healthcare settings is warranted. The study stood on sound ethical principles involving human subjects for future nursing policy, caring science, education, and research.

Nursing

The identification of nature's beneficial factors and qualities from the study can fill the gap of today's effort to practically incorporate nature-based interventions in nursing. For example, space-timeframe of nature immersion, which was identified as "residential proximity" and "shorter and more frequent visits" to green space in the study can be directly applicable to those who are waiting for a pediatrician at an urban pediatric office. The waiting children can be offered a short exposure of nature at a garden nearby the office. Installation of the garden nearby the office is considered in reference to the inference "integration that creates oasis." Now, the pediatric office can be renewed into "a learning and caring hub," around which caring love radiates at the office and possibly to the community at large in the city.

Factors contributing to urban children's well-being from nature immersion can raise attention of nature deficit disorder (NDD) for healthcare authorities, such as the World Health Organization (WHO). At the clinical level, urban children's nature-immersion factors are now clearer in space-timeframe articulation from this study, and NDD could be included into the ICD-11 codes, just as the medical diagnosis, "gaming disorder," which was recently included.

Nature-child immersion is a non-invasive, inexpensive non-pharmacological intervention, thereby being safe for pediatric populations as well as sustainable in both communal and individual self-care practice for well-being. By integrating natural immersion into preventive medicine and health promotion, nurses as 21st century Nightingales can be in the visionary position to serve populations at risk for nature deficit disorder (NDD), such as urban children who otherwise are likely to be distant from nature. Hopefully, nature immersion interventions can be applicable to other age-group populations whoever are at risk of NDD.

Policy

This study potentially provides a small forward movement for legislative activity that is of interest to the urban farm administrators and others who value the experience of nature. The New York State Department of Environmental Conservation (DEC) has committed to conserving clean infrastructure, combatting contamination in the air, water, and land, and connecting New Yorkers with nature (New York State Department of Environmental Conservation [DEC], 2019). The DEC hosts "National Get Outdoors Day" at free DEC events around the state for children, offering a trial for new outdoor activities such as hiking, archery, paddling, and fishing (DEC, 2019). The movements were endorsed by New York State Assembly Bill A735 for integrating an outdoor environmental education and

recreation plan (State of New York, 2017, p. A735). There has, through the current New York state legislative policy, been a political latitude for the guideline of nature immersion interventions to be planned at the community level of the city of Manhattan. These policies are consistent with nature immersion, and this study provides foundational evidence for interested persons.

Caring Science

Caring science has now evolved into a new phase of the metaparadigm with an emphasis on unitary energetic patterns of the human-environmental-global-universal field of oneness (Watson, 2014, p. 101). In respect to the human-environmental field, the nature immersion phenomena exist within the context of caring science. The phenomenon is a dance or *biodance* (Dossey, 1982) of all the elements of nature and a child from the atomic to cosmic level, which manifests to the researcher as a pattern out of unitary, integrative wholeness. Nature immersion interventions are also within the context of integrative nursing. Integrative nursing is embedded in a framework of caring science as the unitary relationship represents a quantum cosmology that recognizes everything is connected with everything else and there is one wholeness of all (Watson, 2014, p. 101).

According to Watson (2014), many contemporary nursing theorists all converge around the same core ontological and epistemological integrative unitary principles as follows (p. 103):

- A unity worldview—that is, the view that everything is connected;
- There is one energetic field of human-environment-cosmos oneness;
- Transcendent possibilities for human experiences, while acknowledging we are fully embodied patterns and processes of relativity of time and space and physicality;

- Unitary worldview acknowledges that, energetically, one's intentional consciousness transcends time and space, and exists beyond the moment, affecting the whole field;
- Evolving consciousness—evolving toward universal cosmic consciousness of love.

With reference to "unitary world view" (Watson, 2014, p. 103), the space-timeframe inference, "short-lived but expansive nature exposure," finding of this study has an implication of transcending time and space and existing beyond the moment. The nature immersion space-timeframe potentially adds new knowledge to the field of integrative nursing and caring science. Besides and beyond all, the nature immersion research study contributes to caring science by reconnecting and remembering human-environment-cosmos oneness or the cosmic consciousness of love. Nurses can both philosophically and practically partake in "caring" with nature immersion research, education, and practice.

Education

As 21st century Nightingales, nurses arrive at being the catalyst for new visions on the field of human-environment-cosmos oneness or nature immersion. The quantum environments are inseparable to the health and happiness of a person. Nurses strive at telling and transforming our stories in environments within and beyond nursing as a nurse journalist, a nurse scientist, or a nurse social-media commentator as well as a nurse at bedside. We are both learners and leaders about this. The learner-leader potential is one of the most exciting state-of-the-art endeavors while still in concert with Nightingale's environmental elements of health—the air, water or light––upheld higher to the heart of nursing.

Research

The study was the first nature immersion research using a mixed method design. The design resonates with pragmatism to fill the gap between nursing practice and education. The utilization of the research findings can be more immediately practical in use for nature-based interventions on well-being among urban children.

Contact with nature or nature-immersion, although it is relatively new, is a fast growing field of research (National Center for Complementary and Integrative Health [NCCIH], 2018). The NCCIH (2018) declared that evidence on nature experience (nature contact or nature exposure) promises a therapeutic or preventive approach for a range of psychological and physical health challenges. For instance, there are exploratory research studies with results indicating there is a decrease in self-reported rumination after nature walks (NCCIH, 2018). Specific pediatric populations with health challenges, such as attention-deficit/hyperactivity disorder (ADHD), were the focus of a NIH research study, where they had improvement of ADHD symptoms with green outdoor exposure across a wide range of individual, residential, and case characteristics (Kuo & Taylor, 2004, p. 1580). The research methodology from those studies can be incorporated into the next study. For example, a research study on physically and psychologically challenged children would be a meaningful next step.

With increasing interest in environmental relationship to human health, the number of research studies on nature experience has been supported by national-level institutions. Nature immersion research potentially expands to a variety of fields of science including medicine, nursing, and social work. Through collaboration with other fields, nature immersion research may evolve to serve the community for betterment of those with complex health-related needs.

Concluding Remarks

The specific aims of this study were to quantitatively explore the factors and qualitatively explore the essence of natural spaces as related to the well-being of urban children who otherwise are at the risk for nature deficit disorder (NDD). The aims were approached with an explanatory sequential mixed-method study design. Nightingale's tenets on human environments from which the nature immersion model was developed spearheaded the heart of this study. This may be the first research study to explore natural space-time factors and qualities in relation to urban children's well-being both quantitatively and qualitatively. This study provides evidence that is applicable to nature immersion interventions for self-care as well as nursing and healthcare modalities. Further nature immersion research studies could expand to populations beyond children and urban areas to reach those who may enhance well-being from contacting earthy materials of nature.

APPENDICES

APPENDIX A. INSTITUTIONAL REVIEW BOARD APPROVAL

DATE:	November 5, 2018
TO:	Patricia Liehr, PhD
FROM:	Florida Atlantic University Social, Behavioral and Educational Research IRB
PROTOCOL #:	1326741-1
PROTOCOL TITLE:	[1326741-1] Exploring the Factors of Natural Space on Well-being of Urban-Dwelling Children
SUBMISSION TYPE:	New Project
REVIEW CATEGORY:	Exemption category # *A3*
ACTION:	DETERMINATION OF EXEMPT STATUS
EFFECTIVE DATE:	November 2, 2018

Thank you for your submission of New Project materials for this research study. The Florida Atlantic University Social, Behavioral and Educational Research IRB has determined this project is EXEMPT FROM FEDERAL REGULATIONS. Therefore, you may initiate your research study.

We will keep a copy of this correspondence on file in our office. Please keep the IRB informed of any substantive change in your procedures, so that the exemption status may be re-evaluated if needed. Substantive changes are changes that are not minor and may result in increased risk or burden or decreased benefits to participants. Please also inform our office if you encounter any problem involving human subjects while conducting your research.

If you have any questions or comments about this correspondence, please contact Donna Simonovitch at:

Institutional Review Board
Research Integrity/Division of Research
Florida Atlantic University
Boca Raton, FL 33431
Phone: 561.297.1383
researchintegrity@fau.edu

* Please include your protocol number and title in all correspondence with this office.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within our records.

APPENDIX B. SURVEY QUESTIONNAIRE

Confidential

Survey Questionnaire

Please complete the survey below.

Thank you!

Please answer the following questions about you.

1)	What is your gender	Female ☐	Male ☐
2)	What is your age?	_____	
3)	What is your ethnicity?	◯ White ◯ Black ◯ Hispanic ◯ Asian ◯ Other	
4)	Do you speak and read English?	◯ Yes ◯ No	
5)	If English is not primary language, what is it?	_____	
6)	What is your religion?	◯ Christianity ◯ Buddhism ◯ Hinduism ◯ Islam ◯ Judaism ◯ Other	
7)	What is your highest educational level attained?	◯ High School ◯ Bachelor ◯ Master ◯ Doctorate ◯ Other	
8)	What is your marital status?	◯ Married ◯ Divorced ◯ Widowed ◯ Living with a Partner ◯ Other	
9)	Are you currently employed?	◯ Yes ◯ No	

10) What is your household income approximately?

- ◯ Below $10,000
- ◯ $10,000 to $30,000
- ◯ $30,000 to $60,000
- ◯ $60,000 to $90,000
- ◯ $90,000 to $120,000
- ◯ $120,000 to $150,000
- ◯ $150,000 to $180,000
- ◯ $180,000 to $210,000
- ◯ Above $240,000

Please answer the following questions, in reference to the child who registered for Battery Urban Farm.

11)	What is the gender of the child?	Male ○	Female ○
12)	What is the age of the child?	_____	
13)	What is the child's ethnicity?	☐ White ☐ Black ☐ Hispanic ☐ Asian ☐ Other	
14)	Does the child speak any language other than English? What is it?	_____	
15)	What is the child's religion?	○ Christianity ○ Buddhism ○ Islam ○ Judaism ○ Other	
16)	What is the living environment of the child?	○ Urban ○ Suburban ○ Rural ○ Other	
17)	Did the child join a program at Battery Urban Farm?	○ Yes ○ No	
18)	If yes in the question 17, which program did the child join?	_____	
19)	How often did the child join the program at Battery Urban Farm?	○ Less than once a month ○ Once a month ○ Once every two weeks ○ Once a week ○ More than once a week	
20)	Approximately, how long did the child spend at the Battery Urban Farm each time?	○ Less than half an hour ○ Half an hour ○ One hour ○ Two hours ○ Three hours ○ More than three hours	
21)	Overall, how long has the child participated in the Battery Urban Farm program?	○ Only one time visit ○ Less than one month ○ One month ○ Two months ○ Three months ○ More than three months	

22) How far is the child living from Battery Urban Farm?
- ◯ Less than half a mile
- ◯ Half a mile
- ◯ One mile
- ◯ Two miles
- ◯ Three miles
- ◯ More than three miles

23) How important is the Battery Urban Farm to your child's well-being?
- ◯ Not important
- ◯ Slightly important
- ◯ Important
- ◯ Very important
- ◯ Extremely important

24) Does the child visit green space (park, garden etc.) closest to your residence?
- ◯ Yes
- ◯ No

25) If yes in the question 24, which green space is it?

_____

26) Over the last month, how often has the child visited the closest green space?
- ◯ Less than once a month
- ◯ Once a month
- ◯ Once every two weeks
- ◯ Once a week
- ◯ More than once a week

27) Approximately, how long does the child spend in this green space each time?
- ◯ Less than half an hour
- ◯ Half an hour
- ◯ One hour
- ◯ Two hours
- ◯ Three hours
- ◯ More than three hours

28) Overall, how long has the child participated in visiting this green space?
- ◯ Only one time visit
- ◯ Less than one month
- ◯ One month
- ◯ Two months
- ◯ Three months
- ◯ More than three months

29) What activity does the child engage in this green space?
- ◯ Gardening
- ◯ Playing
- ◯ Going for a walk
- ◯ Having a picnic
- ◯ Other

30) How far is the child living from this green space?
- ◯ Less than half a mile
- ◯ Half a mile
- ◯ One mile
- ◯ Two miles
- ◯ Three miles
- ◯ More than three miles

31) How important is this green space to the child's well-being?
- ◯ Not important
- ◯ Slightly important
- ◯ Important
- ◯ Very important
- ◯ Extremely important

32)	Does the child visit blue space (beach, river, etc.) closest to your residence?	◯ Yes ◯ No
33)	If yes in the question 32, which blue space is it?	_____
34)	Over the last month, how often has the child visited this blue space?	◯ Less than once a month ◯ Once a month ◯ Once every two weeks ◯ Once a week ◯ More than once a week
35)	Approximately how long does the child spend in this blue space?	◯ Less than half an hour ◯ Half an hour ◯ One hour ◯ Two hours ◯ Three hours ◯ More than three hours
36)	Overall, how long has the child participated in visiting this blue space?	◯ Only one time visit ◯ Less than one month ◯ One month ◯ Two months ◯ Three months ◯ More than three months
37)	What activity does the child engage in this blue space?	◯ Swimming ◯ Playing ◯ Going for a walk ◯ Having a picnic ◯ Other
38)	How far is the child living from the blue space?	◯ Less than half a mile ◯ Half a mile ◯ One mile ◯ Two miles ◯ Three miles ◯ More than three miles
39)	How important is this blue space to the child's well-being?	◯ Not important ◯ Slightly important ◯ Important ◯ Very important ◯ Extremely important

Thank you for taking the survey.

Would you be willing to talk to me about the child's experience with nature? If so, please contact me via email: mnagata2015@health.fau.edu

Have a nice day!

APPENDIX C. POSITIVE AFFECT QUESTIONNAIRE

PROMIS Parent Proxy Item Bank v1.0 – Positive Affect – Short Form 8a

PROMIS Parent Proxy Item Bank v1.0 – Positive Affect – Short Form 8a

Positive Affect – Short Form 8a

Please respond to each question or statement by marking one box per row.

	In the past 7 days…	**Never**	**Rarely**	**Sometimes**	**Often**	**Always**
SWB_P_027_PXR1	My child felt happy	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
SWB_P_025_PXR1	My child felt great	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
SWB_P_026_PXR1	My child felt cheerful	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
SWB_P_029_PXR1	My child felt joyful.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
SWB_P_037_PXR1	My child was in a good mood	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
SWB_P_049_PXR1	My child felt refreshed	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
SWB_P_001_PXR1	My child felt calm	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
SWB_P_004_PXR1	My child felt peaceful.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

APPENDIX D. LIFE SATISFACTION QUESTIONNAIRE

PROMIS Parent Proxy Item Bank v1.0 – Life Satisfaction – Short Form 8a

PROMIS Parent Proxy Item Bank v1.0 – Life Satisfaction – Short Form 8a

Life Satisfaction – Short Form 8a

Please respond to each question or statement by marking one box per row.

	Thinking about the past 4 weeks…	**Not at all**	**A little bit**	**Somewhat**	**Quite a bit**	**Very much**
SWB_LS_046_PXR1	My child was satisfied with his/her life	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
SWB_LS_048_PXR1	My child was happy with his/her life...	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
SWB_LS_051_PXR1	My child had a good life	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
SWB_LS_019_PXR1	My child had what he/she wanted in life	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
SWB_LS_003_PXR1	My child's life was the best	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
SWB_LS_004_PXR1	My child's life was outstanding.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
SWB_LS_006_PXR1	My child's life was great.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
SWB_LS_055_PXR1	My child enjoyed his/her life	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

APPENDIX E. CONSENT FORM FOR PARENTS

ADULT CONSENT FORM - Parents

Consent Form Version & Date: Version 2.0 – July 1, 2016

1) Title of Research Study: Exploring the Factors of Natural Space Well-being of Urban-Dwelling Children.
2) Investigator(s): (PI) Patricia Liehr, PhD, RN; Misako Nagata, RN, HNP, MA, APHN-BC
3) Purpose: The Purpose of this research study is to determine the factor of natural space that promotes well-being of children living in urban areas.
4) Procedures: This research study will recruit parents of a child who registered for a Battery Urban Farm's program. If you agree to participate in the research study, you will be asked to join discussion session(s) and interviewed by the investigator. The interview session(s) will be about 20 to 30 minutes and use tape-recording. A 10 dollar-valued gift card will be awarded to everyone at the completion of the online survey/questionnaire and the in-person interview sequence.
5) Risks: Potential risks from participation in this research study will be minimum. If any, there may be physical or psychological exhaustion by answering the survey, questionnaire, or participation in the discussion group. There are also potential risks for loss of privacy. In order to assure your privacy, you will be given a confidentiality agreement by the investigator. You can decide not to participate at anytime without penalty.
6) Benefits: There may not be direct benefit from this study. However, a possible benefit would be the findings from the research study may become a resource to benefit teachers, parents, and healthcare professionals to promote urban children's well-being.
7) Data Collection & Storage: All information you complete in this study will be assigned with an identification number so that you will not be identified by name on the survey or questionnaire. Any information collected about you and your child will be kept confidential and secure and only the people working with the study will see your data, unless required by law. The data will be kept for 5 years in locked cabinet or password-protected computer in the investigator's office. After 5 years, paper copies will be destroyed by shredding and electronic data will be deleted. We may publish what we learn from this study. If we do, we will not let anyone know your name/identity unless you give us permission.
8) Contact Information:

- If you have questions about the study, you should call or email the investigator(s) Dr. Patricia Liehr (faculty advisor) at (561)297-2875 or pliehr@health.fau.edu; or Misako Nagata (student investigator) at

mnagata2015@health.fau.edu .

- If you have questions or concerns about your rights as a research participant, contact the Florida Atlantic University Division of Research at (561) 297-0777 or send an email to researchintegrity@fau.edu.

9) Consent Statement:

*I have read or had read to me the information describing this study. All my questions have been answered to my satisfaction. I am 18 years of age or older and freely consent to participate. I understand that I am free to withdraw from the study at any time without penalty. I have received a copy of this consent form.

I agree ____ I do not agree ___ be audiotaped/videotaped.

Signature of Participant: _____ Date: _____

Printed Name of Participant: First Name _____ Last Name_____

Signature of Investigator: _____ Date: _____

APPENDIX F. A LETTER OF COOPERATION/COLLABORATION

Version 2.0 – May 9, 2016

THE BATTERY

The Battery
State Street and
Battery Place
New York, NY
10004

Battery Office
1 Whitehall Street
17th Floor
New York, NY 10004
(212) 344-3491
info@thebattery.org

Letter of Cooperation

October 12, 2018

To the Florida Atlantic University (IRB):

I am familiar with Misako Nagata's (student researcher) research project entitled "Exploring the Factors of Natural Space on Well-being for Urban-Dwelling Children." Battery Urban Farm will assist her in recruiting parents for a survey, two well-being questionnaires, and interview sessions, providing achievable data. The assisting activities include: sending email notice of an online link to the survey and questionnaires to the farm programs' registrants; allowing the student researcher to access the farm registrants if necessary; and providing possible venues at the farm for interview sessions.

I understand that this research will be carried out following sound ethical principles and that participant involvement in this research study is strictly voluntary and provides confidentiality of research data, as described in the protocol.

Therefore, as the institutional authority of Battery Urban Farm, I agree that Misako Nagata's research project may be conducted at (or in collaboration with) our farm.

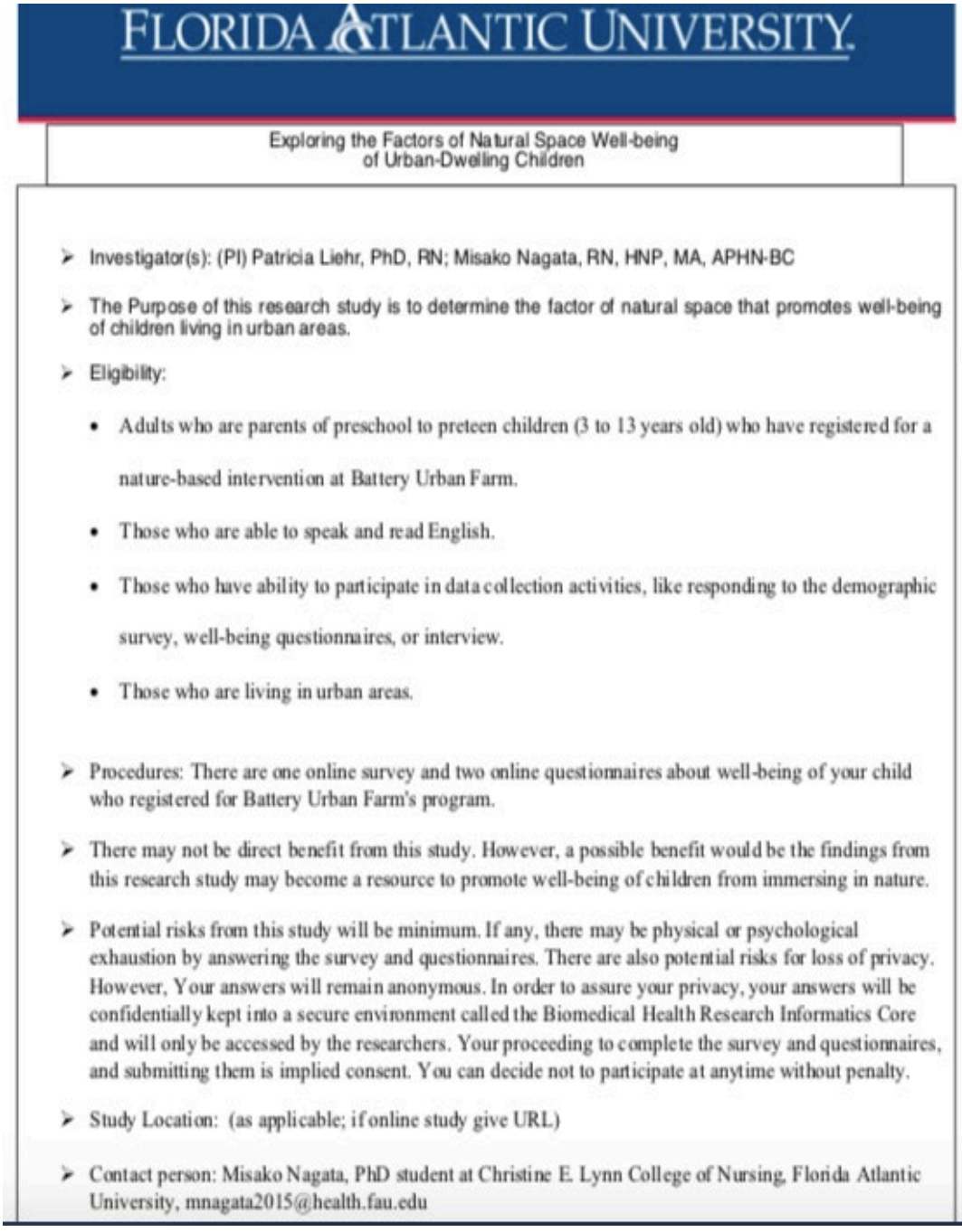
Sincerely,

[redacted]

[redacted] Education Coordinator, Battery Urban Farm

APPENDIX G. A RECRUITMENT FLYER

Version 2.doc – May 23, 2016



FLORIDA ATLANTIC UNIVERSITY

Exploring the Factors of Natural Space Well-being
of Urban-Dwelling Children

- Investigator(s): (PI) Patricia Liehr, PhD, RN; Misako Nagata, RN, HNP, MA, APHN-BC
- The Purpose of this research study is to determine the factor of natural space that promotes well-being of children living in urban areas.
- Eligibility:
  - Adults who are parents of preschool to preteen children (3 to 13 years old) who have registered for a nature-based intervention at Battery Urban Farm.
  - Those who are able to speak and read English.
  - Those who have ability to participate in data collection activities, like responding to the demographic survey, well-being questionnaires, or interview.
  - Those who are living in urban areas.
- Procedures: There are one online survey and two online questionnaires about well-being of your child who registered for Battery Urban Farm's program.
- There may not be direct benefit from this study. However, a possible benefit would be the findings from this research study may become a resource to promote well-being of children from immersing in nature.
- Potential risks from this study will be minimum. If any, there may be physical or psychological exhaustion by answering the survey and questionnaires. There are also potential risks for loss of privacy. However, Your answers will remain anonymous. In order to assure your privacy, your answers will be confidentially kept into a secure environment called the Biomedical Health Research Informatics Core and will only be accessed by the researchers. Your proceeding to complete the survey and questionnaires, and submitting them is implied consent. You can decide not to participate at anytime without penalty.
- Study Location: (as applicable; if online study give URL)
- Contact person: Misako Nagata, PhD student at Christine E. Lynn College of Nursing, Florida Atlantic University, mnagata2015@health.fau.edu

APPENDIX H. QUANTITATIVE ASSUMPTIONS TESTED

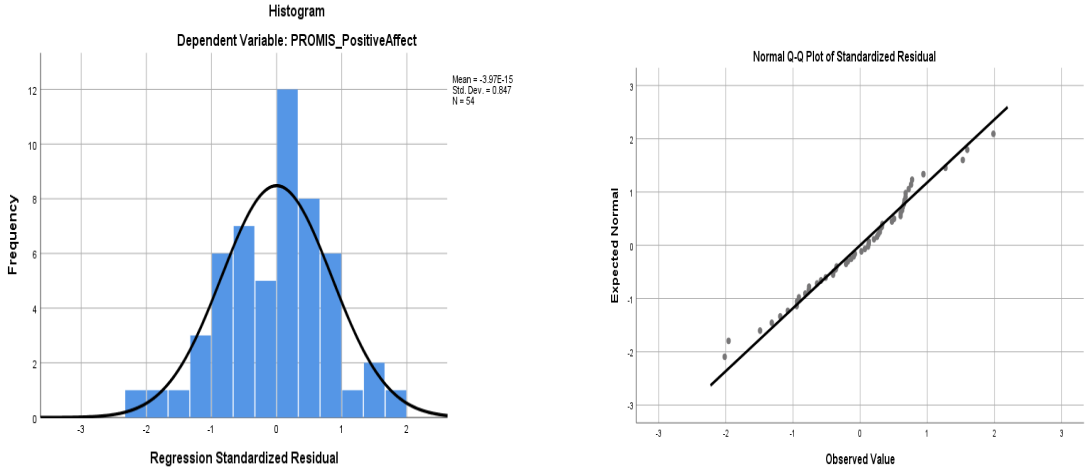
Table 5

Reliability Analysis of Positive Affect and Life Satisfaction

Scale	Items	M	SD	α
Positive Affect	8	47.50	17.91	0.98
Life Satisfaction	8	45.87	15.19	0.98

Figure 4

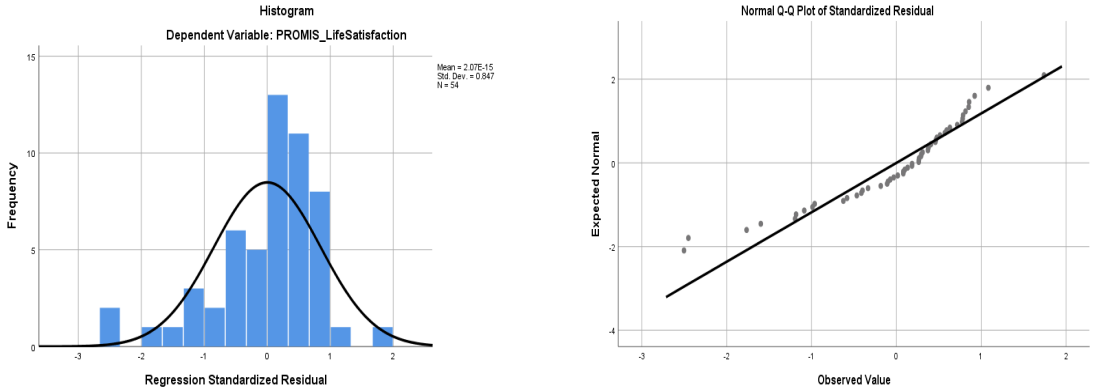
The Histograms and the Q-Q Plot of the Standardized Residuals for Positive Affect



(Skewness = - 0.22, Kurtosis = 0.1)

Figure 5

The Histograms and the Q-Q Plot of the Standardized Residuals for Life Satisfaction



(Skewness = -1.1, Kurtosis = 1.5)

Figure 6

The Outliers Testing of the Standardized Residuals for Positive Affect and Life Satisfaction

Positive Affect Life Satisfaction

Figure 7

The Scatterplot of the Standardized Residuals for Positive Affect and Life Satisfaction

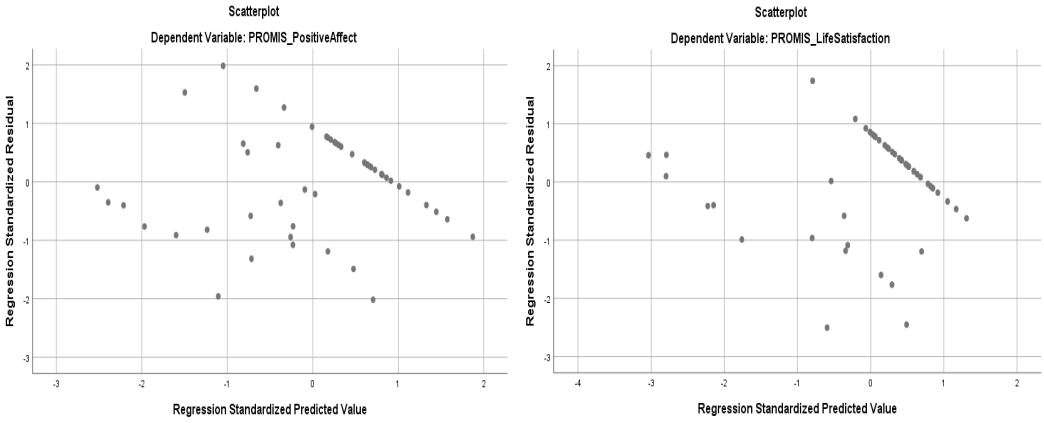


Table 6

The Multi-collinearity Testing with Variance Inflation Factor (VIF) for Predicting Factors of Natural Space: Battery Urban Farm (BUF), Green Space (GS), and Blue Space (BS)

Variables	Collinearity Statistics		Collinearity Statistics	
	Positive Affect		Life Satisfaction	
	Tolerance	VIF	Tolerance	VIF
BUF visitation frequency	0.13	7.56	0.13	7.82

BUF visitation time	0.65	1.53	0.74	1.36
BUF visitation overall timeframe	0.14	7.40	0.13	7.55
Residential proximity to BUF	0.38	2.61	0.36	2.78
Parental importance of BUF	0.49	2.03	0.49	2.03
GS visitation frequency	0.27	3.74	0.32	3.18
GS visitation time	0.55	1.82	0.57	1.74
GS visitation overall timeframe	0.14	7.34	0.16	6.18
Residential proximity to GS	0.58	1.73	0.58	1.72
Parent importance of GS	0.28	3.60	0.25	4.02
BS visitation frequency	0.35	2.85	0.40	2.51
BS visitation time	0.65	1.54	0.67	1.49
BS visitation overall timeframe	0.26	3.90	0.31	3.27
Residential proximity to BS	0.45	2.22	0.43	2.31
Parental importance of BS	0.19	5.40	0.14	7.06

APPENDIX I. NATURAL SPACES VISITED BY URBAN CHILDREN

Table 8

Responses to Survey Question 18 "Which BUF program did the child join?"

Responses	n	%
Staff-led Field Trips		
Water Quality of the Hudson	23	16.2
Summer Exploration	16	11.3
Different Types of Farmers	15	10.6
Eating the Rainbow	12	8.5
Fall Exploration	10	7.0
Insect investigators	9	6.3
Oyster Farming	9	6.3
School Plot	8	5.6
Food Miles	7	4.9
Observing the Seasons	7	4.9
Compost, Recycling, or Trash?	5	3.5
Green Space Study	5	3.5
Plants for Lunch	5	3.5
Gut Microbiome	4	2.8
Whole and Processed Foods	2	1.4
Aquatic Life of the Hudson	2	1.4
Story Telling	1	0.7
Farm Exploration	1	0.7
Self-led Field Trips	1	0.7

Note. N = 142

Table 9

Responses to Survey Question 25 about "Which green space did the child visited?"

Responses	n	%
Central Park	17	9.8
Battery Urban Park	10	5.7
Teardrop Park	8	4.6
West Themes Park	4	2.3
Morningside Park	4	2.3
Tompkins Square	4	2.3
Riverside Park	4	2.3

Columbus Park	3	1.7
Sakura Park	3	1.7
Fort Washington Park	3	1.7
Westside Community Park	3	1.7
Carl Schurz Park	2	1.1
East River Park	2	1.1
Fort Tyron Park	2	1.1
Heather Garden	2	1.1
Sutton Place Park	2	1.1
Thomas Jefferson Park	1	0.6
Andrew Haswell Green Park	1	0.6
City Hall Park	1	0.6
Frederick Playground	1	0.6
Ford Foundation Atrium	1	0.6
Gramercy Park	1	0.6
Harlem River Park	1	0.6
James Walker Park	1	0.6
John Jay Park	1	0.6
Liberty Plaza Park	1	0.6
Liz Christy Park	1	0.6
Prospect Park	1	0.6
Riverbank Park	1	0.6
Rockefeller Park	1	0.6
Roosevelt Park	1	0.6
Seward Park	1	0.6
Schwartz Garden	1	0.6
South Cove	1	0.6
St. Nicholas Park	1	0.6
Straus Park	1	0.6
West 111th Street Garden	1	0.6
Wall Street Courtyard	1	0.6
Washington Square Park	1	0.6
Zuccotti Park	1	0.6
Unspecified NYC Public Parks	45	32.6

Note. N = 138

Table 10

Responses to Survey Question 33 about "Which blue space did the child visited?"

Responses	n	%
Hudson River (Promenade)	22	13.2

East River (Esplanade)	9	5.1
Atlantic Ocean	6	4
Battery	6	4
Fire Island	6	4
Hamptons	6	4
Westside Plaza	6	4
Riverside Park	3	1.7
Harlem River	2	1.1
Little Red Lighthouse	2	1.1
Central Park Gapstow Bridge	1	0.6
Fort Washington Point	1	0.6
John Finlay Walk	1	0.6
New Jersey Shore	1	0.6
Sutton Place	1	0.6
Unspecified Beaches	2	1.1

Note. N = 58

APPENDIX J. POST-HOC PARAMETER ESTIMATES

Table 12

Post-hoc Parameter Estimates of a Battery Urban Farm Visitation Model for Parental Assessment of Child Well-being in Positive Affect

			95% Wald CI		Hypothesis Test		
Parameter	β	SE	Lower	Upper	Wald χ^2	df	Sig.
(Intercept)	66.26	13.67	39.47	93.06	23.49	1	0
Frequency of visit							
Less than once a month	-3.15	7.38	-17.61	11.32	0.18	1	0.67
Once a month	-1.4	7.26	-15.62	12.83	0.04	1	0.85
Once every two weeks	1.04	5.77	-10.27	12.35	0.03	1	0.86
Once a week	-19.1	7.98	-34.68	-3.41	5.7	1	0.02
Length of each visit time							
Less than half an hour	8.4	14.04	-19.11	35.92	0.36	1	0.55
Half an hour	-1.02	18.85	-37.96	35.92	0	1	0.96
One hour	4.45	12.83	-20.71	29.6	0.12	1	0.73
Two hours	-14.8	12.98	-40.28	10.6	1.31	1	0.25
Overall timeframe for visits							
Only one time	-22.6	5.91	-34.15	-10.98	14.56	1	0
Less than one month	-14.6	5.62	-25.56	-3.55	6.72	1	0.01
One month	8.51	10.13	-11.36	28.37	0.71	1	0.4
Two months	-11.5	9.53	-30.18	7.17	1.46	1	0.23
Three months	-9.06	5.94	-20.71	2.59	2.32	1	0.13

Note. Likelihood $\chi^2 = 119.54$, df = 13, $p < 0.001$

Table 14

Post-hoc Parameter Estimates of a Battery Urban Farm Visitation Model for Parental Assessment of Child Well-being in Life Satisfaction

			95% Wald CI		Hypothesis Test		
Parameter	β	SE	Lower	Upper	Wald χ^2	df	Sig.
(Intercept)	59.07	11.94	35.66	82.48	24.46	1	0
Frequency of visit							
Less than once a month	-1.47	6.5	-14.22	11.28	0.05	1	0.82
Once a month	0.64	6.39	-11.88	13.15	0.01	1	0.92
Once every two weeks	2.43	5.04	-7.45	12.31	0.23	1	0.63
Once a week	-9.21	6.49	-21.92	3.51	2.01	1	0.16
Length of each visit time							
Less than half an hour	4.24	12.5	-20.25	28.73	0.12	1	0.73
Half an hour	11.64	16.28	-20.28	43.55	0.51	1	0.48
One hour	4.28	11.21	-17.7	26.25	0.15	1	0.7
Two hours	-10.74	11.34	-32.96	11.49	0.9	1	0.34
More than three hours	-18.66	5.28	-29	-8.32	12.5	1	0
Overall timeframe for visits							
Only one time	-12.36	4.96	-22.1	-2.64	6.2	1	0.01
Less than one month	6.08	8.85	-11.27	23.42	0.47	1	0.49

One month	-11.23	8.34	-27.57	5.11	1.81	1	0.18
Two months	-6.6	5.17	-16.73	3.53	1.63	1	0.2

Note. Likelihood $\chi^2 = 102.42$, df = 13, $p < 0.001$

Table 16

Post-hoc Parameter Estimates of a Green Space Visitation Model for Parental Assessment of Child Well-being in Positive Affect

			95% Wald CI		Hypothesis Test		
Parameter	β	SE	Lower	Upper	Wald χ^2	df	Sig.
(Intercept)	65.86	6.3	53.51	78.22	109.22	1	0.00
Frequency of visit							
Less than once a month	-10.21	5.48	-20.95	0.54	3.47	1	0.06
Once a month	-30.43	4.42	-39.1	-21.76	47.32	1	0.00
Once every two weeks	-22.49	3.42	-29.2	-15.78	43.19	1	0.00
Once a week	-11.33	2.9	-17.02	-5.64	15.25	1	0.00
Length of each visit time							
Less than half an hour	-0.94	6.65	-13.98	12.09	0.02	1	0.89
One hour	-2.78	6.29	-15.1	9.55	0.2	1	0.66
Two hours	-4.96	6.57	-17.83	7.91	0.57	1	0.45
Three hours	-9	7.18	-23.06	5.07	1.57	1	0.21
Overall timeframe for visits							
Only one time visit	3.7	8.21	-12.38	19.78	0.2	1	0.65

Less than one month	-7.71	5.63	-18.75	3.32	1.88	1	0.17
One month	0.58	6.88	-12.89	14.06	0.01	1	0.93
Two months	-5.09	6.46	-17.74	7.57	0.62	1	0.43
Three months	-19.77	11.25	-41.82	2.28	3.09	1	0.08

Note. Likelihood $\chi^2 = 102.73$, df = 13, $p < 0.001$

Table 18

Post-hoc Parameter Estimates of a Green Space Visitation Model for Parental Assessment of Child Well-being in Life Satisfaction

			95% Wald CI		Hypothesis Test		
Parameter	β	SE	Lower	Upper	Wald χ^2	df	Sig.
(Intercept)	63.32	5.61	52.32	74.31	127.36	1	0.00
Frequency of visit							
Less than once a month	-8.65	5.17	-18.78	1.48	2.8	1	0.09
Once a month	-26.9	3.94	-34.62	-19.18	46.59	1	0.00
Once every two weeks	-15.59	2.96	-21.39	-9.79	27.75	1	0.00
Once a week	-6.18	2.64	-11.35	-1.01	5.49	1	0.02
Length of each visit time							
Half an hour	-3.63	5.92	-15.22	7.97	0.38	1	0.54
One hour	-5.27	5.61	-16.25	5.72	0.88	1	0.35
Two hours	-5.6	5.86	-17.08	5.88	0.91	1	0.34
Three hours	-8.46	6.5	-21.21	4.29	1.69	1	0.19

Overall timeframe for visits							
Only one time visit	3.45	9.77	-15.71	22.61	0.13	1	0.72
Less than one month	-8.53	5.07	-18.47	1.4	2.83	1	0.09
One month	3.21	6.08	-8.72	15.14	0.28	1	0.6
Two months	-8.44	5.73	-19.66	2.79	2.17	1	0.14
Three months	-24.83	10.03	-44.5	-5.17	6.13	1	0.01

Note. Likelihood $\chi^2 = 89.18$, df = 13, $p < 0.001$

Table 20

Post-hoc Parameter Estimates of a Blue Space Visitation Model for Parental Assessment of Child Well-being in Positive Affect

			95% Wald CI		Hypothesis Test		
Parameter	β	SE	Lower	Upper	Wald χ^2	df	Sig.
(Intercept)	69.92	3.84	62.41	77.44	332.5	1	0.00
Frequency of visit							
Less than once a month	-10.91	4.3	-19.34	-2.49	6.44	1	0.01
Once a month	-14.84	4.15	-22.98	-6.7	12.76	1	0.00
Once every two weeks	-0.19	5.16	-10.31	9.92	0	1	0.97
Once a week	-0.86	3.52	-7.76	6.04	0.06	1	0.81
Length of each visit time							
Less than half an hour	-9.32	9.83	-28.58	9.94	0.9	1	0.34

Half an hour	-9.54	7.56	-24.36	5.29	1.59	1	0.21
One hour	-7.87	3.88	-15.48	-0.26	4.11	1	0.04
Two hours	-4.91	4.7	-14.12	4.31	1.09	1	0.3
Three hours	-17.95	7.41	-32.48	-3.43	5.87	1	0.02
Overall timeframe for visits							
Only one time visit	17.82	12.13	-5.95	41.59	2.16	1	0.14
Less than one month	-4.74	4.93	-14.4	4.91	0.93	1	0.34
One month	-11.64	5.72	-22.84	-0.44	4.15	1	0.04
Two months	-8.02	9.83	-27.28	11.25	0.67	1	0.42

Note. Likelihood $\chi^2 = 37.1$, df = 13, $p < 0.001$

Table 22

Post-hoc Parameter Estimates of a Blue Space Visitation Model for Parental Assessment of Child Well-being in Life Satisfaction

			95% Wald CI		Hypothesis Test		
Parameter	β	SE	Lower	Upper	Wald χ^2	df	Sig.
(Intercept)	62.03	3.49	55.2	68.87	316.43	1	0.00
Frequency of visit							
Less than once a month	2.59	3.68	-4.62	9.79	0.5	1	0.48
Once a month	-6.16	3.79	-13.6	1.27	2.64	1	0.1
Once every two weeks	-0.67	4.74	-9.95	8.61	0.02	1	0.89
Once a week	-0.2	3.23	-6.53	6.13	0	1	0.95

Length of each visit time							
Less than half an hour	-0.53	9.01	-18.19	17.12	0	1	0.95
Half an hour	-6.64	6.91	-20.18	6.89	0.93	1	0.33
One hour	-5.34	3.5	-12.2	1.52	2.33	1	0.13
Two hours	-2.04	4.3	-10.48	6.39	0.23	1	0.64
Three hours	-10.65	6.79	-23.95	2.66	2.46	1	0.12
Overall timeframe for visits							
Less than once month	-11.92	4.45	-20.64	-3.2	7.18	1	0.01
One month	-7.38	5.23	-17.63	2.87	1.99	1	0.16
Two months	-18.729	9	-36.38	-1.08	4.33	1	0.04

Note. Likelihood $\chi^2 = 29.34$, df = 12, $p < 0.05$

Table 25

Post-hoc Parameter Estimates of a Residential-Proximity-to-Green-Space Model for Parental Assessment of Child Well-being in Positive Affect

			95% Wald CI		Hypothesis Test		
Parameter	β	SE	Lower	Upper	Wald χ^2	df	Sig.
(Intercept)	64.73	4.62	55.67	73.78	196.16	1	0.00
Residential Proximity to green space							
Less than half a mile	-9.06	4.93	-18.72	0.61	3.38	1	0.07
Half a mile	-0.07	4.93	-9.73	9.6	0	1	0.99
One mile	-5.2	4.87	-14.75	4.35	1.14	1	0.29
Two miles	-29.62	5.47	-40.33	-18.9	29.33	1	0
Three miles	-39.23	4.93	-48.89	-29.56	63.31	1	0

Note. Likelihood $\chi^2 = 176.67$, df = 5, $p < 0.001$

Table 27

Post-hoc Parameter Estimates of a Residential-Proximity-to-Green-Space Model for Parental Assessment of Child Well-being in Life Satisfaction

			95% Wald CI		Hypothesis Test		
Parameter	β	SE	Lower	Upper	Wald χ^2	df	Sig.
(Intercept)	61.5	4.06	53.55	69.448	230.01	1	0.00
Residential proximity to green space							
Less than half a mile	-6.62	4.33	-15.1	1.858	2.34	1	0.13
Half a mile	-1.48	4.34	-9.98	7.015	0.12	1	0.73
One mile	-6.54	4.27	-14.9	1.829	2.35	1	0.13
Two miles	-27.68	4.8	-37.08	-18.28	33.28	1	0.00
Three miles	-33.62	4.37	-42.18	-25.06	59.26	1	0.00

Note. Likelihood $\chi^2 = 157.12$, df = 5, $p < 0.001$

Table 29

Post-hoc Parameter Estimates of a Parental-Rating-of Importance-of-Green-Space Model for Parental Assessment of Child Well-being in Positive Affect

			95% Wald CI		Hypothesis Test		
Parameter	β	SE	Lower	Upper	Wald χ^2	df	Sig.
(Intercept)	66.26	13.67	39.47	93.06	23.49	1	0.00
Parental Ratings of Importance of Green Space							
Slightly important	-38.42	2.05	-42.43	-34.4	351.62	1	0.00
Important	-16.81	2.34	-21.4	-12.22	51.47	1	0.00
Very important	-2.47	1.95	-6.3	1.36	1.6	1	0.21

Note. Likelihood $\chi^2 = 213.56$, df = 3, $p < 0.001$

Table 31

Post-hoc Detailed Parameter Estimates of a Parental-Rating-of Importance-of-Green-Space Model for Parental Assessment of Child Well-being in Life Satisfaction

			95% Wald CI		Hypothesis Test		
Parameter	β	SE	Lower	Upper	Wald χ^2	df	Sig.
(Intercept)	60.54	1.3	57.99	63.08	2171.72	1	0.00
Parental Ratings of Importance of Green Space							
Slightly important	-32.56	1.78	-36.06	-29.07	333.26	1	0.00
Important	-16.07	2.02	-20.02	-12.12	63.51	1	0.00
Very important	-2.78	1.65	-6.02	0.46	2.82	1	0.09

Note. Likelihood $\chi^2 = 201.53$, df = 3, $p < 0.001$

Table 33

Parameter Estimates of a Parental-Socioeconomic-Status-Covariate Model for Parental Assessment of Child Well-being in Positive Affect

			95% Wald CI		Hypothesis Test		
Parameter	β	SE	Lower	Upper	Wald χ^2	df	Sig.
(Intercept)	24.95	4.02	17.08	32.82	38.6	1	0.00
Parental employment	-3.11	2.42	-7.84	1.63	1.66	1	0.2
Household income	5.02	0.4	4.24	5.8	158.53	1	0.00

Note. Likelihood $\chi^2 = 118.03$, df = 2, $p < 0.001$, Pearson $\chi^2 = 24664.62$, df = 156

Table 35

Parameter Estimates of a Parental-Socioeconomic-Status-Covariate Model for Parental Assessment of Child Well-being in Life Satisfaction

			95% Wald CI		Hypothesis Test		
Parameter	β	SE	Lower	Upper	Wald χ^2	df	Sig.
(Intercept)	25.32	3.41	18.63	32.01	55.05	1	0
Parental employment	-1.43	2.05	-5.45	2.6	0.48	1	0.49

Household income	4.31	0.34	3.64	4.97	162.91	1	0

Note. Likelihood $\chi^2 = 117.28$, df = 2, $p < 0.001$, Pearson $\chi^2 = 17084.15$, df = 153

APPENDIX K. CATEGORIES AND QUOTES IN CONTENT ANALYSIS

Table 36

Theme: Short-lived but Expansive Nature Exposure

Category	Quote
Brief nature exposure	A small nature exposure really works to children. She gets it, the well-being definitely. The little dose of contacting with nature fits the lifestyle of New Yorkers anyways, too. You don't need to go to a forest or a beach. Well-being is accessible right here in New York City. You don't need to live in rural areas, either. The Riverside Park Promenade in the upper westside is the best park in Manhattan to me. Great scenery along the river, whichever you do running or watching the sunset. It is peaceful and picturesque. It is my favorite site, I mean, my family's and of course, my daughter's, too. We all just love to visit it. Even a short visit. Well-being may be meant to be a short time experience. One thing that I realized about my son is that a short visit, not long visit, to the farm is beneficial to him. Connecting with nature restores and recharges us. But hyper-active persons like my son can get easily exhausted by spending too much in nature. So, being longer in a natural environment doesn't mean to give him higher quality of well-being. It may not be sustainable if you are exhausted. So I think timeframe can be important. You want well-being but not exhaustion from being in nature. Like some folks said, it's good to have a small dose of exposure to nature, little by little, everyday rather than a big dose. Little things do the big things. That more makes sense to me. I don't know why, but this park is probably at least not widely known even by native New Yorkers. So, it is quiet to have a short comfy break or rest. Also, it is very convenient. Very convenient in urban settings. It allows campers to go home each afternoon. So she can experience and expose to nature in the morning and be back to the urban life in the afternoon. She doesn't need to spend a whole week or a month to spend in a mountain or river. Only a few hours of time. Disconnecting from the daily routine a bit can help her grow in something that she cannot do so otherwise.

Yes. Only a dose of nature exposure is what all we need. We don't need to live in the middle of fields or oceans. We just a little bit get in touch with nature everyday and so. That is really I think making something different in mindset. It is like a reset.

What my son does usually there is taking his dog for a walk earlier in the morning. He is really good at this since he was only 5 years old when he got the dog, Mink. Mink is always with him. He used to be going twice a day, morning and night. But since he is now attending the school, the school stuff comes first. He cannot do so often any more unfortunately. But he does still this whenever he finds even only a little time. Only a brief time a day off to the esplanade makes him really refreshed. The esplanade is like a breather. Since that younger age, he made this taking for a walk with dog things some routine work.

I think that only brief time spending at natural space like the esplanade makes his day a bit smoother.

Okay. I think only thing that I can tell you is that my son's brief well-being. I mean he is 12 years old whose emotions are quite wacky. He is having I think a sort well-being at a moment and having a withdrawal at another moment.

New Yorkers will not be tolerated on living in mountains or oceans. They want just a breather in the middle of high-rise buildings. We just need a small break time. We need a small moment. That's enough to change some levels of our well-being. Well, how long it lasts is another question, though.

Subtle rhythms

The nature is universal, no matter where in Melbourne or New York City. It has a kind of universal, own rhythms. The nature's rhythm helps my son to regulate his own rhythms. He can get in touch with his own rhythms everywhere there is nature. So, learning to regulate self is really important in any ages, but especially at the younger age as his own. The state of well-being is similar to I think what is called mindfulness. We are living as travelers and foreigners in New York City, and our lifestyle changes are inevitable. In terms of that, nature actually benefits us to cope with the life.

The trees and plants also exert some molecules, invisible ones, like the ones we smell. That kind of subtle stuffs might have more effects on human system than gross ones. Maybe. Especially to the small, young, children. The subtle things like waves of melodies and molecules can reach the heart of human systems. I believe in that.

Table 37

Theme: Learning and Caring Hubs

Category	Quote
Hubs	She may grow up, continuously supported by nature in the midst of this bustling urban area of New York City. She doesn't necessarily move out to the rural area. She can find her own natural environments in the urban area where she grew up—right here in New York City. If the natural environment like the one at the Battery farm can support more kids around the city, the place becomes a hub for the health education and information. If the farm is the hub for well-being, isn't it great?
	Nature really includes a group of farmers, fishers, campers…all of those people are really working as a group of folks. There are cultures to share. Skills to share. A lot of wisdoms to share. So many to share out there. Sharing and connecting with people are really a fundamental, seminal seed to well-being. Those sharing is more possible in natural environments.
Lessons	If they didn't demonstrate how the lavender leaves would give us a scent between the kids' fingers, they couldn't have known anything about it. My daughter cannot learn without them. Of course, she can learn something, but some sorts of lessons or structures can help a lot. Just being in nature probably isn't enough for the kids in her age, I think.
	It was organized in a way that kids play and reflect on what they have made in learning. At the end of each lesson, there are time to reflect. They made a circle where everyone sat down in circle. Each person was given opportunity to speak about one's own reflection or anything. When you have a turn to speak, they will give you a wood log so that others knew that you are the person to speak. It's very respectful.
	And page by page, talked about nature, cycling, changing seasons, kinds of insects, green plants, wild creatures and animals. Kids seemed to get succumbed to the beauty of the story. The story was connected to the community via recycling nature of water, foods, nutrition, climate, like that. It makes even us adults think about relationship between nature and ourselves. It just didn't seem to me only for kids but for adults. Well, it depends on how you take look at the story. It seems like a science. With a hint of biology, ecosystems, earth's systems, that made us think of future. The future of this community, city, country or planet.

It but doesn't sound to be righteousness or religious preach. It is more like knowledge and principles. Simply that is it. The story doesn't force kids to take look at one direction or behave for one way. Rather, it made kids think more in connection to other environments, people, friends, family, nature, animals. How we can live in harmony. How we can make that harmony. The story told me that the harmony can grow deeper and higher and wide. It evolves bigger in harmony. That is what I feel my M can touch some of the points like that. It was a real lesson not just visiting to take a nice deep breath in the farm. It was more than just a textbook.

We need that kind of interactive environments that has supporters. Someone with experience is good, not necessarily someone with education. Again, it's not about righteousness or religious preach, you know. It is about life story – the storytelling. I love love love this.
No, actually he was enthusiastic. He became more engaged. That fieldtrip was interactive and educational.

The children are now learning about that complex network of teamwork from nature, too. Battery Urban Farm's program with insect study taught the children about how different bugs do the different jobs to help gardens grow. There are works of pollinators, predators, aerators and so many others. The different ones are contributing each to the same outcome job in the field. For flowering, for instance. Without being told to do this or that, theses small creatures do the job in togetherness. It was so impressive to the children.

The salad was made of a variety of colors of nature. That was very appealing. That was so very like a rainbow. The teachers talked about the colors and nutrition in such raw harvests. Now she knew about vitamins and minerals. After that, she even taught me proudly about how color of a veggie can help us identify the vitamins, whenever we picked up some veggies at nearby supermarket. It's like a what. like a what's called…oh farm to table, right? The phrase, farm to table, is a kind of social movements, right? Other words to say… it is like a locavore movement, huh? I think what my daughter learned that kind so on time of this movements. Believe or not, she now so gears toward local community healthy eating and living movements. What a change. A change in her life.

Safety

Volunteering parents are here to watch and guard those kids outside. Always, safety is critical and becomes issue in school for kids like my son's age. Safety is the priority.

If it is on the soil ground, it is very much soft for kids not to much worry about those risks. And the soil itself has a lot of information in it, right?

	Yeah. It is made of very safe for kids to play. Of-course freely. This free-standing really releases my daughter's stress or fears that she might have in class. The soil of the park for green plants has never been supplied with chemical fertilizers, pesticides, herbicides, fungicides, some-cides at all.
Love	It takes a lot of attention, care, and love. Of course, the food preparation from harvesting takes lots of love to take care and spend with them. It all includes continuous and meticulous work of how to prepare the soil for new plants. It's a continuous cycle of preparation and attention. It requires a type of love to pour over the soul of natural materials like the water to pour over the plants and soil. She always asked me how much time to take care of the veggie to grow into adults. But she knew the answer. She said to me, how to take care is how much to love because she thinks nothing can grow well without love. Her rational makes sense to me. Without love from nature, my daughter can probably not feed herself with something she dislikes. She stopped discriminating the foods by likes or dislikes. Her sensitivity to nature's unconditional love made her behave also in unconditional ways to others. I think now my daughter is learning mother nature and mother love from the natural environments. To my daughter, her own mother is mysterious. So is mother nature, or natural environments. But unconditional love and nature of productivity are common in both. Those are probably sure things to her. Since then, I could start to see something inside my daughter healed. She started to enjoy connecting with others or natural materials.
Belonging	After all, the natural environments really gave her a sense of being part of something….something bigger than herself, that is even beyond my husband and I, the community and society. The best natural environments are really providing us with that kind very gently. I really like to say kids have kids' own business. They first really seemed to get to know about how humans are connected together with nature because nature's gifted harvests for our eating and living.
Mystery	The students started noticing Fibonacci patterns everywhere. It was mystery to them hidden deeper in nature. Secret. This finding was really exciting the students including my son. Back to the school from the beach, they started drawing the spiral making spiral arts. Even though the children didn't get into the deeper math in Fibonacci, they get the concept that there are mystery and secret of nature residing in living materials.

	There is difference between plastic made flowers and natural flowers. The patterns would never be taught but happen naturally as if there is God, the intelligence that design this universe. The children got this concept, which is an awesome thinking. They might have felt some awe before nature. Higher being or energy or existence above us. That makes them feel nature more respectable. Nature taught very quietly but effectively to the students about how precious each live is. Every natural material is worth respecting.
Curiosity	I see her some good spirits which is gained from natural environments. She has more curiosity which you can read apparently from her shining eyes, grinning face, cheering speech, also many other things. It is so fun. Her lifted spirts lifts up my spirits, too. If I can call higher spirits well-being, the well-being is contagious. Higher spirits are generated from high quality natural environments. When my youngest daughter goes to the Battery park, for example, it seemed to happen. The Battery's farm environment elevates her curiosity to the all living creatures and natural objects like seeds, insects, plants. Her curiosity shows up in her composure to try to learn something new. She becomes eager for touch, smell, knowledge and more. Is it considered well-being? I think it is. One thing is that she became more curious about natural things. But not just about the natural things. She is more curious about changing nature. Those are the things that she can tell and observe. For example, she can tell daily changes of the sun and moon's shapes and seasonal changes of the colors of leaves. I mean children have lots of power of healing. It feels that any natural environments can bring us adults back to the childhood, giving a child-like wonder. It is so pleasure to spend in nature. You can just show up in front of the farm and join. M was shy at the beginning and hiding in my skirt. But then, as instructors at the farm approached her gently, she was able to come out and walk along with other folks. She seemed to be getting more calmer and calmer. I think her curiosity increased. She as getting more and more curious about gardening.
Dreams	She was telling me about very tiny insects that live in the farm and do the great jobs at the farm to grow the vegetables and plants or herbs. The tiny ones usually hid behind or deeper below the ground soil. But digging with her fingers, it showed up out. They kept other bad bugs from damaging the veggies. She learned. That was the first time really when she talked about what is fun about the Camp. Now she is saying she wanna be a scientist that can observe with a field glass or a pair

	of binoculars. Since then, she begged me to buy her the binoculars. She is hopeful. She is motivated to observe those small creatures in the soil and their big jobs at nurturing the foods that eventually transform out dinner table. She seemed to be excited about the connections and cycles of the foods from the farm. Those are real. The real life and real world expanded beyond her toys and books. She at that young age knew about this. It really opened my son's heart. He also was very interested in water treatment and impacts of pollution to what lives in the river. He now studied harder about common pollutants in the river and a filtration system of the city, because he dreams a professional who can explore ways to conserve water and improve water quality.
Excitement	And she said to me that they were tiny bits of lavender leaves that became to travel into air after she rubbed them. She explained to me about how lavender reaves emitted pleasant smell when she rubbed them with her fingers. The bubbles were her imagination of a gift of lavender leaves. The bubbles are possibly the molecules that contains the property of smelling. I was aghast at it. She is an artist and a scientist! Sometimes, a challenge, courage, or what is called adventure is a well-being. They have a future so ahead of them. It's more than the school textbooks. The experience from the nature is such an invaluable thing. The outdoor sensory experiences are invaluable. That is true. It's because the connection to nature uses all senses by the hands, head, eyes, nose, ears, or even mouth! My daughter said to me that she ate a plate of salad with sweet peanut or sesame tasted source at the end of semester. The salad was made of the harvested herbs and vegetables right out from the Battery farm. She enjoyed using all senses of testing the nature. There was a place of labyrinth covered with lawn and surrounded with green shrubs and grasses in the Battery Urban Farm. That was the place for my boy and other kids in the program enjoyed exploring nature. He was picking shiny, glittery rocks on a rainy day and special leaves and flowers on another day. He run and stomped mushy and slimy grounds. He even almost swam in mud. He looked like someone who revived in a fresh water like a fish that survived and turned over a new leaf. There were school field trips at pier waterfront place. Because he was so intrigued with science or oceanic science, in particular, he was so excited humming and singing a song!

Table 38

Theme: Integration that Creates Oasis

Category	Quote
Oasis	It is an original and signature park in New York City. It is a hidden gem. Or it is a hidden oasis. Hidden in the deep inside the Wall street buildings, the hub of business, and yuppie residential high-rise apartments. The Teardrop was after all very original and made of a famous architect who knows about the beautiful integration and care about sustainability of urban planning. I heard the park reuses the water from the surrounding buildings for the irrigation of the park. Its shady site provides native and migratory birds to rest. I think this park has the most shrubberies, trees with plenty of green foliage providing temporary relief from the purgatory blazing heat and sun for shade. Children feel this greatness, a gift from nature in some levels. That is why my daughter is a frequent flyer to the Riverside Park. She is only 5 years old, but she goes by herself or with my wife so often. Just like it is the place of oasis in the midst of a desert. Every time she goes to the park, her thirsty is quenched enough to make another adventure in her life. It is literally true, but it is so true to her spirituality. Children are so honest. They are emotional, acting out, sometimes not responding in a well-manner. But after the lesson of quenching herself, her emotions calm down. She looked not only refreshed but moved into one step ahead of growth. Growing both emotionally and spiritually. I am so impressed of how nature does to those little one. I would say, this is an awesome spot when you wanna step off the faux bustle streets and into nature but don't wanna make a commitment of going along the Hudson. It's certainly a nice little refuge.
Integration	The pathway meets a wonderful green space, too. So, the blue meets the green. It is a real true natural place including both dualistic spaces of the blue and green. There are connections of the both spaces, an integration of blue and green spaces along this Eastside Esplanade. If you are studying both blue and green spaces, this esplanade is the one you can't miss. It's probably rare, I think, to have both spaces altogether, in nicely paved, safely built, cleanly swept and maintained, in this urbanized area of big cities like New York City.

I like to think about the integration of nature with urbanity. I heard that New York has the cleanest water in the United States despite the image that the city usually is contaminated. We can conserve something natural beautifully even in urban areas. We are eager to have both nature and urbanity. Either one cannot fail. Both needed. I am glad that this Battery farm is actually I think well integrated together. Both are sustainable and strong. Nature exposure is not new, either. It is traditionally held in old good American culture. Today's popularity in nature exposure is somewhat revival. People has gotten more attention to that. Health care effects from nature exposure. People do that so in urbanized areas like New York City. It is a really nice move. I think it's not only for children but for adults and older adults, too. We can live lives not in desolated areas but here in urban areas with integration of nature and high-end infrastructures.

But their consciousness is showing up in the infrastructures of the city. The more appreciation to nature and urban convenience, the more integration of nature and urbanization. See the riverside park I said earlier. It is about integration.

It is beautiful when there is even a scant of green leaves. I like it. I don't know about how green leaves affect bodies' physiology. I am not a medical doctor. But I know beauty of nature affect bodies at different levels. It is elevating human spirits. Then, why not human bodies. My daughter is lucky enough to get exposed to the hint of a good mixture of nature and urbanized civilization, per se.

So, you see lots of reservation and conservation of nature. It is very integrative of nature and urbanization. The park provides natural materials – the water fall, plants, rock, sand, and more. Out there, children can use those natural materials for planting, too.

It's a piece of art or one of a kind. Or it is a state of the art. It is a kind of up-to-date park with technological and natural integration for children to play outdoors. Believer or not, this park was rolled out about ten years ago, or more. But a lot of New Yorkers don't know about this park. It is the best park.

There is highly considerable, the city's unique urban landscape art and functionality for kids to play with safety still precautioned. It requires sustainability science and philosophy behind the scene. Those elements are nicely integrated there. It yes requires some strong support and understanding with environmental intellectual workmanship. We finally see this in that kind of space in the Teardrop really. It is something that we really longed-for. I am so glad that the city finally launched into this aspect of connection to childhood well-being. The development is really a world-class public art and technology installation.

The urban landscape planning project. So the best natural environment for child well-being is really the issue of how the governmental decision can go green. The conscious support can gift the public. This could be happening or not if there is the support.

You know, our life cannot be disconnected from non-nature things. We cannot be disconnected from nature, either. Our time should be in the somewhat middle. Nature and non-nature should be mixed ideally, with a good balance.

A Good thing is that there are more people who are recognizing the health benefits and well-being from the special characters of landscapes or natural environments. But not only that. Importantly, people more emphasize on the integration of natural space and urban space. While enjoying the convenience of living in the urbanized space, we also can enjoy the natural space. Not either one, but both. This kind mixture is apparently demanded. It is happening at the level of general citizens.

There is highly considerable, the city's unique urban landscape art and functionality for kids to play with safety still precautioned. It requires sustainability science and philosophy behind the scene. Those elements are nicely integrated there. It yes requires some strong support and understanding with environmental intellectual workmanship. We finally see this in that kind of space in the Teardrop really. It is something that we really longed-for. I am so glad that the city finally launched into this aspect of connection to childhood well-being. The development is really a world-class public art and technology installation.

REFERENCES

Aggio, D., Smith, L., Fisher, A., & Hamer, M. (2015). Mothers' perceived proximity to Green space is associated with TV viewing time in children: the growing up in Scotland study. *Preventive Medicine*, 70, 46-49. https://doi.org/10.1016/j.ypmed.2014.11.018

Amoly, E., Davand, P., Forns, J., Lopez-Vincente, M., Basagana, X., Julvez, J. … Sunyer, J. (2014). Green and blue spaces and behavioral development in Barcelona schoolchildren: the BREATH project. *Environmental Health Perspectives*, 122(12), 1351-1358. http://dx.doi.org/10.1289/ehp.1408215

Ashbullby, K. J., Oahl, S., Webley, P., & White, M. P. (2013). The beach as a setting for families' health promotion: A qualitative study with parents and children living in coastal regions in Southwest England. *Health & Place*, 23, 138-147. https://doi.org/10.1016/j.healthplace.2013.06.005

Balseviciene, B., Sinkariova, L., Grazuleviciene, R., Andrusaityte, S., Uzdanaviciute, I., Dedele, A., Nieuwenhuijsen, M. J. (2014). Impact of residential greenness on preschool children's emotional and behavioral problems. *International Journal of Environmental Research and Public Health*, 11, 6757-6770. doi: 10.3390/ijerph110706757

Barton, J., Sandercock, G., Pretty, J., & Wood, C. (2014). The effect of playground- and nature based playtime interventions on physical activity and self-esteem in UK school children. *International Journal of Environmental Health Research*, 25(2), 196-206. http://dx.doi.org/10.1080/09603123.2014.915020

Battery Conservancy (n. d.). Education. http://thebattery.org/programs/education/

Beck, D. (2005a). At the millennium crossroads: reigniting the fame of Nightingale's legacy. In B. M. Dossey, L.C. Selanders, D. M. Beck, & A. Attewell (Eds.), *Florence Nightingale today: Healing, leadership, global action* (pp. 127-150). Silver Spring.

Beck, D. (2005b). Sick-nursing & health-nursing: Nightingale establishes our broad scope of practice in 1893. In B. M. Dossey, L.C. Selanders, D. M. Beck, & A. Attewell (Eds.), *Florence Nightingale today: Healing, leadership, global action* (pp. 151-175). Silver Spring.

Beck, D. (2005c). 21st-century citizenship for health: "may a better way be opened!" In B. M. Dossey, L.C. Selanders, D. M. Beck, & A. Attewell (Eds.), *Florence Nightingale today: Healing, leadership, global action* (pp. 177-201). Silver Spring.

Birky, J. & Strom, E. (2013). Urban perennials: how diversification has created a sustainable community garden movement in the United States. *Urban Geography*, 34 (8), 1193-1216. doi: 10.1080/02723638.2013.784086

Canning, N. (2010). The influence of the outdoor environment: den-making in three different contexts. *European Early Childhood Education Research Journal*, 18(4), 555-566. doi: 10.1080/1350293X.2010.525961

Canning, N. (2013). 'Where's the bear? Over there!' – creative thinking and imagination in den making. *Early Child Development and Care*, 183(8), 1042-1053. doi: 10.1080/03004430.2013.772989

Cantril, H. (1965). *The pattern of human concern*. New Brunswick, NJ: Rutgers University Press.

Centers for Disease Control and Prevention (CDC) (2018). Middle childhood (6-8 years of age)/child development. https://www.cdc.gov/ncbddd/childdevelopment/positiveparenting/middle.html

Chang, P. & Yeh, C. (2004). Agreement between child self-report and parent proxy report to evaluate quality of life in children with cancer. *Psycho-Oncology*, 14, 125-134.

Cherrie, M. P. C., Shortt, N. K., Mitchell, R. J., Taylor, A. M., Redmond, P., Thompson, C. W., Starr, J. M., Deary, I. J., & Pearce, J. R. (2018). Green space and cognitive ageing: a retrospective life course analysis in the Lothian Birth Cohort 1936. *Social Science & Medicine*, 196, 56-65. https://doi.org/10.1016/j.socscimed.2017.10.038

Chiang-Hanisko, L., Newman, D., Dyess, S., Piyakong, D., & Liehr, P. (2016). Guidance for using mixed methods design in nursing practice research. *Applied Nursing Reseach*, 31, 1-5. http://dx.doi.org/10.1016/j.apnr.2015.12.006

Coe, R. (2002, September 12-14). *It's the Effect Size, Stupid: What effect size is and why it is important*. Paper presented at the annual conference of the British Research Association, University of Exeter, England. http://www.leeds.ac.uk/educol/documents/00002182.htm

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). New York, NY: Psychology Press, Taylor & Francis Group.

Creswell, J.W., & Plano-Clark, V.L. (2011). *Designing and conducting mixed Methods Research* (2nd Ed.). New York, NY: Sage.

Creswell, J. W. (2013). *Qualitative inquiry & research design: choosing among five approaches* (3rd Ed.). New York, NY: Sage.

Dickinson, E. (2013). The misdiagnosis: rethinking "Nature-deficit Disorder." *Environmental Communication*, 7(3), 315-335. http://dx.doi.org/10.1080/17524032.2013.802704

Dossey, B. M. (2005a). Florence Nightingale's Tenets: Healing, Leadership, Global Action. In B. M. Dossey, L.C. Selanders, D. M. Beck, & A. Attewell (Eds.), *Florence Nightingale today: Healing, leadership, global action* (pp. 1-28). Silver Spring.

Dossey, B. M. (2005b). Florence Nightingale's 13 formal letters to her nurses (1872-1900). In B. M. Dossey, L.C. Selanders, D. M. Beck, & A. Attewell (Eds.), *Florence Nightingale Today: Healing, Leadership, Global Action* (pp. 29-63). Silver Spring.

Dossey, B. M. (2008). Theory of Integral Nursing. *Advances in Nursing Science*, 31(1), E52-E73.

Dossey, B. M. (2015a). Nurse Coaching. In B. M. Dossey, S. Luck & B.G. Schaub (Eds.), *Nurse Coaching: Integrative approaches for health and well-being* (pp. 3-28). International Nurse Coach Association.

Dossey, B. M. (2015b). Theory of Integrative Nurse Coaching. In B. M. Dossey, S. Luck & B.G. Schaub (Eds.), *Nurse Coaching: Integrative approaches for health and well-being* (pp. 29-49). International Nurse Coach Association.

Dossey, B. M. (2015c). Stories, strengths, and the Nurse Coach 5-step process. In B. M. Dossey, S. Luck & B.G. Schaub (Eds.), *Nurse Coaching: Integrative approaches for health and well-being* (pp. 85-108). International Nurse Coach Association.

Dossey, L. (1982). *Space, time and medicine*. Boston, MA: Shambhala.

Duvall, J. & Kaplan, R. (2014). Enhancing the well-being of veterans using extended group-based nature recreation experiences. *Journal of Rehabilitation Research & Development*, 51(5), 685-696.

Feng, X. & Astell-Burt, T. (2017a). Residential green space quantity and quality and child well being: a longitudinal study. *American Journal of Preventive Medicine*. https://dx.doi.org/10.1016/j.amepre.2017.06.035 http://www.ajpmonline.org/article/S0749-3797(17)30377-X/pdf

Feng, X. & Astell-Burt, T. (2017b). The relationship between neighbourhood green space and child mental wellbeing depends upon whom you ask: multilevel evidence from 3083 children aged 12-13 years. *International Journal of Environmental Research and Public health*, 14. doi: 10.3390/ijerph14030235

Feng, X. & Astell-Burt, T. (2017c). Do greener areas promote more equitable child health? *Health & Place*, 46, 267-273. doi: 10.1016/j.amepre.2017.06.035

Field, A. (2014). *Discovering Statistics Using IBM SPSS Statistics*. (4th ed). London, UK: SAGE Publications Ltd.

Finlay, B. B. & Arrieta, M. (2016, September 15). Get your children good and dirty. *Wall Street Journal*. https://www.wsj.com/articles/get-your-children-good-and-dirty-1473950250?tesla=y

Flouri, E., Midouhas, E., & Joshi, H. (2014). The role of urban neighborhood green space in children's emotional and behavioural resilience. *Journal of Environmental Psychology, 40*, 179-186.

Fukushima, A., Yagi, R., Kawai, N., Honda, M., Nishina, E., Oohashi, T. (2014) Frequencies of inaudible high-Frequency sounds differentially affect brain activity: positive and negative hypersonic effects, negative hypersonic effect. *PloS One*, 9(4), e95464.

Forrest, C. B., Tucker, C. A., Ravens-Sieberer, U., Pratiwadi, R., Moon, J., Teneralli, R. E., Becker, B., Bevans, K. B. (2015). Concurrent validity of the PROMIS® pediatric global health measure. *Quality of Life Research*, 27. doi: 10.1007/s11136-015-1111-7

Goodman, A., Lamping, D. L., & Ploubidis, G. B. (2010). When to use broader internalising and externalising subscales instead of the hypothesized five subscales on the strengths and difficulties questionnaire (SDQ): data from British parents, teachers and children. *Journal of Abnormal Child Psychology*, 38(8), 1179-1191.

Griebling, S., Elgas, P. & Konerman, R. (2015). "Trees and things that live in trees": Three children with special needs experience the project approach. *Early Childhood Research & Practice*, 17(1). http://go.galegroup.com.ezproxy.fau.edu/ps/i.do?p=EAIM&u=gale15691&id=GALE%7CA429735030&v=2.1&it=r&sid=summon&authCount=1

Guest, G. (2012). Describing mixed methods research: an alternative to typologies. *Journal of Mixed Methods*. 79(2), 141-151. doi: 10.1177/1558689812461179

Hsieh, H., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, 15(9), 1277-1288.

Huynh, Q., Craig, W., Janssen, I., & Pickett, W. (2013). Exposure to public natural space as a protective factor for emotional well-being among young people in Canada. *BMC Public Health*, 13, 407. http://www.biomedcentral.com/14712458/13/407

Integrative (iHMP) Research Network Consortium (2014). The integrative human microbiome project: Dynamic analysis of microbiome-host omics profiles during periods of human health and disease. *Cell Host Microbe*, 16(3), 276-

289. doi: 10.1016/j.chom.2014.08.014.

Jonker, M. F., van Lenthe, F. J., Donkers, B., Mackenbach, J. P., & Burdorf, A. (2014). The effect of urban green on small-area (healthy) life expectancy. *Journal of Epidemiology and Community Health*, 68, 999-1002. doi:10.1136/jech-2014-203847

James, P., Hart, J. E., Banay R. F., & Laden, F. (2016). Exposure to greenness and mortality in a nationwide prospective cohort study of women. *Environmental Health Perspectives*, 124(9), 1344-1352. doi:10.1289/ehp.1510363

Kalkman, S., Thiel, G. V., Graaf, R. V., Zuidgeest, M., Goetz, I., Grobbee, D., & Delden, J. V. (2017). The social value of pragmatic trials, *bioethics*, 31(2), 136-143.

Kamioka, H., Tsutani, K., Yamada, M., Park, H., Okuizumi, H., Honda, T., Okada, S., Park, S. J., Kitayuguchi, J., Abe, T., Handa, S., & Mutoh, Y. (2014). Effectiveness of horticultural therapy: A systematic review of randomized controlled trials. *Complementary Therapies in Medicine*, 22, 930-943.

Kellar, S. P. & Kelvin, E. A. (2013). *Munro's statistical methods for health care research* (6th ed.). New York, NY: Wolters Kluwer, Lippincott Williams & Wilkins.

Kim, H., Lee, C., & Sohn, W. (2016). Urban natural environments, obesity, and health related quality of life among Hispanic children living in inner-city neighborhoods. *International Journal of Environmental Research and Public Health*, 13(1). doi: 10.3390/ijerph13010121 http://www.mdpi.com/1660-4601/13/1/121/htm

Kobayashi, H., Song, C., Ikei, H., Kagawa, T., & Miyazaki, Y. (2015). Analysis of individual variations in autonomic responses to urban and forest environments. *Evidence based Complementary and Alternative Medicine*, 2015, 1-7.

Kreitzer, M. J. (2012). Spirituality and well-being: focusing on what matters. *Western Journal of Nursing Research*, 34(6), 707-711. doi:10.1177/0193945912448315

Let's Move (n. d.). America's move to raise a healthier generation of kids. https://letsmove.obamawhitehouse.archives.gov/about

Kuo, F. E. & Taylor, A. F. (2004). A potential natural treatment for attention-deficit/hyperactivity disorder: evidence from a national study, *Research and Practice*, 94(9), *1580*

Louv, R. (2005). *Last child in the woods: saving our children from nature-deficit*. Chapel Hill, NC: Algonquin Books of Chapel Hill.

Louv, R. (2016). *Vitamin N: the essential guide to a nature-rich life*. Chapel Hill, NC: Algonquin Books of Chapel Hill.

Lumber, R., Richardson, M., & Sheffield, D. (2017). Beyond knowing nature: contact, emotion, compassion, meaning, and beauty are pathways to nature connection. *PLOS One*, 12(5): e0177186. https://doi.org/10.1371/journal.pone.0177186

Markevych, I., Tiesler, C. M. T., Fuertes, E., Romanos, M., Dadvand, P., Nieuwenhuijsen, M. J., Berdel, D., Koletzko, S., & Heinrich, J. (2014). Access to urban green spaces and behavioural problems in children: Results from the GINIplus and LISAplus studies. *Environment International*, 71, 29-35.

McNeil, K. A, Newman, I. and Fraas, J. W. (2012). *Designing general linear models to test research hypotheses*. Lanham, MD: University Press of America.

Nagata, M. (2018). Concept building for research: Nature immersion. In M. J. Smith & P. R. Liehr (4th ed.), *Middle range theory for nursing* (pp. 371-392). Springer Publishing Company.

Naik, G. (2015, September 30). Study Links Asthma to Low Levels of Gut Bacteria in Newborns. *Wall Street Journal*. http://www.wsj.com/articles/study-links-asthma-to-low-levels-of-gut-bacteriainnewborns-1443636000

National Center for Complementary and Integrative Health (NCCIH) (2018, November 26). *Bratman describes science of nature's effect on psychological health.* https://nccih.nih.gov/research/blog/Bratman-Describes Science-of-Natures-Effects-on-Psychological-Health

National Institute of Environmental Health Sciences (NIEHS). (2017, January 9). *Children, nature, and the importance of getting kids outside: Partnerships for Environmental Health (PEPH)*. https://www.niehs.nih.gov/research/supported/translational/peph/podcasts/children-nature/index.cfm

The New York State Department of Environmental Conservation (DEC) (2019, January 23).*Testimony of Basil Seggos commissioner. New York state legislature senate standing committee on finance assembly standing committee on ways and means hearing: The 2018-2019 Executive Budget Recommendations for the Department of Environmental Conservation* [PDF file]. https://nyassembly.gov/write/upload/publichearing/000954/001634.pdf

Nightingale, F. ([1860]1969). *Notes on nursing: What it is and what it is not*. New York, NY: Dover.

Nightingale, F. ([1893]2005). Sick-nursing and health-nursing. In B. M. Dossey, D. M. Beck, L. C. Selanders, & A. Attewell (Eds.), *Florence Nightingale today: healing, leadership, global action* (pp. 288-303). Silver Spring.

Olshansky, S. J., Passaro, D. J., Hershow, R. C., Layden, J., Carnes, B. A., Brody, J., Hayflick, L., Butler, R. N., Alison, D. B., & Ludwig, D. S. (2005). A potential decline in life expectancy in the United States in the 21st century. *The New England journal of Medicine*, 352(11), 1138-1145.

Oxford University Press. (2010). *New Oxford American Dictionary* (3rd ed.). Oxford, UK: Oxford University Press.

Patient-Reported Outcomes Measurement Information System (PROMIS®) (2017a). Life Satisfaction scoring measurement [PDF file]. http://www.healthmeasures.net/administrator/components/com_instruments/uploads/PROMIS%20Life%20Satisfaction%20Scoring%20Manual.pdf

Patient-Reported Outcomes Measurement Information System (PROMIS®) (2017b). Positive Affect scoring manual [PDF file]. http://www.healthmeasures.net/administrator/components/com_instruments/uploads/PROMIS%20Positive%20Affect%20Scoring%20Manual.pdf

Pedhazur, E. J. (1997). *Multiple regression in behavioural research explanations and predictions*. Belmont, CA: Wadsworth Publishing Company.

Pedhazur, E. J., & Schmelkin, L. P. (1991). *Measurement, design, and analysis: an integrated approach*. Mahwah, NJ: Lawrence Erlbaum Associates.

Richardson, E. A., Pearce, J., Shortt, N. K., & Mitchell, R. (2017). The role of public and private natural space in children's social, emotional and behavioural

development in Scotland: A longitudinal study. *Environmental Research*, 158, 729-736.

Richardson, T. & Murrary, J. (2017). Are young children's utterances affected by characteristics of their learning environments? A multiple case study. *Early Child Development and Care*, 187(3-4), 457-468. http://doi.org/10.1080/03004430.2016.1211116

Rousseau, J. (1762 [1979]). *Emile: or on education*. Basic Books: New York, NY.

Ruiz-Gallardo, J., Verde, A., & Valdes, A. (2013). Garden-based learning: an Experience with "at risk" secondary education students. *The Journal of Environmental Education*, 44(4), 252-270. http://doi.org/10.1080/00958964.2013.786669

Rupprecht, C., Byrne, J., & Lo, A. Y. (2015). Memories of vacant lots: how and why Residents used informal urban green space as children and teenagers in Brisbane, Australia, and Sapporo, Japan. *Children's Geographies*, 14(3), 340-355.

Selanders, L. C. (2005). Leading through theory: Nightingale's environmental adaptation theory of nursing practice. In B. M. Dossey, L.C. Selanders, D. M. Beck, & A. Attewell (Eds.), *Florence Nightingale today: Healing, leadership, global action* (pp. 97-114). Silver Spring.

Shields, D. A., Levin, J., Reich, J., Murnane, S., & Hanley, M. A. (2016). Creative Expressions in Healing. In B. M. Dossey & L. Keegan (7th ed.), *Holistic Nursing: A Handbook for Practice* (pp. 321-343). Jones & Bartlett Learning.

Shields, D. A. & Stout-Shaffer, S. (2016). Self-Development: The Foundation of Holistic Self-Care. In B. M. Dossey & L. Keegan (7th ed.), *Holistic Nursing: A Handbook for Practice* (pp. 683-708). Jones & Bartlett Learning.

Social Science Statistics. (n. d.). P value from Chi-Square Calculator. https://www.socscistatistics.com/pvalues/chidistribution.aspx

Soga, M., Gaston, K. J., & Yamaura, Y. (2016). Gardening is beneficial for health: A meta analysis. *Preventive Medicine Reports*, 5, 92-99. http://dx.doi.org/10.1016/j.pmedr.2016.11.007

Soga, M., Gaston, K. J., & Yamaura, Y., Kurisu, K., Hanaki, K. (2016). Both direct and vicarious experiences of nature affect children's willingness to conserve biodiversity. *International Journal of Environmental Research and Public Health*, 13, 529. http://dx.doi.org/10.3390/ijerph13060529

State of New York. (2017, January 9). 735, 2017-2018 regular sessions in assembly [PDF file]. https://www.nysenate.gov/legislation/bills/2017/A735

Steiner, R. (1911). *The education of Children from the standpoint of theosophy*. Chicago, IL: The Rajput Press. http://www.hathitrust.org. access_use#pd

Tappen, R. (2016). *Advanced Nursing Research: From Theory to Practice*. 2nd edition. Sudbury, MA: Jones & Bartlett.

United Nations Children's Fund (UNICEF) (2014). *The state of the world's children 2014 in numbers: Every child counts revealing disparities, advancing children's rights*. New York, NY: Division of Communication, UNICEF. https://www.unicef.org/sowc2014/numbers/#statistics

United States Census Bureau (2018). *U.S. Census Bureau Quick Facts/New York city, New York.* https://www.census.gov/quickfacts/newyorkcitynewyork

Watson, J. (2014). Integrative nursing caring science, human caring, and peace. In M. J. Kreitzer & M. Koithan (Eds.), *Integrative Nursing* (pp. 101-108). Oxford Press.

Williams, D. R. & Dixon, P. S. (2013). Impact of garden-based learning on academic outcomes in schools: synthesis of research between 1990 and 2010. *Review of Educational Research*, 83(2), 211-235.

Wilson, E. O. (1984). *Biophilia*. Cambridge, MA: Harvard University Press.

Winslow, R. & Rockoff, J. (2012, June 14). Gene map of body's microbes is new health tool. *Wall Street Journal*. http://www.wsj.com/articles/SB10001424052702303410404577464961870114758

Wood, C., Gladwell, V., & Barton, J. (2014). A Repeated Measures Experiment of School Playing Environment to Increase Physical Activity and Enhance Self-Esteem in UK School Children, *PloS ONE*, 9(9), e10871. https://doi.org/10.1371/journal.pone.0108701.

World Health Organization (WHO) (1946, July 22). *Constitution of the World Health Organization* [PDF file]. http://apps.who.int/gb/bd/PDF/bd47/EN/constitution-en.pdf?ua=1

World Health Organization (WHO) (2018, January). *Gaming disorder*. http://www.who.int/features/qa/gaming-disorder/en/

Wu, J. & Jackson, L. (2017). Inverse relationship between urban green space and childhood autism in California elementary school districts. *Environment International*, 107, 140-146.

Younan, D., Tuvbald, C., Li, L., Wu, J., Lurmann, F., Franklin, M., Berhane, K., McConnell, R., Wu, A. H., Baker, L. A., Chen, J. C. (2016). Environmental determinants of aggression in adolescents: Role of urban neighborhood greenspace. *Journal of the American Academy of Child and Adolescent Psychiatry*, 55(7), 591-601. doi: 10.1016/j.jaac.2016.05.002.

Zach, A., Meyer, N., Hendrowarsito, L., Kolb, S., Bolte, G., Nennstiel-Ratzel, U., Stilianakis, N. I., Herr, C., & the GME Study Group. (2016). Association of sociodemographic and environmental factors with the mental health status among preschool children results from a cross-sectional study in Bavaria, Germany. *International Journal of Hygiene and Environmental Health*. 219, 458-467. http://dx.doi.org/10.1016/j.ijheh.2016.04.012

Zamani, Z. (2016). 'The woods is a more free space of children to be creative; their imagination kind of sparks out there': exploring young children's cognitive play opportunities in natural, manufactured and mixed outdoor preschool zones. *Journal of Adventure Education and Outdoor Learning,* 16(2), 172-189. http://dx.doi.org/10.1080/14729679.2015.1122538

Zhang, J. W., Howell, R. T., & Iyer, R. (2014). Engagement with natural beauty Moderates the positive relation between connectedness with nature and psychological well-being. *Journal of Environmental Psychology*, 38, 55-63.