Influence of an Art Museum Visit on Individuals' Psychological and Physiological Indicators of Stress

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Abstract

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In recent years, the museum sector has responded to the global trend of expanded awareness of health and well-being challenges. Although the interest in examining museums' health impacts is growing, the field lacks robust evidence of measurable well-being benefits that would allow art museums to expand their social role and realize their health-enhancing potential for the communities they serve. The purpose of this study was to explore the potential influence of an art museum visit on people's psychological and physiological indicators of stress, including self-reported stress, self-reported arousal, and saliva cortisol. A single group pre- and post-test approach was used, and data were collected through self-administered questionnaires and saliva samples. Thirty-one local professionals participated in this study, on a lunchtime visit to the Bellevue Arts Museum in Seattle, WA. Results demonstrated that average levels of self-reported stress and arousal were significantly reduced by a brief art museum visit during lunchtime; levels of saliva cortisol were unchanged. The museum experience increased visitors' feelings of

pleasantness, happiness, and enjoyment and decreased their sense of wakefulness, alertness, and tension. The results of the study suggest that art museums have an opportunity to strengthen their social role by becoming health and well-being resources for their communities. The study contributes to the research on how arts, cultural, and museum engagement impacts individual and societal health and well-being.

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Chapter 1: Introduction

Problem

With challenges to health and well-being increasingly affecting more and more people in the new millennium, the cultural sector has a role to play in creating the context for better health (Chatterjee & Noble, 2013). In recent years, the museum sector has responded to the global trend of expanded awareness of health and well-being challenges (O'Neill, 2010). Although the interest in examining the health impact of museum engagement is growing, the field lacks robust evidence of measurable well-being benefits that would allow art museums to expand their social role and realize their health-enhancing potential for the communities they serve.

Literature

Starting in 1990, population studies conducted in Sweden and Norway set the scene for examining the significant role of culture in helping to improve the public health and the importance of cultural attendance as a variable affecting health and longevity (Bygren et al., 1996; Cuypers et al., 2012; Davies et al., 2016; Johansson et al., 2001; Konlaan et al., 2000; Wilkinson et al., 2007). In recent years, a growing body of literature has evaluated the health benefits of arts engagement and participation; this research has given a boost to the development of the art therapy programs within museums and healthcare institutions (Chatterjee & Noble, 2013; Davenport & Corner, 2011; Nainis, 2006; NML, 2012; Stuckey & Nobel, 2010). Museums themselves are seeking to understand the well-being impact of their collections and programs; the studies conducted within the last decade build understanding of the kinds of audiences and health categories addressed, as well as the types of activities offered (Lackoi et al., 2016).

Museums have used a range of qualitative and quantitative approaches to assess the impact of their work on well-being and health. However, to raise the profile and significance of

art museums' work in driving a health agenda, there is a need for more rigorous research, strong and consistent evaluation frameworks, and robust evidence (Staricoff, 2006). Many studies do not perform before-and-after comparisons in evaluating the benefits of museum participation and rely on self-reported metrics of the difference made to participants. Questionnaires, focus groups, and interviews researching participants' subjective feedback, feelings, and attitudes produce large amounts of quantitative and qualitative data making interpretation subject to the skills of the researcher (Staricoff, 2006). To derive a more profound understanding of museums' health and well-being impact, researchers advocate a mixed-method interdisciplinary approach and collaborations with academic and healthcare partners (Chatterjee & Noble, 2013). The field will benefit from the use of "objective measurements of the arts intervention on the physiological, psychological and clinical state of the individual" (Staricoff, 2006, p. 118). Although there is little published in this area, a handful of studies point to the potential of measuring the physiological outcomes of museum participation. The suggested research will add to the emerging body of literature exploring and evaluating the measurable physiological and psychological evidence from an art museum intervention.

Purpose Statement and Research Questions

The purpose of this study was to explore the potential influence of an art museum visit on people's psychological and physiological indicators of stress. The following research question guided this study: To what extent does a brief visit to an art museum influence people's psychological and physiological indicators, including self-reported stress, self-reported arousal, and saliva cortisol?

Significance

Despite the proven potential of arts and cultural participation to be a resource of health and well-being, the art museum sector lacks recognition of its ability to deliver health benefits to their audiences (Chatterjee & Noble, 2013). This research aims to study the relationship between a museum visit and individuals' stress levels and contribute to the growing body of literature exploring the psychological and physiological benefits of the arts and cultural participation. The research may benefit the following audiences:

- Art museums in becoming a resource for health and well-being thus strengthening their social role for the communities they serve;
- Members of the general public in turning to museums in maintaining or improving their health and well-being;
- Health professionals and clinicians in prescribing museum participation as a method for improving health and well-being;
- Health promoters and policy makers in updating population-based health messages, policy and practice and reinforcing museum's role in delivering health and well-being benefits.

Chapter 2: Literature Review

In recent years a growing body of literature has explored the health benefits of arts, cultural, and museum participation on individual and societal levels. These studies set the scene for understanding the expanding social role of museums and their position as vital community assets, which can help meet local well-being needs. While museums are seeking to understand the impact their collections and programs can have on people's health and well-being, the health sector is increasingly interested in examining the health potential of the cultural sector. New models of health and social care have started to emerge as a result of these tendencies (Lackoi et al., 2016). To examine the health-enhancing potential of museums, this chapter reviews literature from three main areas: 1) Cultural participation and health; 2) Health and well-being work in museums; 3) Stress and health.

Cultural Participation and Health

Does Cultural Participation Have an Impact on People's Health?

A notable development in examining the health-enhancing potential of cultural participation emerged in the 1990s with population studies conducted in Sweden and Norway (Bygren et al., 1996; Cuypers et al., 2012; Johansson et al., 2001; Konlaan et al., 2000). This research set the scene for evaluating the significant role of culture in improving public health, and the importance of cultural attendance as a variable affecting health and longevity. The term *cultural attendance* is widely used to indicate various kinds of engagements with cultural activities and creative workshops, such as visiting art museums, exhibits, music performances, making art or music, and watching movies or plays. The studies conclude that cultural attendance

has a positive impact on health and well-being, measured by longevity, perceived health, anxiety, depression, satisfaction with life, and perceived happiness (O'Neill, 2010).

In a study of 12,675 individuals, results show that people who frequently participated in cultural events had better **survival rates** than those who rarely did so; moreover, it was concluded that people who rarely attended cultural events were at almost 60% higher mortality risk than those attending more frequently (Bygren et al., 1996). Another study showed a correlation between cultural participation and **perceived health**: those who became less culturally active within time had a 65% higher risk of weakened health than those who remained culturally active (Johansson et al., 2001). The researchers concluded that "results could be in agreement with a causal influence of stimulation" and suggested that "cultural participation is a 'perishable commodity'" that needs to be replenished to continue to provide benefits (Johansson et al., 2001, p. 229).

One of the studies followed up individuals with respect to survival 14 years later, and found that visiting art exhibitions, cinemas, attending concerts, and visiting museums showed more positive effects on **longevity** than going to the theater, being at a church service or attending a sport event as a viewer (Konlaan et al., 2000). Another examination of 50,797 adults through comprehensive questionnaires and a health screening differentiated receptive and creative cultural activities and looked at how participation in these activities impacted health indicators in women and men (Cuypers et al., 2012). In creative activities participants were actively involved in creative process, such as painting, signing, or playing an instrument. Receptive cultural activities assumed receiving some experiences without self-doing, like visiting art museums, exhibitions, or concerts. The data suggest that creative cultural activities were more popular than receptive cultural activities in both genders. However, men who engaged

in receptive, rather than creative activities, reported stronger health-related outcomes. Overall, "in both women and men, participation in both receptive and creative cultural activities was associated with **good health, good satisfaction with life, a low anxiety score, and a low depression score**" (Cuypers et al., 2012, p. 702).

Following up on population studies in Europe, Wilkinson conducted the **first large scale U.S.-based research** study to examine the association between attending cultural activities and health for U.S. residents (Wilkinson et al., 2007). Setting the study background, the researchers acknowledged "striking differences in social structure and health outcomes" between Sweden and the U.S., a strong association of cultural attendance with socio-economic status, and the fact that the "well documented relationship between health and socio-economic status is not fully explained by differences in health care, work conditions, social ties, and health behavior" (p. 2, 7). A group of 1244 individuals was asked to report on the types of cultural activities attended in the previous year, such as art exhibits, dance performances, operas or classical recitals, life popular music events, movies, or plays, and to indicate self-rated health. The variables for age, gender, race, number of children, subjective social class, employment status, household income and years of education were controlled. The study supported the relationship between cultural attendance and **self-rated health**, and the results remained constant after controlling for potential confounding variables. While the study did not explore the mechanisms of cultural attendance benefiting health outcomes, it suggested that social aspects of cultural activities may have played a role; the fact that people frequently attend cultural activities in groups receiving emotional and social support, were assumed to likely influence health. The reduction of stress was also mentioned as a possible effect of art participation, thus suggesting cultural attendance to be particularly important during periods of stress.

Although the above-mentioned population studies explored evidence of the benefits of recreational cultural participation, little is known about how much engagement is needed for good mental health. One of the only studies to examine and quantify the **dose–response relationship** between cultural participation and mental health in a general population was published in 2016 (Davies et al., 2016). A random sample of 702 Australian adults were invited to take part in a 15-minute telephone survey that included questions about arts engagement in the last 12 months and assessment of their **mental well-being** using the Warwick-Edinburgh Mental Well-being Scale (WEMWBS). The study confirmed a correlation between cultural attendance and mental health and concluded that those who engaged in the arts for 100 or more hours per year (i.e., two or more hours/week) reported significantly better mental well-being than those involved less frequently.

The population studies described above suggested a robust and statistically significant correlation between regular cultural participation and improvements in health and well-being. An important point raised in these works is whether the relationship between cultural engagement and health is a correlation or a causal relationship (Davenport & Corner, 2011).

What Are the Underlying Mechanisms of Cultural Participation Impact on Health?

Three strands of research that are relevant to understanding the underlying mechanisms of how cultural/arts/museum participation influences health and well-being will be discussed here. One strand of research considers **psycho-neuroimmunology and neural plasticity** as ways to explain the health-enhancing potential of cultural participation. The second strand has to do with **positive psychology and positive non-clinical interventions** as pathways to health improvements. The third strand of research is more museological in nature, and views **museums**

as places where space, environment, intrinsic value of objects, and social connections have an influence on people's health and well-being.

One of the important theoretical developments explaining why cultural participation promotes health and well-being was led by psychiatrist Gene Cohen (2009) who pioneered research into geriatric mental health. Cohen strongly believed that "if there is not an understanding of the underlying mechanism to explain why the results happened, then no matter how robust the findings of the research, they could be dismissed", "questioned, trivialized, or viewed as not being real" (p. 48, 49).

Cohen's theory on underlying dynamics and mechanisms of the health-enhancing outcomes of cultural participation revolved around ideas of **psycho-neuroimmunology and neural plasticity**. Coined in the 1970s and initiating "the mind/body movement" in medical research, psycho-neuroimmunology demonstrated that nervous and immune systems are connected bidirectionally, with psychological state capable of altering the immune system and the immune system itself capable of leading to alterations in the psychological state (Cohen, 2009, p. 49; Fancourt, 2017). In line with the psycho-neuroimmunology theory, Cohen found that arts/music participation revealed an increase in the level of T cells (lymphocytes that ward off bacterial infections) and NK cells (natural killer cells combating cancer cells in the bloodstream), thus resulting in an immune system boost.

Cohen's work on neural plasticity indicated that the neural structure of the brain retains its capacity to develop. It was theorized that "the brain, like muscles, benefits from ongoing challenge" (p. 50). By engaging in challenging activities and new experiences, such as arts and museum participation, the human brain is altered through the formation of new synapses (the contact points between cells), thereby enhancing its reserve of neurons, synapses, and dendrites.

Cohen's findings suggested that cultural experience through activities in museums may boost the immune system, increase brain reserve and "efficiency of brain cell connectedness," thus resulting in health benefits (p. 50).

The second strand in examining the pathways to health improvements by cultural participation is related to the introduction of the term "**positive psychology**" in the late 1990s by Martin Seligman, the head of the American Psychological Association (Fancourt, 2017, p. 32; Seligman, 2013). Positive psychology described the concept of well-being and flourishing through five elements: positive emotion, engagement, relationships, meaning, and accomplishment (PERMA). This shifted the focus of psychology from mental illness to positive aspects of health and well-being and suggested that positive states can influence wider psychological and physical health.

Interventions that capitalize on positive emotions, such as cultural and museum participation, were theorized to contribute to these positive states by one of the leading scholars in affective science, Barbara Fredrickson (2000). Fredrickson investigated love, joy, gratitude, serenity, interest, hope, pride, amusement, inspiration, and awe. Fredrickson proposed the *broaden-and-build model*, distinguishing positive and negative emotions in their form and function and suggesting specific mechanisms and intervention strategies to cultivate positive emotions (p. 1). The author hypothesized that when "tapped effectively," positive emotions can "optimize health, subjective wellbeing, and psychological resilience" (p. 2).

Fredrickson argued that negative emotions bring in the evolutionally tested "thought-action repertoire" that requires quick action and mobilizes bodily resources; when prolonged or initiated repeatedly this response can promote anxiety disorders, depression or cardiovascular problems. On the contrary, positive emotions are not linked with life-threatening situations and

are argued to "broaden" a person's "thought-action repertoire," build personal physical, intellectual, and social resources and expand scopes of attention, cognition, and action (p. 6).

Fredrickson described three distinct positive emotions: *joy, interest,* and *contentment.* These emotions are suggested to change momentary "thought-action repertoire" and drive health-related outcomes. *Joy* and related positive emotions of exhilaration and amusement are viewed to appear in safe and familiar contexts and result in "urge to play and be playful in the broadest sense of the word" (p. 4). *Interest,* as well as curiosity, excitement, or wonder, were suggested to arise in safe contexts that, nonetheless, offer novelty, change, possibility, or challenge. *Contentment* and related emotions of serenity, tranquility, and relief were thought to appear in safe situations with a high degree of certainty and a low degree of effort.

Being psychologically incompatible with the narrowed "thought-action repertoire," positive emotions were theorized not only to build physiological and psychological reserves but were also seen as effective "antidotes" to the long-term impact of negative emotions (Fredrickson, 2000, p. 5). This work suggested that activities and strategies, such as engaging with museums, which are marked by creating positive meaning of *joy, interest,* and *contentment,* capitalize on positive emotions and therefore can effectively counteract health issues that stem from prolonged or repeated negative emotions.

The third strand of evidence of the potential influence of museum participation on health analyzes **museums' environment** and explores how the space, collection of objects, and communication within the museum might impact visitors' well-being. In the context of attention restoration theory, museums are hypothesized to have a restorative role and create a "sense of peace and calm," enabling people to recover their cognitive and emotional effectiveness (Kaplan et al., 1993, p. 726). According to the attention restoration theory, prolonged mental effort leads

to directed attention fatigue (DAF), which can manifest in distractibility, irritability, stress, and a reduced capacity to reason and plan.

Researchers argue that museums share the four common properties of restorative environments: *Being Away, Extent, Fascination, and Compatibility* (Kaplan et al., 1993, p. 726, 727). The first of these properties, *being away*, suggests being physically and mentally outside of the usual setting and away from everyday concerns. *Extent* is thought to exist in the rich content and coherent structure in the museum environment that one can enter and spend time in and perceive as a "whole other world" (Felsten, 2009, p. 160). The third property, *fascination,* is argued to be linked to interest, attention, and engagement, and is assumed to vary in its intensity from soft to hard depending on the strength of stimuli and its ability to generate reflection. *Compatibility* is thought to occur when the setting fits an individual's goal and provides the necessary resources for these goals to be achieved. The research suggested that while each of these properties can vary across a wide range, the more the environment possesses these properties, the more restorative the environment will be.

Salom (2011) examined the ways art museums provide therapeutic benefits to their communities and suggested that the artistic diversity of museum collections "mirrors the nature of individuality, fosters a tolerance for differences, and provides imagery for interventions" (p. 81). He theorized that this diversity combined with architectural elements and exhibit design, the collective nature of images, as well as the interpersonal relations museums offer, can be effective allies in museums' therapeutic role. The study suggested four metaphorical roles art museums play in realizing their health-enhancing potential: "*museum as co-leader, museum as group, museum as self and museum as environment*" (p. 81).

As a *co-leader,* museums are thought to determine a therapeutic goal and keep the focus on achieving it. Within its role of a *group,* by housing diverse artifacts related to human experience, museums are capable of showing "human similarities beyond our own particular time place," informing visitors about the "commonalities among human situations, emotions, difficulties, and achievements as expressed in aesthetic form" (p. 84). Theorizing about the third role of a *museum as self,* Salom considered that the range of artwork on display supports learning about "the self by inquiring into those things that we identify with or reject" (p. 84). In their role as an *environment,* the museums were seen to provide opportunities for social interactions, where members draw from experiences with each other. Salom concluded that based on these qualities museums and their settings can be effective allies in health-focused interventions.

Together with these essential theories investigating the underlying mechanisms of such influence, the earlier population studies reveal the remarkable potential of health and culture sector collaboration. Most importantly, they set the scene for societal and scientific recognition of the value of arts and culture in promoting health and well-being.

Health and Well-Being Work in Museums

Social Turn in Health, Well-Being, Economics, and Policy

Starting in the 1970s, healthcare research started to gradually recognize the role that emotions, feelings, and thoughts play in bodily responses (Sapolsky, 2000). With increased understanding that health and disease are affected not only by biological factors, but by psychological and social factors too, health services have transformed from the "old factory model of care and repair" of treating acute illnesses with individual interventions and towards "a people-centered approach, rooted in communities," or so called social medicine (Arnold et al.,

2018, p. 6). Social medicine explicitly explores "social determinants of health and disease, rather than treating such determinants as mere background to biomedical phenomena" (Dal Sun Han et al., 2017, p. 144).

According to research conducted in the UK, less than 10 percent of what affects people's health and well-being comes from access to health care; the rest is shaped by what happens in their daily lives and social circles – housing, education, relationships, and networks (Arnold et al., 2018). Researchers argue that the social model of medicine, unlike the conventional one, has the potential to recognize multiple and interconnected determinants of well-being and look for changes that can be initiated by individuals and communities to make population healthier (Broderick, 2011).

The definitions of health and well-being have expanded to include social dimensions as well. While the World Health Organization (WHO) defines well-being as part of health - "Health is a state of complete physical, social and mental well-being and not merely the absence of disease or infirmary", some researchers, describe health and well-being as discrete phenomena (Ander et al., 2011; WHO, 1946). One of the widely cited and expanded definitions of well-being was suggested by the New Economic Foundation (NEF), a think-tank directed at governments and policy makers that has done much research and work to define and measure well-being. According to the NEF, well-being is defined as "a dynamic process that gives people a sense of how their lives are going, the interaction between their circumstances, activities and psychological resources or 'mental capital'" (NEF, 2009, p.9). To achieve well-being, people need a) a sense of individual vitality; b) to undertake activities that are meaningful, engaging, and which make them feel competent and autonomous; and c) a stock of inner resources to help them cope with things that go wrong and be resilient to changes beyond their immediate control.

It is also seen crucial that people "feel a sense of relatedness to others so that in addition to the personal, internally focused elements, people's social experiences – the degree to which they have supportive relationships and a sense of connection with others - form a vital aspect of well-being" (NEF, 2009, p. 9).

The social turn became also apparent in economics, business, and policy making. The main economic indicator, Gross Domestic Product (GDP), measures what is produced and sold but says nothing about the impact of these indicators on people's lives, or who is winning and losing within the current economic system (NEF, 2018). GDP incorporates fossil fuel and tobacco markets alongside farming and manufacturing; it does not consider much of what underpins the rest of the economy – from unpaid childcare to volunteering. The last couple of decades have shown that the traditional use of GDP or income as a determinant of progress is not sustainable (Ander et al., 2011). Local and national governments have come up with new indices to guide their policy making, which often include heath, happiness, well-being, longevity, quality of life, equity, community involvement, inclusiveness, and sustainable environment. France introduced 10 "happiness" indicators to measure progress in the nation (2009); Canada uses the Canadian Index of Wellbeing (2010), and Bhutan uses nine dimensions to measure their Gross National Happiness Index (2010).

In 2019, New Zealand broke new ground by moving away from GDP in favor of wellbeing when setting, developing, and assessing government policy (Button, 2020). Bids to the Treasury for money from now on will not only need a cost-benefit analysis of the project but an assessment of its contribution to the wellbeing of the population, measured through four dimensions: human capital; social capital; natural capital; and financial and physical capital. Switching the focus of governments and policymakers from constantly chasing economic growth

alone to including social determinants and assets into the equation is considered as a step in the right direction that can benefit human development and decrease inequalities. (NEF, 2018).

How Do Museums Contribute to Health and Well-Being?

Museums as publicly funded institutions operating for public good are seen as part of the shift towards the "holistic conception of human progress" and well-being (Ander et al., 2011, p.238). As noted by museum opinion leader Mark O'Neill (2006), "Museums can only be as good as their analysis of society and their awareness of the reality of people's lives" (p. 111). Indeed, museums are seen to increasingly recognize complex social problems, from migration to global warming, from social exclusion to health education, and commit to "their potential as agents of human well-being and social change" (Silverman, 2010, p. 26). In *The Social Work of Museums*, Silverman suggests that museums contribute to the pursuit of health and well-being in five major ways: (1) promoting relaxation; (2) providing an immediate intervention of beneficial change in physiology, emotions, or both; (3) encouraging introspection, a process of understanding ones feelings and thoughts that is vital for mental health; (4) fostering health education; and (5) addressing broader social conditions related to health through public health advocacy.

Museums in health has become a field of practice involving work in health education, hospital acute services, primary and chronic care, and rehabilitation. In June 2013, the American Alliance of Museums released a detailed report on the "significant role" museums have begun to play in US healthcare (AAM, 2013**)**. The report describes specific contributions that museums have made to 10 areas of healthcare, from Alzheimer's, autism, and mental health to nutrition and visual impairment. In 2016, The Arts Council England published a preliminary report from the National Alliance for Museums, called Health and Wellbeing, summarizing the state of the

261 UK-based health-centered museum programs (Lackoi et al., 2016). The report reviewed the major audiences that museums' health and well-being projects were able to engage and serve. Among them were older and isolated people, people diagnosed with dementia, adults affected by mental health issues, and general museum visitors with no specific health conditions. The report documented the variety of activities offered by museums to their communities: creative workshops incorporating a wide range of activities and art forms, programs engaging people with collections and object handling, and projects built around reminiscence activities with focus on memory and social inclusion. The report called for museums and non-profit organizations to vigorously seek partners and build a strategic approach to well-being in line with their regional health infrastructures and priorities.

In September 2019, the International Council of Museums (ICOM) proposed a new definition of museums. Although the voting over the new definition was postponed, it is the first time since ICOM's creation in 1946 that the definition encourages museums to contribute to "human dignity and social justice, global equality and planetary wellbeing," thus recognizing the social role of museums (ICOM, 2019).

Many studies have examined museums' contributions to health and well-being and have highlighted the potential of museum and arts interventions to address health and well-being outcomes. Some of them can be classified as therapeutically driven, concentrating on specific health issues, like dementia, cancer, and mental health, while others focus on environmental improvement to support the health of museum staff and caregivers, and still others focus on the general public and community health (Chatterjee & Noble, 2013; White, 2009).

Arts interventions for people with **chronic illnesses** like cancer are well-structured, often conducted in collaboration with medical professionals and clinically based (Lackoi et al., 2016).

Such art therapy is seen to help people "express experiences that are too difficult to put into words" and "explore the meanings of past, present, and future" (Stuckey & Nobel, 2010, p. 254). Studies of visual arts interventions for 228 chronic patients with cancer, hemodialysis, and trauma were seen to result in the distraction from thoughts of illness, a decrease in negative emotions and an increase in positive ones, reduced stress, pain, and anxiety, and an increase in medical outcomes of treatment. (Nainis, 2006; Stuckey & Nobel, 2010).

Addressing people with **dementia**, one of the best-known programs in the U.S., *Meet Me at MoMA* (MoMa, NY), provided facilitated tours for people affected by the condition, their family members, and caregivers. Through structured conversations the project helped a re-discovery of the personhood of those affected by dementia in the eyes of their relatives and care givers (Davenport & Corner, 2011). Self-rated surveys and observations were used to evaluate participant's responses to the sessions for nine months. The study found improvements in happiness of adults with dementia, their relationships with their care givers and provided an opportunity for them to "re-engage with 'normal' social activity" (p. 11).

In addition to supporting people with **memory issues**, some museum interventions were targeted at their caregivers. The *House of Memories* training program at the National Museum Liverpool aimed "to provide social and healthcare staff with new skills and resources to share with people living with dementia, and to promote and enhance their well-being and quality of life, as a potential alternative to medication" (NML, 2012, p. 7). The program was built around objects, archives, and stories of the National Museum of Liverpool; it demonstrated how interactions with heritage objects engaged people living with dementia in conversations and reflections based on their memories and histories. Through both quantitative and qualitative methods, the program evaluated how *House of Memories* impacted 1,200 adults in their

awareness of dementia and helped acquire skills and knowledge to effectively care for and interact with individuals living with dementia. The program won the Guardian Public Sector Award in 2010 and gained national recognition (Chatterjee & Noble, 2013).

Museums have much to offer in response to societal issues like **isolation and loneliness** and reducing socially excluding practices within communities (Chatterjee & Noble, 2013). A review of the programs targeting older adults suggested that programs provide an experience of calm, involve mild physical exercise and gaining mastery over tasks, encourage social interaction and sharing of skills, and increase self-esteem of participants (Chatterjee & Noble, 2013; Davenport & Corner, 2011). The London's Dulwich Picture Gallery *Good Times* program targeted socially isolated members of the community and offered a range of activities, such as workshops and art appreciation tours and talks (Chatterjee & Noble, 2013). A retrospective quantitative evaluation of the program used post-session questionnaires, diaries, interviews, and observations. The study found that the program improved lives of participants, helped fight social isolation, and improved the efficacy of their medical treatment (Harper & Hamblin, 2010). An expanded review aimed at exploring museum programs for socially isolated older people proposed providing more intense and novel social experiences, increasing the length of these interactions, involving interesting and unusual objects, and including a facilitator (Todd et al., 2017).

There are numerous examples of how involvement with **museum objects in health-focused activities** can positively impact people's well-being (Chatterjee & Noble, 2013). Research has found psychological, social, and aesthetic factors involved in interaction with found and second-hand objects (Camic, 2010). Additionally, the physiological aspects of touch

are argued to be linked to emotion, which in turn guides and motivates behavior (Chatterjee et al., 2008; Chatterjee & Noble, 2013).

The well-being impact of taking museum objects into healthcare facilities was assessed by Ander (2012), based on one-to-one museum object handling sessions organized in four hospital settings in the UK in medical facilities ranging from acute hospitals and psychiatric hospitals to neurological units and geriatric care facilities. The data collection involved audio recordings, observations, and interviews of 185 patients and looked for qualitative evidence of engagement with museum objects as well as well-being impacts. The research described the well-being benefits that occurred as a result of museum object interaction as new outlooks, positive feelings, learning, energy and alertness, positive mood, sense of identity, something different and inspiring, calming and relieving anxiety, passing time, social experiences, and tactile experiences. In discussion of the reasons why museum objects produce engagement, feeling, and wellbeing benefits, the study mentioned heritage object significance, their ability to provoke memories and previous knowledge, as well as patients' feeling privileged by being able to touch museum objects, which is usually not allowed. Museum sessions were described to "draw people into the objects," which in some cases, "drew people out of their illness and environment" (p. 240).

Finally, a smaller portion of literature examines the potential influence of non-clinical interventions on **physiological indicators** of health. One of the earliest studies of non-pharmacological health programs involved assessment of blood pressure change by patting a dog; authors observed lowering of the blood pressure that indicated reduction of stress level (Chatterjee & Noble, 2013; Vormbrock & Grossberg, 1988). Cultural participation involving live-music performances has been demonstrated to reduce blood pressure and stress hormone

cortisol level in patients receiving chemotherapy (Chatterjee & Noble, 2013; Staricoff & Loppret, 2003). Cortisol concentrations have been used to examine stress levels in relationship to participation in yoga classes, visiting a zoo, and exposure to green spaces (Coolman et al., 2020; Nakayama et al., 2009; Ward Thompson et al., 2012; West et al., 2004).

A handful of studies assessed change in physiological indicators as a result of a museum visit involving the **general public** with no specific therapeutic needs. Blood pressure and heart rate have been used in a study that researched the physiological response to different types of art museums (Mastandrea et al., 2018). Participants were randomly assigned to visit a figurative art exhibit, a modern art exhibit, or spend time in the museum office. Research found that both art settings had health benefits as compared with more routine settings, like an office. Moreover, figurative art was found to have a more significant effect on blood pressure reduction than modern art. Another study conducted by bio-psychologists in London researched the effects of an art gallery visit on cortisol level in people visiting the gallery during their lunch break. The research demonstrated that a casual and brief art gallery visit may have a positive impact on visitors' stress levels, measured by cortisol levels and a subjective stress assessment questionnaire (Clow & Fredhoi, 2006).

The health programming examples above collectively describe the diversity of practice in museums and medical settings, a range of groups and health issues addressed, and a variety of approaches used in developing and interpreting these projects.

Can Museums' Impact on Health and Well-Being Be Proven?

The scope and openness of the concept of well-being, as well as the new social trends in healthcare and policy- making, bring "culture to the same policy table as other major policy goals such as health, education and the economy" (Ander et al., 2011, p. 238). This creates a

unique window of opportunity for arts and museums to become an important asset in achieving individual and community well-being in a cultural context and realizing a social model of health (White, 2009). At the same time, such engagement requires robust theoretical and empirical background to examine, measure, and analyze individual and community well-being impact in a cultural context (Ander et al., 2011; Putland, 2008; Staricoff, 2006).

The field of health-focused programming in museums is notably practice-driven, which is seen to raise questions about lack of **conceptual approaches, absence of a framework and "shared language"** to facilitate "inter-sectoral dialogue" and "reflect the interests and values inherent in both health and arts perspectives" (Chatterjee & Noble, 2013; Putland, 2008, p. 266; Staricoff, 2006). Many initiatives in the field are seen to involve diverse and multidisciplinary partnerships. The concepts of health and well-being impact are differently understood and categorized across these collaborations and vary from physiological and clinical outcomes of therapeutically-centered programs to psychological and social impact of general well-being and community-centered initiatives (Putland, 2008; White, 2009). Also, many academics argue that health benefits of arts and cultural participation are "partly substantiated," "partly unknown," and are still to be discovered (Raw, 2012; White, 2009, p. 201). Hence, the absence of a common conceptual approach and broadly varying terminology are argued by some researchers to contribute to a high risk of "academic dismissal or, at best, poor visibility" of the field (Raw, 2012, p. 97).

It has also been noted that although research in the field is growing, much of the literature is 'grey' and is accessible only on the websites of government and non-profit organizations thereby making it unsubstantial for healthcare professionals and policy-makers (Putland, 2008; Raw, 2012; White, 2009). Throughout the research there is a well-articulated need for new

interdisciplinary approaches and frameworks that would take into account the "ambiguity and amorphousness" of well-being agendas, place culture "in the well-being jigsaw puzzle" and broaden current concept of medical and social care (Ander et al., 2011, p. 253; Putland, 2008; Raw, 2012).

Another recurring theme in the literature is the debate about **evidence, evaluation, and research design**. While academics have made constant calls for evidence-based research into the impact of the arts and health work, there is disagreement about what constitutes valid evidence (Putland, 2008; Raw, 2012; Staricoff, 2006). Should a health-related practice always be evaluated using biomedical research values, quantitative data and experimental research approaches, or are social sciences qualitative methods the only way to capture or measure the outcomes of arts and health field (Raw 2012; Staricoff, 2006; White, 2009)? This critical dilemma is seen to contribute to the sector's vulnerability (Raw, 2012; Staricoff, 2006).

The evaluation methods used by museums have been **largely qualitative** in nature. They have been designed to assess subjective feedback and responses of individuals to a particular program and include focus groups, face-to-face interviews, observations, specially designed questionnaires, surveys, and case studies (Chatterjee & Noble, 2013; Staricoff, 2006). Solid and well-designed qualitative research have provided valuable insight into the benefits and social implications of cultural and museum participation and are argued to be effective in assessing subtle and emotional responses such as increased enjoyment, happiness, pleasure, a feeling of belonging, and connectedness (Chatterjee & Noble, 2013; Putland, 2008; Staricoff). However, some investigators have attributed this to bias, and have criticized the heavy reliance on the social science approach for its lack of a systematic and controlled observation of the impact of arts programs on clinical outcomes (Chatterjee & Noble, 2013; Harper & La Fontaine, 2008;

Putland, 2008). It has also been argued that qualitative methods aimed at capturing feelings, attitudes and emotions, produce large amounts of information in the form of text, making the quality of interpretation and conclusions "mainly dependent on the skill of the researcher" (Staricoff, 2006, p. 17).

The proponents of **biomedical quantitative research** argue that evidence-based medicine as the "dominant frame in which medicine is researched, discussed and practiced" is the way that health-centered practices outside medical settings should been interpreted (Broderick, 2011, p. 99). While there is evidence of some excellent work using robust research methods in health-centered museum work, there are relatively few examples of rigorous and/or longitudinal studies, or research using before-and-after comparisons, control groups to measure the impact of the programming on individual's well-being (Chatterjee & Noble 2013). Reviews of the existing evaluations note a prevalence of small sample sizes, a lack of health and well-being indicators, unsuitable use of instruments, and an insufficient distinction between process and impact evaluation (Putland, 2008). Some of these drawbacks were attributed to a lack of resources and training to develop more rigorous project evaluations, rare use of external evaluators, and reluctance to build interdisciplinary collaborations with academic and research fields. (Putland, 2008). Hence, one of the repeated themes throughout the literature is the need to convince the "health field proper" with "hard" evidence that results from comprehensive evaluation projects and rigorous research design (Hamilton et al. 2003, p. 402; Putland, 2008, p. 266). It is considered critical that the discussion of positive health gains of therapeutically-oriented initiatives uses methodologies that originate in medical research (Broderick, 2011) and assumes rigorous study designs, generalizable sample sizes, the ability to control for variables, and strong quantitative and qualitative methods to examine outcomes (Putland, 2008).

Summarizing the above, health and well-being programming in museums is seen to influence the "physiological, psychological and clinical state of the individual" (Chatterjee & Noble, 2013; Staricoff, 2006, p.118). Hence, researchers have advocated for the advantages of an interdisciplinary approach and mixed methods in research (Chatterjee & Noble, 2013; Raw 2012). To achieve "critical and rigorous evaluation," researchers have encouraged quantitative methods in combination with representative samples, control groups, and trained collaborative teams to measure, analyze and interpret data (Chatterjee & Noble, 2013; Staricoff, 2006, p. 118). A combination of qualitative and quantitative methods is argued to allow "detailed and nuanced effects from museum encounters in combination with empirically robust outcomes", and offer "a valuable way forward in demonstrating and understanding the value of Museums in Health" (Chatterjee & Noble, 2013, p. 106).

Museums are non-medical settings and are not designed to treat people in the same way as clinics do. Nevertheless, as the health sector is looking for meaningful arts and culture engagement and creative approaches to address wider social determinants of health, the non-clinical settings in the cultural sector have the potential to gradually become recognized for making contributions to well-being and "bringing a spirit of deep and meaningful inquiry to pioneering work" (Camic & Chatterjee, 2013; White, 2009, p. 201).

Stress and Health

Definition of Stress

The concept of stress is fundamental for understanding both life and evolution; our future as a species and as individuals depends on our ability to adapt to a challenging environment over time (Monroe, 2008; Schneiderman et al., 2005). Advances in conceptualizing, defining, and

measuring stress have led to progress in evaluating the contribution of stress in promoting disorder and disease as well as finding mechanisms to reduce the negative impact of stress (Monroe, 2008).

The popular concept of stress often relates to insecurities people experience daily, at their job, in their marriage, or in social relationships, and to the pressures related to inadequate institutional resources like the health and educational system, safety, or global instability (Schneiderman et al., 2005). The academic interpretation of the concept of stress suggests a variety of definitions. Common among these definitions is that "stress is a process in which environmental demands tax or exceed individuals' adaptive capacities, contributing to biological and psychological changes that may place them at risk for illness" (Cohen et al., 1997; King & Hegadoren, 2002, p. 92).

Several research traditions have emphasized different aspects of the stress phenomenon: some studies view stress originating in the external environment, whereas animal research regards stress as a particular psychobiological response of the organism to different environmental challenges and introduced a term "stressors" to describe the environmental conditions causing stress (Monroe, 2008, p. 35; Weiner 1992). Further research suggested capturing the particulars of the organism, the environment, and the time, thereby defining stress in terms of an ongoing relationship between organism and environment (Monroe, 2008; Weiner 1992). This approach acknowledges the complexity of the transactions between the organism and the environment over time; "the stress process is thought of in terms of external challenges and perceptions of challenges, coping resources and perceptions of coping resources, and the dynamic interplay of these over time" (Gunnar & Quevedo 2007; Monroe, 2008, p. 36).

The variety of ways to conceptualize stress produced a range of **measurement approaches** (Monroe, 2008). Much of the research on human stress uses the **construct of a "life event"** to measure life stress and define it as "a discrete change in the subject's social and personal environment" (Paykel & Rao, 1984, p. 73). Moreover, the event is thought to "represent a change, rather than a persistent state, and it should be an external verifiable change, rather than an internal psychological one" (p. 73). This approach is supported by the Social Readjustment Rating Scale (SRRS) that assigns life change unit (LCU) score to a list of 43 life events, like marriage, retirement, pregnancy, change in residence, troubles at work, etc. (Holmes & Rahe, 1967). Although influential and widely researched during last 40 years, this approach generated a great deal of criticism for not differentiating between positive and negative events, for disregarding individual differences, as well as for its lack of reliability and validity of reported life events by people, and, therefore, for its limited ability to predict the impact of stress on health (Jones et al., 2001).

An attempt to address these issues led to the development of the **"daily hassles and uplifts" approach** (Jones et al., 2001, p. 25). Hassles are described as the "irritating, frustrating, distressing demands that to some degree, characterize everyday transactions with the environment"; uplifts are seen as the positive, pleasant, and enjoyable experiences of everyday life (Kanner et al., 1981, p. 3). Research suggests that major life events may increase the probability of hassles or uplifts, which in turn cumulatively mediate the life event-health relationship (Kanner et al, 1981). Further studies researched and confirmed that daily hassles and uplifts are more reliable predictors of health outcomes than major life events (Jones et al., 2001).

Physiology of Stress

A large body of research addresses the relationship between physiological reactions to stressors and health status, both physical and mental (Jones et al., 2001). The two main arms of the stress system are the autonomic nervous system (ANS) and the hypothalamic-pituitary-adrenal (HPA) axis (Marques et al., 2010). Central to the **physiology of stress response** of mammals are the two adrenal glands located on top of each kidney, each of which is suggested to have two separate functional zones: the adrenal medulla at the core and adrenal cortex around the outer area (Jones et al., 2001). One of the ways by which psychological stress is hypothesized to be transmitted to the body is the hypothalamic-pituitary-adrenalaxis via the neuroendocrine route, prompting the cortex adrenal to release glucocorticoids – cortisol (Marques et al., 2010). Another path is through the sympathetic nervous system and neural route, prompting the adrenal medulla to release noradrenaline/adrenaline and neuropeptides (Marques et al., 2010). Although both are important to the overall stress response, the sympathetic nervous system is considered more closely associated with initiating the "fight-or-flight" response, whereas the HPA system plays an important role in the physiological and psychological effects of stress on health, mood, and behavior (King & Hegadoren, 2002). Dysfunction of these stress systems may lead to dissonance among multiple other physiological systems, resulting in stress-related disorders including cardiovascular, inflammatory, autoimmune, and metabolic disease as well as behavioral and psychiatric disorders (Marques et al., 2010).

Extensive literature on the topic suggests that the HPA axis **regulation of cortisol release** plays an important role in psychological, physiological, and physical functioning under stress (Dickerson & Kemeny, 2004). In addition to the stress response, cortisol regulates the immune system, counteracts inflammatory and allergic reactions (Dickerson & Kemeny, 2004;

King & Hegadoren, 2002), and supports the nervous system with adequate levels of serotonin responsible for mood and depression (Jones et al., 2001). In a crisis, however, brain and muscles need more oxygen and "fuel," causing heart rate and blood pressure to accelerate (Jones et al., 2001, p. 56). When the HPA axis is activated by stress the initiated cortisol secretion is hypothesized to promote short-term survival by "a) increasing the glucose and oxygen supply to skeletal muscles, heart and brain; b) suppressing reproductive, immune, and digestive functions to protect energy resources; c) promoting analgesia; and d) triggering peripheral autonomic response" (King & Hegadoren, 2002, p. 93). For these reasons, body cortisol levels provide an insight into the hypothalamic-pituitary-adrenal axis activity and are extensively used as an indicator of alerted physiological states in response to stress (Kirschbaum & Hellhammer, 1989).

Does Stress Affect Health?

Although cortisol activation under acute stress is protective in the short-term, research shows that extreme or chronic activation of it can lead to premature wear and tear of physiological systems and long-term health problems (Jones et al., 2001; King &Hegadoren, 2002). For the cardiovascular system, the repeated increase in blood pressure caused by sympathetic nervous system activation can lead to hypertrophy of the left ventricle (Schneiderman et al., 2005), trigger turbulence in the blood flow, damage to some blood vessels, thus increasing the probability of heart attacks and strokes (Jones et al., 2001). The recurring stress activation of the hypothalamic-pituitary-adrenal axis and cortisol secretion was observed to result in a buildup of excess glucose and free fatty acids released from body reserves, contributing to clogged blood vessels (Jones et al., 2001). Also, the stress response systems can directly affect immune system status: sensitivity to stress hormones in the blood may cause the immune system to fail to protect the body from infectious agents, as well as be over vigilant such

that the immune system itself may be the underlying cause of the disease (Evans et al., 2000; Jones et al., 2001). Studies in a field called psychoneuroimmunology show how external stressors "get into" into the immune system, provoking the release of a wide variety of chemical and stress hormones, such as cortisol, and influence their functions (Passer & Smith, 2007, p. 493). Continuous stress makes the immune cells "resistant" to the effects of cortisol, resulting in indefinite production of proinflammatory hormones (Miller et al., 2002; Schneiderman et al., 2005, p. 617). Thus, repeated activation of stress response system presents risks for physiological, psychological and physical well-being (Jones et al., 2001).

Both epidemiological and labaratory studies have demonstrated the **links between psychosocial factors and disease** (Schneiderman et al., 2005). Effects of stress on mental health were studied among people who experienced disastrous life events, like floods, hurricanes, and fires. Incidence of psychological disorders in these victims, such as anxiety and depression, demonstrated a 17% increase (Rubonis & Bickman, 1991). It was found that stress can influence the entire spectrum of physical illnesses: negative life events were suggested to cause breast cancer (Pettecrew et al., 1999); strong associations were observed between job strains and cardiovascular diseases (Schnall et al., 1994); life stress was detected to be linked to weakened immune functioning and increased susceptibility to infectious diseases (Cohen & Herbert, 1996; Watkins & Maier, 1999).

Because stress is a universal human experience and has implications for health, researchers considered vital the use of a multidimensional and reliable assessment of its effects (King & Hegadoren, 2002**).** Cortisol measurement is applied in health practice and research to help identifying stress-specific changes in the body, the risks of developing stress-related diseases, and the efficiency of interventions aimed at stress reduction (King & Hegadoren, 2002).

The measurement of saliva cortisol concentrations to evaluate stress expanded outside of the medical field as a non-invasive and stress-free method not requiring medically trained personnel (King & Hegadoren, 2002). The research has confirmed salivary cortisol measurement to be as sensitive as urinary and plasma cortisol (Kirschbaum & Hellhammer, 1989).

Individual Response to Stress and Stress Interventions

Puzzled by many variables in the stress response, a large body of research investigated individual differences in relation to stress to asses why people respond differently to stressors and why some people are more susceptible to stress than others (Jones et al., 2001). Some models classified these differences into three broad categories: genetic, acquired, and dispositional (Jones et al., 2001; Wittenborn, 1989). The genetic category assumed the role of factors like gender, age, and physique; the acquired factors included social class, education, social support; the dispositional factors related to coping styles and personality types. While the genetic factors were assumed to be generally stable characteristics of the individual, the dispositional and the acquired factors were thought to be more predisposed to change during lifetime. Researchers continue examining the impact of individual differences in stress response by investigating more complex personality variables (Jones et al., 2001).

Another area central to stress research is **coping** (Jones et al., 2001). To evaluate coping, researchers have used indicators that present people with a range of options and ask them to indicate to what extent they "usually" use each option (Jones et al., 2001, p. 144). Some models suggested distinguishing between problem- and emotion-focused coping strategies (Folkman & Lazarus, 1980), others evaluated situational responses and strategies in relation to personality variables and dispositional approaches (Carver et al., 1989).

Following the development of the literature related to coping, another body of research investigated **interventions** designed to tackle the problem of stress (Jones et al., 2001). These interventions were seen to change the environment by either changing the persons' ability to cope or by reducing the negative impact of the stress on person's well-being. Some of the most evaluated types of interventions included stress management trainings, relaxation, meditation, exercise, neuro-linguistic programming, and self-help literature. Despite the massive amount of literature on this topic, it is considered that little is known about how a given individual can best cope with a situation and find the intervention that will make a real difference. The field is seen to move towards further evaluation of various interventions as well as measurement of their objective impact on the physiological and psychological well-being of the individual.

Chapter 3: Methods

The purpose of this study was to explore the potential influence of an art museum visit on people's psychological and physiological indicators of stress. The following research question guided this study: To what extent does a brief visit to an art museum influence an individual's psychological and physiological indicators, including self-reported stress, self-reported arousal, and saliva cortisol?

Research Design

A pre-experimental design was used to assess the influence of a brief art museum visit on an individual's indicators of stress. The researcher studied a single group and provided an intervention during the experiment; a pre- and post-test approach was used to structure the experiment. Because this used a pre-experimental design, the study did not have a control group to compare with the experimental group (Creswell, 2014).

The research replicated the study design and data collection methods used in a research study conducted by psychophysiologists and stress researchers at the University of Westminster (UK) (Clow & Fredhoi, 2006). Clow and Fredhoi examined the normalization of salivary cortisol levels during a brief lunchtime visit to an art gallery by London City workers.

Data collection methods

Data collection methods for this study included an objective measurement of participants' saliva cortisol levels and a subjective assessment of their stress and arousal levels. Measurement of the saliva cortisol level has been increasingly employed as an objective biomarker of stress; cortisol regulates human health systems in normal non-stressful living and responds to stressors by additional cortisol secretion (Nater & Rohleder, 2009). The validity and availability of non-

invasive methods cortisol evaluation in saliva made it an ideal measurement to apply in non-clinical settings.

To evaluate participants' perceived stress and arousal levels, the research used a self-administered questionnaire based on Cox Mackay Stress Arousal Checklist (Mackay et al., 1978). The combination of the objective physical data, such as cortisol level, with the subjective "behavioral and expressive" measures, are suggested to lead to a more comprehensive understanding of health outcomes of non-clinical interventions (King & Hegadoren, 2002, p. 93).

Data collection procedures involved four steps. First, the researcher met participants in a designated area in the museum and explained the study procedure. Verbal consent was obtained from participating subjects. Second, participants were asked to collect their saliva and complete a self-administered, paper-and-pencil questionnaire. It took participants about 7-10 minutes to complete the measurements. Third, participants were given 35-40 minutes to walk around the museum galleries in any way they prefer. After that time, visitors were asked to return for their post-test measurements. Finally, participants were again asked to collect their saliva and complete a self-administered, paper-and-pencil questionnaire a second time. It took participants about 7-10 minutes to complete the post-visit measurements as well. These procedures were approved by the University of Washington's Institutional Review Board (IRB).

Sample and Sampling Plan

The study participants were recruited using the quota sampling method. Employees working in institutions located in proximity to the participating museum were invited through a direct mailing and/or by a personal invitation. Participants were required to be older than 18 years and not to be taking corticosteroid medications. No other restrictions were applied to the sample in terms of the demographics of the participants.

The final sample consisted of 31 people. Sixty-eight percent (n=21) identified as female, and 32% (n=10) as male. Three age groups were identified: 26% of the participants were younger than 34 years old, 19% were between 35 - 44, and 55% were between 45 - 55 years old. On average, participants said they woke up at 6:20am on the day of testing, and their cortisol was collected between 12:40 pm – 2:40 pm. All participants came to the study from their workplace during their lunch break; the average time for the participants to get to the museum was 25 minutes. The average time between the pre- and post-test measurements was 40 minutes. Participants were provided with free admission to the museum and lunch at the end of the study.

Saliva Cortisol Measurement

Saliva specimens were collected by passive drool without the use of gum or stimulants. Participants were asked to rinse their mouth with water before saliva collection, and to avoid brushing teeth, eating or drinking, immediately before collecting saliva to avoid contamination of the saliva with blood or food. Participants were asked to spit saliva directly into a tube until they had accumulated at least 2 milliliters of saliva, as indicated by a line on the outside of the tube. It took approximately 3-5 minutes to collect each saliva sample. Each participant was also asked a few questions about things that may have affected measurements of cortisol. Questions included age, gender, and wake-up time.

Saliva tubes with specimens were tightly capped and transported in insulated, cold bags to the freezer within 2 hours following the collection. After 31 samples were collected, they were be transported by the researcher in the insulated cold bags to the laboratory and stored frozen.

Saliva Cortisol Assay *(provided by Brindle E., UW Biodemography Lab, 2020)*

Saliva was analyzed for cortisol using an enzyme immunoassay based on the protocol of Munro and Stabenfelt (Munro & Stabenfeldt, 1985). This assay was originally validated for use

in plasma specimens (Munro & Stabenfeldt, 1985), and has been successfully used by the UW Biodemography Lab for salivary (Skinner et al., 2011), urine (Trumble et al., 2010), dried blood spot (Brindle et al., 2014) and hair (Heller et al., 2018) specimens. The assay uses a purified polyclonal anti-cortisol antibody, R4866 (provided by C. Munro, UC Davis) and cortisol reference calibrators (Steraloids, cat. no. Q3880). The antibody cross reacts 100% with cortisol, 10% with prednisolone, 6% with prednisone, 6% with compound S, 5% with cortisone, and less than 1% with all other steroids (data provided by C. Munro). The assay exhibited parallelism between calibrators and eleven serially diluted saliva specimens (average slope=-0.01 ± 0.03, p=.8); and recovery of known added dose from a specimen matrix averaged 89% for saliva specimens. The minimal detectable dose was 302 pg/mL (n=19 plates). As part of assay validation, Rodbard's variance components model (Rodbard, 1974) was used to calculate imprecision. Within-assay imprecision, reported as coefficient of variation (CV), was 3.8% and 4.4% for the low (1655 pg/mL) and high (3323 pg/mL) controls respectively, and between-assay imprecision was 11.7% and 13.3% (n=15 plates for each CV). For the four assay plates used in this study, average within-assay CV for duplicate wells was 4.0%, and between-assay CVs for quality control specimens were 7.4% for the low (968 pg/mL) control and 6.5% for the high (4645 pg/mL) control, respectively. Cortisol is stable when stored frozen and is robust to freeze-thaw cycles (Barrett et al., 2005). Specimens were thawed and centrifuged to separate saliva supernatant from any debris just prior to assay.

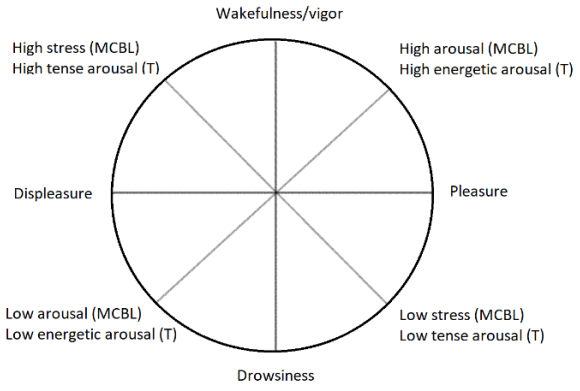
Self-Reported Stress and Arousal Assessment

To assess participants' psychological state, the research used self-administered questionnaire (see *Appendix A*). It took participants approximately 3-5 minutes to complete the survey. The questionnaire consisted of 34 'mood'-describing adjectives and is known as Cox

Mackay stress-arousal checklist based on two-dimensional model of 'mood' (Mackay et al., 1978). The stress dimension of the instrument is thought to be related to feelings of "unpleasantness" and "pleasantness" or "hedonic tone", indicating a general sense of well-being; while the arousal factor is related to "wakefulness/vigor" and "drowsiness" (Cox & Mackay, 1985, p. 183). To calculate the scores using the stress-arousal checklist respondents were asked to scale each of 19 stress adjectives and 15 arousal adjectives using the following response scale: 'definitely feel (++),' 'feel slightly (+),' 'do not understand or cannot decide (?),' and 'definitely do not feel (-).'

The Cox Mackay stress-arousal checklist has been widely used and discussed in literature as a measure of generalized stress response (Matthews et al, 1990, King et al., 1983; Thayer, 1978). Researchers suggested that a combination of high stress and high arousal scores could be interpreted as a "high tense arousal" state, while low stress and high arousal could produce a "high energetic arousal" state (Matthews et al, 1990; Thayer, 1978). Likewise, a combination of high stress and low arousal scores could be described as a "low energetic arousal" state, and low stress and low arousal as a "low tense arousal" state (see *Figure 1*).

Figure 1. Alignment in factor space of two-factor structural models of mood.
Key: MCBL (Mackay et al., 1978); T (Thayer, 1978). (Matthews et al., 1990)



Individuals' experience of stress and their response to commonly used 'mood'-describing adjectives is argued to reveal a psychological state in relation to the situation; the 'mood' is described to capture the perception of the environment and emotional reaction to it (Cox, 1985). As suggested by the authors of the stress-arousal checklist, the stress factors may relate to the perceived favorability of the external environment, while the arousal dimension may reflect ongoing somatic activity; together these measurements of 'mood' is seen to offer a "direct method of tapping the individual's experience of stress" (Cox, 1985, p. 1158). While general agreement in the literature is that stress and arousal tend to be raised in unison, some research found evidence that depending on a task these two variables may behave independently (King et al., 1983).

The two-dimensional stress-arousal model was validated as being sensitive to a generalized stress response and demonstrated to be sensitive to a variety of environmental, task, and pharmaceutical effects, as well as physiological measurements (Cox & Mackay, 1985).

Data Analysis

The study was designed to collect three types of quantitative data before and after the museum visit: saliva cortisol, self-reported stress, and self-reported arousal. A paired sample *t*-test was used to calculate differences in means from pre to post for these three experimental measures.

Data Collection Site

Data collection was performed at the Bellevue Art Museum, Bellevue, WA. The Museum was chosen based on its location in downtown Bellevue - a home for many businesses and companies whose employees were invited to participate in the study. Additionally, the scope of the museum and the exhibition plan made the study procedures easy to plan and follow.

Founded in 1947, the Museum opened the doors of its first dedicated home in Bellevue, WA, in January of 2001. BAM is one of few museums in the nation with a focus on art, craft, and design and an emphasis on Northwest artists. **"**With a long history of community engagement, BAM today is home to provocative exhibitions and programs highlighting some of the region's most influential artists as well as international collections" (BAM, 2019). BAM's mission is built around providing a public forum for the community to contemplate, appreciate, and discuss visual culture and working with audiences, artists, makers, and designers to understand shared experience of the world.

Limitations

This study has several limitations. The quota sampling approach, focused on a selected group of working people who were asked to visit a museum during their lunch break, which may limit statistical generalization of the results to wider audiences. Another limitation is the self-selected nature of participants, which may have created a bias. Participants were people who felt comfortable exploring an art museum and sharing their experiences. Also, the data were collected in one museum, and all participants were exposed to a certain kind of art. Therefore, it is possible that the content of the exhibitions has influenced the results.

Finally, the main limitation of the study is the absence of the control group. To infer that visiting a museum decreases stress, a control group is needed to compare measurements in participants who left their workplace during their lunch break but did not experience a museum visit. Also, because cortisol levels tend to decrease during the day, it would be difficult to distinguish between the impact of a museum visit and the natural drop in cortisol level. While adding a control group would have made the research more rigorous and the evidence more

robust, it was not within the scope of this master's thesis. Future research is suggested to address these limitations.

Chapter 4: Results and Discussion

The purpose of this study was to explore the potential influence of an art museum visit on people's psychological and physiological indicators of stress. The following research question guided this study: To what extent does a brief visit to an art museum influence an individual's psychological and physiological indicators, including self-reported stress, self-reported arousal, and saliva cortisol?

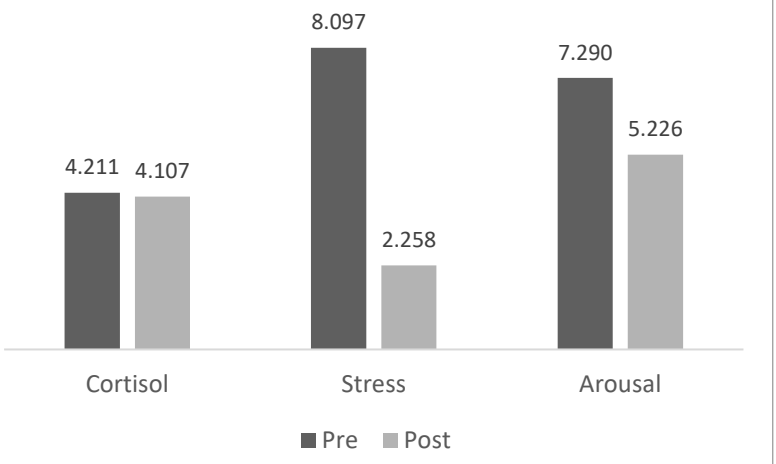
Self-Reported Stress

Before and after the museum visit, study participants rated themselves on 19 stress adjectives, using a 4-point scale from definitely feel (++) to feel slightly (+) to 'do not understand or cannot decide (?), and definitely do not feel (-) (Mackay et al., 1978). The recommended scoring system for the instrument applies a different methodology for positive and negative adjectives (Cox & Mackay, 1985). For positive adjectives: score 1 was assigned if a 'definitely feel (++)' or 'feel slightly (+)' has been circled; otherwise, score 0 is given. For negative adjectives**:** score 1 is assigned if a 'do not understand or cannot decide (?)' or 'definitely do not feel (-)' has been selected; otherwise, score 0 is given.

The positive adjectives describing "pleasantness" of the experience or "hedonic tone" were *peaceful, relaxed, cheerful, contented, pleasant, comfortable, calm, restful*. The adjectives describing the negative emotional reaction to the environment were *tense, worried, apprehensive, bothered, uneasy, dejected, up-tight, jittery, nervous, distressed, fearful*. Scores for all adjectives in stress dimension were added to obtain an aggregated stress score from 0-19 for each participant.

The mean self-reported stress score before the museum visit was 8.097, while the mean self-reported stress score after the museum visit was 2.258 (see *Figure 2*). The difference between these means was statistically significant (t=10.013, df=30, p<0.000), and shows that participants' self-reported stress levels dropped by 72% after their museum visit. The statistically significant reduction in self-reported stress was true for both men (t=9.000, df=9, p<0.000) and women (t=7.021, df=20, p<0.000) in the sample.

Figure 2. Cortisol, stress, and arousal means before and after the museum visit (n=31)



These findings confirm those of Clow and Fredhoi (2006), who reported a 45% drop in self-reported stress levels before and after a museum visit. Specifically, their mean self-reported stress level before visiting the museum was 5.28, and after visiting the museum was 2.89.

Self-Reported Arousal

Using the same technique for measuring self-reported stress, study participants rated their arousal levels before and after visiting the museum using the same 4-point scale for 15 arousal adjectives (Mackay et al., 1978). The positive adjectives describing feelings of "wakefulness" were *active, energetic, vigorous, alert, lively, activated, stimulated, aroused*. The negative adjectives describing "drowsiness" were *tired, drowsy, idle, sluggish, sleepy, somnolent, passive.*

Scores for all adjectives in arousal dimension were added to obtain an aggregated arousal score from 0-15 for each participant.

The mean arousal before visiting the museum was 7.290, and after visiting the museum the mean was 5.225 (see *Figure 2*). The difference between these means was statistically significant ($t=4.325$, $df=30$, $p<0.0005$), and shows that participants' self-reported arousal scores decreased by 28% after their museum visit. Again, this significant decrease in arousal was true for both men ($t=3.235$, $df=9$, $p<0.05$) and women ($t=3.143$, $df=20$, $p<0.01$) in the sample.

The self-reported drop in arousal levels found here differ from Clow and Fredhoi's (2006) findings. Their pre-visit and post-visit mean values for arousal were 8.6 and 9.4 respectively, with no statistically significant difference between them.

Saliva Cortisol

Mean saliva cortisol concentrations were also compared. Before visiting the museum, the mean cortisol concentration was 4.210 ng/mL, and after visiting the museum the mean cortisol concentration was 4.107 ng/mL. There was no significant difference between these means, suggesting that participants' saliva cortisol concentrations did not change after their museum visit. Again, this finding held true for both men and women in the sample.

Here too this study's findings differed from those of Clow and Fredhoi (2006). In the latter study, the mean cortisol concentration before visiting the gallery was 2.110 ng/mL (5.82 nmol/l), and after the value was 1.428 ng/mL (3.94 nmol/l) ($t= 1.056$ (2.913), $df=24$, $p<0.008$). There was a statistically significant difference between these two means; the post-test mean for cortisol decreased by 32.3%.

Discussion

The current study demonstrated that participants who visited the museum at lunchtime reported a 72% drop in self-reported stress and a 28% reduction in self-reported arousal. It can be concluded that a brief art museum experience has the potential to improve the psychological state of the visitors by increasing their feelings of pleasantness, happiness and enjoyment, decreasing sense of wakefulness, and transforming them from a tense to an energized state (Cox, 1985; Cox & Mackay, 1985; Matthews et al., 1990).

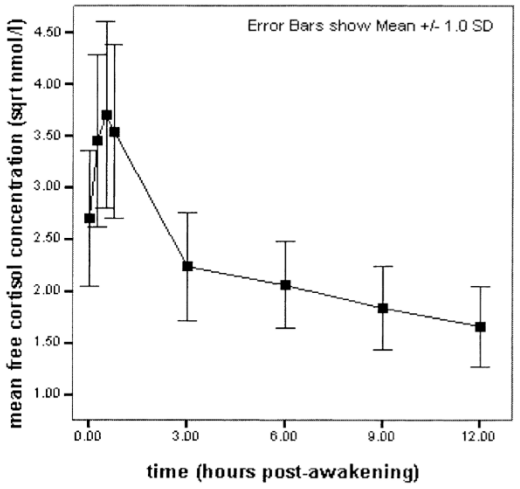
The results of the current research and the original Clow and Fredhoi 2006 study have demonstrated the potential of a brief lunchtime art museum/gallery visit to decrease an individual's stress. The studies arrived at similar conclusions based on demonstrating a statistically significant change in two out of three stress indicators. Both studies observed a statistically significant change in visitors' self-reported stress levels. The studies, nevertheless, reported different findings concerning the change in self-reported arousal levels and saliva cortisol concentrations. The variations in these results can be attributed to a few possible factors.

The sample sizes in both studies (31 in the U.S., 24 in the UK) were not large enough to lend themselves to statistical generalization. The sampling strategies applied by the studies were not identical. The time spent by participants in the UK study to get to the gallery was between 5 and 10 minutes to assure that visitors came directly from work with an elevated level of daily job-related stress. In the current U.S. study, participants spent on average 25 minutes to travel to the museum. It is possible that the additional time spent in commuting may have influenced participants' pre-test cortisol concentrations. Also, almost 50% of the U.S. study participants were related to a museum practice and museum studies. This could have influenced both the participant's initial stress levels as well as the impact the museum visit had on their indicators of

stress. In the UK study, it is noted that only relatively high pre-test cortisol values were associated with a subsequent drop in post-test cortisol concentrations. Finally, differences in participants' response could be related to the kind of art they were exposed to. Therefore, it is possible that the content of the exhibitions in both studies has impacted the results. A significant part of these limitations could be addressed in future studies by using larger sample sizes and applying a more rigorous sampling strategy.

Another considerable step forward in making this research and evidence more robust would be by adding a control group to the study. To confidently conclude that the museum visit has a potential to lower physiological and psychological stress, a control group is needed to compare measurements in participants who got out of the workplace at lunchtime but did not experience a museum visit.

Figure 3. Mean cortisol concentrations for 42 subjects across two days. (Edwards et al., 2001)



The control group data would be particularly valuable in assessing cortisol results. Normal cortisol levels have basal diurnal rhythm (see *Figure 3*). Saliva cortisol concentrations peak by 50% in the first 30 minutes after awakening, drop rapidly over the next few hours, and

then slowly decline throughout the day at 15% per hour at wakeup to reach the lowest values around midnight (Adam et al., 2006, p. 17059). The study measured cortisol levels during relatively slow decline period, from 12:40 pm to 2:40 pm. Nevertheless, in order to distinguish between the influence of an intervention, like a museum visit, and the normal drop in cortisol levels, it is necessary to refer to a control group results. Also, factors such as age, gender, hormonal state, medications intake, sleep, diet, and lifestyle, may influence cortisol levels and must be considered in future study designs (King & Hegadoren, 2002).

The study also contributes to discussions of a correlation between physiological and psychological measures of stress. The research found no evidence of the direct correlation between the subjective stress-arousal and objective saliva cortisol measurements. Because stress is not considered an "observable and discrete event", some authors suggested that there are no direct physiological measures of stress, only "physiological correlates" (Cox, 1985, p. 1155). The reasons for not expecting causal relationships between physiological and psychological methods are argued to be related to the nature of measurement methods (snapshot, cumulative, or continuous), the intensity and duration of changes measured, and the characteristics of response systems (p. 1160). Some researchers emphasize that the measurement of stress must focus on the individual's psychological state and look for reliable correlations with physiological methods (Cox, 1985). For future research, it is advisable to form interdisciplinary teams consisting of museum, health, and behavioral science professionals in order to comprehensively and methodically design and interpret studies assessing health outcomes of museum interventions.

The number of cultural and museum participation studies involving physiological measurements is only a handful. This can be explained by the absence of health-focused expertise in museums as well as the low level of interest of the healthcare field to study well-

being benefits of museum and other non-clinical interventions. The field will benefit from more studies deploying vigorous research designs, large sample sizes, control groups, and interdisciplinary teams. Future research could assess a well-being impact of different styles of art, experiment with a length of the museum exposure, study gender differences, as well as look at various combinations of psychological and physiological measurements. The increased body of research would lead to development of frameworks, methodologies, and proven recommendations to study health and well-being benefits of museum engagement.

Chapter 5: Conclusions and Implications

The purpose of this study was to explore the potential influence of an art museum visit on people's psychological and physiological indicators of stress. This chapter summarizes the study's findings, situates them within the literature, and suggests further implications for researchers and practitioners.

Conclusions

In recent years a growing body of literature has explored the health benefits of arts and cultural participation on societal and individual levels (O'Neill, 2010). The present study reinforces that an art museum visit may have an influence on people's subjective levels of stress and arousal. These findings add to the body of literature evaluating cultural attendance as a variable affecting health and well-being, measured by longevity, perceived health, anxiety, depression, satisfaction with life, and perceived happiness (Bygren et al., 1996; Cuypers et al., 2012; Davies et al., 2016; Johansson et al., 2001; Konlaan et al., 2000; Wilkinson et al., 2007).

Several essential research fields have investigated the underlying physiological and psychological mechanisms of cultural/arts/museum participation's influence on health and well-being. The current study contributes to the research in positive psychology, neuro-immunology, and neurophysiology that investigates the role that emotions, feelings, thoughts, and environment play in fighting disease and promoting health and well-being (Cohen, 2009; Fancourt, 2017; Fredrickson, 2000; Kaplan et al., 1993; Passer & Smith, 2007). By setting the study in an art museum and examining the psychological health benefits of an art museum visit, this research also supports the exploration of the potential influence of arts and creative participation on biological, mental, and cognitive functions (Cohen, 2009; Fancourt, 2017; Salom, 2011).

In much of the discussion about the potential of the museum field to deliver health outcomes, researchers have advocated for the use of an evidence-based approach and robust research methodologies (Broderick, 2011; Putland, 2008; Raw, 2012; White, 2009). For the non-clinical settings to become recognized as health and well-being contributors, robust research and empirical background is required to examine, measure, and prove individual and community well-being impact in a cultural context (Ander et al., 2011; Camic& Chatterjee, 2013; Staricoff, 2006; White, 2009). The present study suggests that by using a combination of quantitative psychological and physiological indicators, before-and-after comparisons, a sufficient sample size, and randomization, museums and other cultural settings can go beyond qualitative research methods and apply rigorous study designs to prove their contribution to the healthcare agenda.

A growing body of literature has examined museums' contributions to health and well-being and has highlighted the potential of museums to address individual and community health needs (Lackoi et al., 2016). Museums' health-centered programs were able to engage and serve various audiences, among them older and isolated people, adults diagnosed with dementia and other forms of memory disorders, and people affected by mental health issues (Chatterjee & Noble, 2013; Davenport & Corner, 2011; Nainis, 2006; NML, 2012; Stuckey & Nobel, 2010). While the majority of current museum health-centered programs are therapeutically driven and concentrate on specific health issues, the present study is centered around providing evidence for potential health benefits to the general population with no specific health conditions. By studying the influence of a museum visit on everyday stress, the research contributes to the efforts of psychology field to explore non-clinical interventions that have ability to combat stress, create positive states, and thus impact people's wider physiological and physical well-being (Fredrickson, 2000; Jones et al., 2001).

With increased understanding that health and disease are affected not only by biological determinants, but also by psychological and social factors, health services are gradually transforming into a social model of medicine (Broderick, 2011; Jones et al., 2001; Sapolsky, 1974; Schneiderman et al., 2005). By assessing the health benefits of museum participation, the present research contributes to the health sector's increased interest in recognizing the interconnected determinants of well-being and looking for interventions that can be initiated by the cultural sector outside of clinical settings (Ander et al., 2011; Broderick, 2011). The research contributes to the discussion of the potential to engage arts and culture sectors in developing new models of health and social care and serving communities (Lackoi et al., 2016; Silverman, 2010).

Implications for Research

The present study could set the scene for continued examination in two directions: 1) by researching the potential of an art museum intervention to reduce stress in working people in comparison with other kinds of lunchtime interventions; 2) by examining the impact of various kinds of art experiences on an individual's level of stress and well-being.

The first research study would explore several stress-reducing interventions during the workday, comparing well-being benefits among them. The lunchtime interventions might include visiting a museum and taking a short walk in a park. The study should have a control group consisting of people who did not leave their workplace and instead spent their 40-minute break at their workplace. The purpose of this study would be to examine to what extent visiting a museum and taking a short walk during lunchtime can potentially influence the psychological and physiological levels of stress of working people, and how the impact of these interventions compares with results in people who do not engage in these activities and stay in the office.

The study could use a sample of 60 people and apply the pre- and post-test control-group design. In this design, the experimental groups A and B, and the control group C, consisting of 20 participants each, are selected through random assignment. All groups would take pretest and post-test measurements. The data collection would involve objective physiological measurements of participants' saliva cortisol levels and a subjective psychological evaluation of their stress and arousal levels through a self-administered questionnaire. The study participants could be recruited using the quota sampling method. Employees working in businesses and organizations located in proximity to the participating museum and walking area could be invited to a museum through a direct mailing and/or by a personal invitation. The study could be conducted at two or more sites to make the data more reliable and generalizable to wider audiences.

The study would collect three types of quantitative data from groups A, B, and C: saliva cortisol, self-reported stress, and self-reported arousal. The pre- and post- measurements would be examined using statistical tools. Further, the mean values of the reported change for samples A and B could be compared between each other and with the results of the control group. The study would describe how each of the interventions impacted the psychological and physiological stress levels of working people and how different these changes were in comparison with results from the control group. The study would contribute to the health and psychology research around the influence of positive interventions and various stress management practices on health and well-being (Fredrickson, 2000; Jones et al., 2001).

Another direction for future research would be to evaluate how different kinds of arts participation at art museums may influence visitors' stress levels. The study would explore the stress and well-being impact of visiting an art exhibit for 40 minutes and engaging in a creative

art making workshop for the same period. The purpose of this study would be to examine to what extent each type of arts engagement influences the psychological and physiological levels of stress of people, and compare the impact of these interventions.

The study could use a sample of 60 people and apply the two-group pre-test and post-test design with no control group. In this design, the experimental groups A and B consisting of 30 people each would be selected through random assignment. Both groups would take pre-test and post-test measurements. The data collection would involve a subjective psychological evaluation of participant stress and arousal levels through a self-administered questionnaire. The study participants could be recruited among museum visitors (18+). The study could be conducted at two or more sites to make the data more reliable and generalizable to wider audiences.

The research would derive two types of quantitative data from groups A and B: self-reported stress self-reported arousal levels. The pre- and post- measurements would be examined using statistical tools. Further, the mean values of the reported change for samples A and B could be compared among each other. The study would describe how each kind of the arts engagement impacted visitors' psychological stress levels. The research could also examine the relationship of the results and demographics. The study would contribute to the research on the health benefits of cultural participation and arts engagement (Bygren et al., 1996;Cohen, 2009; Cuypers et al.; Wilkinson et al., 2007).

Implications for Practice

The current study suggests that a brief visit to an art museum during work hours has a potential to improve an individual's subjective psychological well-being indicators, such as stress and arousal; it increases visitor's feelings of "pleasantness" and enjoyment and decreases their sense of "wakefulness" and alertness (Cox & Mackay, 1985, p. 183). This research could

inform art museums' practice in three different ways: by becoming a health and well-being resource for their visitors and strengthening their social role for the communities they serve, by attracting new audiences that would benefit from museum's health-enhancing potential, and by stimulating health professionals and promoters to prescribe museum participation as a method for improving well-being.

By examining potential well-being benefits for the general public, the study suggests practical implications for art museums' communication and marketing professionals. Based on the findings of the study, art museums can position themselves as resources for health and well-being and strengthen their social role in the communities they serve (O'Neill, 2010; Silverman, 2010). By communicating the well-being benefits to their visitors, museums can invite new audiences interested in the stress-reducing impact of a museum visit, i.e. people who experience high job-related stress and alertness levels. Since the study revealed a potential for a positive stress influence of a museum visit during lunch break, art museums could prepare communication and publications for companies and businesses located in proximity to the museum and invite their employees to visit the museum during lunchtime. A slogan like "Come to a Museum at Lunchtime and Reduce Your Stress by 70%" could work well for printed flyers, museum banners, and online communication channels. The museum could also reach local well-being and health-focused media with the results of the study and support publications around this topic (Putland, 2008; Raw, 2012). All these communication initiatives should be focused on informing the general public that they can turn to art museums for maintaining or potentially improving their health and well-being (Ander et al., 2011; Camic & Chatterjee, 2013).

By contributing to the growing research investigating the well-being potential of arts and

cultural participation, the study can stimulate health professionals to prescribe art museum participation as a potential method for decreasing stress and improving well-being. Through publications and professional channels, these studies will reach health promoters and policy makers and reinforce the museums' social role in delivering health and well-being benefits to their communities (Lackoi et al., 2016; O'Neill, 2010; Silverman, 2010; White, 2009).

The purpose of this study was to explore the influence of an art museum visit on people's psychological and physiological indicators of stress. The study points to the potential of a brief visit to an art museum to influence an individual's subjective psychological well-being and contributed to the literature and practice exploring the health benefits of arts, cultural, and museum participation.

References

Adam, Emma K., Hawkley, Louise C., Kudielka, Brigitte M., & Cacioppo, John T. (2006). Day to-day dynamics of experience--cortisol associations in a population-based sample of older adults. (PSYCHOLOGY)(Author abstract)(Clinical report). *Proceedings of the National Academy of Sciences of the United States, 103*(45), 17058-17063.

Ander, E., Thomson, L., Noble, G., Lanceley, A., Menon, U., & Chatterjee, H. (2011). Generic well-being outcomes: Towards a conceptual framework for well-being outcomes in museums. *Museum Management and Curatorship, 26*(3), 237-259.

Ander, E., Thomson, L., Noble, G., Lanceley, A., Menon, U., & Chatterjee, H. (2012). Heritage, health and well-being: Assessing the impact of a heritage focused intervention on health and well-being. *International Journal of Heritage Studies, 19*(3), 1-14.

Arnold, S., Coote, A., Harrison, T., Scurrah, E., and Stephens, L., (2018) HEALTH AS A SOCIAL MOVEMENT: THEORY INTO PRACTICE PROGRAMME REPORT. https://neweconomics.org/uploads/files/hasm-final-report.pdf Accessed January 8, 2020.

Barrett, Yu Chen, Akinsanya, Billy, Chang, Shu-Ying, & Vesterqvist, Ole. (2005). Automated on-line SPE LC-MS/MS method to quantitate 6beta-hydroxycortisol and cortisol in human urine: Use of the 6beta-hydroxycortisol to cortisol ratio as an indicator of CYP3A4 activity. *Journal of Chromatography B, 821*(2), 159-65.

Brindle, E., O'Connor, K.A. and Garrett, D.A. (2014). Applications of Dried Blood Spots in General Human Health Studies. In Dried Blood Spots (eds W. Li and M.S. Lee). doi:10.1002/9781118890837.ch9

Broderick, S. (2011). Arts practices in unreasonable doubt? Reflections on understandings of arts practices in healthcare contexts. *Arts & Health, 3*(2), 95-109.

Button, Dan (2020). *The UK should stop obsessing over GDP. Wellbeing is more telling | The Guardian*. (n.d.). https://www.theguardian.com/commentisfree/2019/jun/10/uk obsessing-gdp-wellbeing-new-zealand Accessed January 8, 2020.

Bygren, L., Konlaan, B., & Johansson, S. (1996). Attendance At Cultural Events, Reading Books Or Periodicals, And Making Music Or Singing In A Choir As Determinants For Survival: Swedish Interview Survey Of Living Conditions. *BMJ: British Medical Journal, 313*(7072), 1577-1580.

Camic, P. (2010). From Trashed to Treasured: A Grounded Theory Analysis of the Found Object. *Psychology of Aesthetics, Creativity, and the Arts, 4*(2), 81-92.

Camic, P., & Chatterjee, H. (2013). Museums and art galleries as partners for public health interventions. *Perspectives in Public Health, 133*(1), 66-71.

Carver, C., Scheier, M., & Kumari Weintraub, J. (1989). Assessing Coping Strategies: A Theoretically Based Approach. *Journal of Personality and Social Psychology, 56*(2), 267-283.

Chatterjee, H. (2015). Museums and art galleries as settings for public health interventions. In *Oxford Textbook of Creative Arts, Health, and Wellbeing, International perspectives on practice, policy and research* (p. Oxford Textbook of Creative Arts, Health, and Wellbeing, International perspectives on practice, policy and research, Chapter 34). Oxford University Press.

Chatterjee, H., MacDonald, Sally, Prytherch, David, & Noble, Guy. (2008). *Touch in museums : Policy and practice in object handling* (English ed.). Oxford ; New York: Berg.

Chatterjee, H. J. and Noble, G. (2013) Museums, Health and Wellbeing. Ashgate Publishing Ltd. Farnham, UK; Burlington USA.

Clow, A. and Fredhoi, C. (2006). Normalisation of salivary cortisol levels and self-report stress by a brief lunchtime visit to an art gallery by London City workers. *Journal of Holistic Healthcare.* 3 (2), pp. 29-32.

Cohen, G. (2009). New theories and research findings on the positive influence of music and art on health with ageing. *Arts & Health, 1*(1), 48-62.

Cohen S., Kessler R.C., Gordon L.U. (1997). Strategies for measuring stress in studies of psychiatric and physical disorders. In: Cohen S, Kessler RC, Gordon LU, editors. Measuring stress: a guide for health and social scientists. New York: Oxford University Press. p 3-26.

Cohen, Sheldon, & Herbert, Tracy B. (1996). Health psychology: Psychological factors and physical disease from the perspective of human psychoneuroimmunology. *Annual Review of Psychology, 47*, 113.

Coolman, A., Niedbalski, A., Powell, D., Kozlowski, C., Franklin, A., & Deem, S. (2020). Changes in human health parameters associated with an immersive exhibit experience at a zoological institution. *PLoS One, 15*(4), E0231383.

Cox, T. (1985). The nature and measurement of stress. *Ergonomics, 28*(8), 1155-1163.

Cox, T., & Mackay, C. (1985). The measurement of self-reported stress and arousal. *British Journal of Psychology (London, England : 1953), 76 (Pt 2)*, 183-6.

Creswell, J. (2014). *Research design : Qualitative, quantitative, and mixed methods approaches* (4th ed.). Thousand Oaks, California: SAGE Publications.

Cuypers, K., Krokstad S., Holmen, T.L., SkjeiKnudtsen M., Bygren L.O., and Holmen J. (2012). Patterns of receptive and creative cultural activities and their association with perceived health, anxiety, depression and satisfaction with life among adults: the HUNT study,

Norway. *Journal of Epidemiology & Community Health*. 66(8), 698-703.

Dal Sun Han, Sang-Soo Bae, Dong-Hyun Kim, & Yong-Jun Choi. (2017). Origins and Evolution of Social Medicine and Contemporary Social Medicine in Korea. *Journal of Preventive Medicine and Public Health, 50*(3), 141-157.

Davenport, B. and Corner, L. (2011), Review of Policy and Research Evidence Relating to the Ageing, Health and Vitality Project. Newcastle University. https://objecthandling.files.wordpress.com/2012/05/policy-research-review-for-ahv1.pdf Accessed January 8, 2020.

Davies, C., Knuiman, M., & Rosenberg, M. (2015). The art of being mentally healthy: A study to quantify the relationship between recreational arts engagement and mental well-being in the general population. *BMC Public Health, 16*(1), BMC Public Health, 12/2015, Vol.16(1).

Dickerson, S., & Kemeny, M. (2004). Acute Stressors and Cortisol Responses: A Theoretical Integration and Synthesis of Laboratory Research. *Psychological Bulletin, 130*(3), 355-391.

Edwards, S., Clow, A., Evans, P., & Hucklebridge, F. (2001). Exploration of the awakening cortisol response in relation to diurnal cortisol secretory activity. *Life Sciences, 68*(18), 2093-2103.

Evans, P., Hucklebridge, Frank H, & Clow, Angela. (2000). *Mind, immunity, and health : The science of psychoneuroimmunology* (Key texts in the psychology of health and illness). London ; New York: Free Association Books.

Fancourt, Daisy, & Fancourt, D. (2017). *Arts in Health: Designing and researching interventions*. Oxford University Press.

Felsten, G. (2009). Where to take a study break on the college campus: An attention restoration theory perspective. Journal of Environmental Psychology, 29, 160–167.

Folkman, S., & Lazarus, R. (1980). An analysis of coping in a middle-aged community sample. *Journal of Health and Social Behavior, 21*(3), 219-239.

Fredrickson, B. (n.d.). Cultivating Positive Emotions to Optimize Health and Well Being. *Prevention & Treatment, 3*(1), Prevention & Treatment, 2000, Vol.3(1).

Gunnar M., Quevedo K. (2007). The neurobiology of stress and development. Annu. Rev. Psychol, 58, 145–173.

Harper, S. and Hamblin, K. (2010) *This is Living.* London: Dulwich Picture Gallery.

Harper, S. and La Fontaine, J. (2008). Ethnography. *Research Methods for Health And Social Care.* Basingstoke: Palgrave Macmillan, 238-252.

Heller, Madeleine, Roberts, Sarah T, Masese, Linnet, Ngina, Jacquiline, Chohan, Neha, Chohan, Vrasha, . . . Graham, Susan M. (2018). Gender-Based Violence, Physiological Stress, and Inflammation: A Cross-Sectional Study. *Journal of Women's Health (2002), 27*(9), 1152 1161.

Holmes, T., & Rahe, R. (1967). The social readjustment rating scale. *Journal of Psychosomatic Research, 11*(2), 213-218.

Johansson, S., Konlaan, B., &Bygren, L. (2001). Sustaining habits of attending cultural events and maintenance of health: A longitudinal study. *Health Promotion International, 16*(3), 229-234.

Jones, F., Bright, Jim, & Clow, Angela. (2001). *Stress : Myth, theory and research*. Harlow, England ; New York: Prentice Hall.

Kanner, A., Coyne, D., Schaefer, J., & Lazarus, C. (1981). Comparison of two modes of stress

measurement: Daily hassles and uplifts versus major life events. *Journal of Behavioral Medicine, 4*(1), 1-39.

Kaplan, S., Bardwell, L., & Slakter, D. (1993). The Museum as a Restorative Environment. *Environment and Behavior, 25*(6), 725-742.

King, M., Burrows, G., & Stanley, G. (1983). Measurement of stress and arousal: Validation of the stress/arousal adjective checklist. *British Journal of Psychology (London, England : 1953), 74 (Pt 4)*, 473-9.

King, S., & Hegadoren, K. (2002). Stress Hormones: How Do They Measure Up? *Biological Research For Nursing, 4*(2), 92-103.

Kirschbaum, C., & Hellhammer, D. (1989). Salivary Cortisol in Psychobiological Research: An Overview. *Neuropsychobiology, 22*(3), 150-169.

Konlaan, B., Bygren, L., & Johansson, S. (2000). Visiting the cinema, concerts, museums or art exhibitions as determinant of survival: A Swedish fourteen-year cohort follow up. *Scandinavian Journal of Public Health, 28*(3), 174-178.

Krokstad S., Holmen, T.L., SkjeiKnudtsen M., Bygren L.O., and Holmen J. (2012). Patterns of receptive and creative cultural activities and their association with perceived health, anxiety, depression and satisfaction with life among adults: the HUNT study, Norway. *Journal of Epidemiology & Community Health*. 66(8), 698-703.

Lackoi, K., Patsou, M., and Chatterjee, H.J. et al. (2016) Museums for Health and Wellbeing. A Preliminary Report, National Alliance for Museums, Health and Wellbeing. Available at: https://museumsandwellbeingalliance.wordpress.com Accessed January 8, 2020.

Mackay, C., Cox, T., Burrows, G., & Lazzerini, T. (1978). An inventory for the measurement of self-reported stress and arousal. *British Journal of Social and Clinical Psychology, 17*(3),

283-284.

Mangione, G. (2018). The art and nature of health: A study of therapeutic practice in museums. *Sociology of Health & Illness, 40*(2), 283-296.

Marques, A., Silverman, M., & Sternberg, E. (2010). Evaluation of Stress Systems by Applying Noninvasive Methodologies: Measurements of Neuroimmune Biomarkers in the Sweat, Heart Rate Variability and Salivary Cortisol. *Neuroimmunomodulation, 17*(3), 205-208.

Mastandrea, S., Maricchiolo, F., Carrus, G., Giovannelli, I., Giuliani, V., & Berardi, D. (2018). Visits to figurative art museums may lower blood pressure and stress. *Arts & Health*, 1 10.

Matthews, G., Jones, D., & Chamberlain, A. (1990). Refining the measurement of mood: The UWIST Mood Adjective Checklist. *British Journal of Psychology, 81*(1), 17-42.

Miller, G., Cohen, S., & Ritchey, A. (2002). Chronic Psychological Stress and the Regulation of Pro-Inflammatory Cytokines: A Glucocorticoid-Resistance Model. *Health Psychology, 21*(6), 531-541.

Monroe, S. (2008). Modern approaches to conceptualizing and measuring human life stress. *Annual Review of Clinical Psychology, 4,* 33-52.

Munro, C. J., & Stabenfeldt, G. (1985). Development of a Cortisol Enzyme Immunoassay Plasma. *Clinical chemistry*, 31(6), 956.

Nainis, Paice, Ratner, Wirth, Lai, &Shott. (2006). Relieving Symptoms in Cancer: Innovative Use of Art Therapy. *Journal of Pain and Symptom Management, 31*(2), 162-169.

Nakayama, H., Kikuta, F., & Takeda, H. (2009). A Pilot Study on Effectiveness of Music Therapy in Hospice in Japan. *Journal of Music Therapy, 46*(2), 160-172.

Nater, & Rohleder. (2009). Salivary alpha-amylase as a non-invasive biomarker for the sympathetic nervous system: Current state of research. *Psychoneuroendocrinology, 34*(4), 486-496.

NEF (2009). *National Accounts of Well-being: bringing real wealth onto the balance sheet*. New Economic Foundation. https://neweconomics.org/uploads/files/2027fb05fed1554aea_uim6vd4c5.pdf Accessed January 8, 2020.

NEF (2018). *The health system can work differently with communities to improve health*. (n.d.). New Economic Foundation. https://neweconomics.org/2018/05/health-system communities Accessed January 8, 2020.

NML (2012). House of Memories. An evaluation of National Museums Liverpool: Dementia Training Programme. https://houseofmemories.co.uk/media/1013/house-of-memories evaluation-report.pdf Accessed June 8, 2019.

Nutma, E., Willison, H., Martino, G., & Amor, S. (2019). Neuroimmunology – the past, present and future. *Clinical & Experimental Immunology, 197*(3), 278-293.

O'Neill, M. (2006). Essentialism, adaptation and justice: Towards a new epistemology of museums. *Museum Management and Curatorship, 21*(2), 95-116.

O'Neill, M. (2010). Cultural attendance and public mental health - from research to practice. *Journal of Public Mental Health, 9*(4), 22-29.

Passer, M., & Smith, Ronald Edward. (2007). *Psychology : The science of mind and behavior* (3rd ed.). Boston: McGraw-Hill Higher Education.

Paykel, E.S. and Rao, B.M. (1984). Methodology in study of life events and cancer. In C.L. Cooper (Ed.), *Psychosocial Stress and Cancer*. Chichester: John Wiley and Sons.

Petticrew, M., Fraser, J., & Regan, M. (1999). Adverse life-events and risk of breast cancer: A meta-analysis. *British Journal of Health Psychology, 4*(1), 1-17.

Putland, C. (2008). Lost in Translation: The Question of Evidence Linking Community-based Arts and Health Promotion. *Journal of Health Psychology, 13*(2), 265-276.

Raw, A., Lewis, S., Russell, A., & Macnaughton, J. (2012). A hole in the heart: Confronting the drive for evidence-based impact research in arts and health. *Arts & Health, 4*(2), 97-108.

Rodbard, D. (1974). Statistical quality control and routine data processing for radioimmunoassays and immunoradiometric assays. *Clinical chemistry*, 20(10), 1255–70.

Rosenberg, F. (2009). THE MOMA ALZHEIMER'S PROJECT: MAKING ART ACCESSIBLE TO PEOPLE WITH DEMENTIA. *Gerontologist, 49*, 145.

Rubonis, A., & Bickman, L. (1991). Psychological Impairment in the Wake of Disaster: The Disaster–Psychopathology Relationship. *Psychological Bulletin, 109*(3), 384-399.

Sahrmann, J., Niedbalski, A., Bradshaw, L., Johnson, R., & Deem, S. (2016). Changes in human health parameters associated with a touch tank experience at a zoological institution. *Zoo Biology, 35*(1), 4-13.

Salom, A. (2011). Reinventing the setting: Art therapy in museums. *The Arts in Psychotherapy, 38*(2), 81-85.

Sapolsky R.M. (2000). Why zebras don't get ulcers: an updated guided to stress, stress-related diseases, and coping. NewYork: W. H. Freeman.

Schnall, P. L., Landsbergis, P. A., and Baker, D. (1994). Job strain and cardiovascular health. Annual Review of Public Health, 15, 381-411.

Schneiderman, N., Ironson, G., & Siegel, S. (2005). Stress and health: Psychological, behavioral, and biological determinants. *Annual Review of Clinical Psychology, 1*, 607-28.

Seligman, M. (2013). *Flourish : A visionary new understanding of happiness and well-being* (First Atria paperback ed.). New York ; Toronto: Atria.

Silverman, L. (2010). *The social work of museums*. London ; New York: Routledge.

Skinner, M., Shirtcliff, E., Haggerty, K., Coe, C., & Catalano, R. (2011). Allostasis model facilitates understanding race differences in the diurnal cortisol rhythm. *Development and Psychopathology, 23*(4), 1167-1186.

Staricoff R.L. (2004) Can the Arts Have a Positive Effect on Health? A review of the medical literature. Abingdon: Arts Council of England.

Staricoff, R. (2006). Arts in health: The value of evaluation. *The Journal of the Royal Society for the Promotion of Health, 126*(3), 116-120.

Staricoff, R.L. and Loppert, S. (2003). Integrating the arts into healthcare: can we affect clinical outcomes? *The Healing Environment: Without and Within.* London: Royal College of Physicians, 63-79.

Stuckey, Heather L., & Nobel, Jeremy. (2010). The connection between art, healing, and public health: A review of current literature.(FRAMING HEALTH MATTERS)(Author abstract)(Report). *The American Journal of Public Health, 100*(2), 254-25463.

Todd, C., Camic, P., Lockyer, B., Thomson, L., & Chatterjee, H. (2017). Museum-based programs for socially isolated older adults: Understanding what works. *Health & Place, 48*, 47.

Trumble, B., Brindle, E., Kupsik, M., & O'Connor, K. (2010). Responsiveness of the reproductive axis to a single missed evening meal in young adult males. *American Journal of Human Biology, 22*(6), 775-781.

Vormbrock, J., & Grossberg, K. (1988). Cardiovascular effects of human-pet dog

interactions. *Journal of Behavioral Medicine, 11*(5), 509-517.

Ward Thompson, C., Roe, J., Aspinall, P., Mitchell, R., Clow, A., & Miller, D. (2012). More green space is linked to less stress in deprived communities: Evidence from salivary cortisol patterns. *Landscape and Urban Planning, 105*(3), 221-229.

Watkins, L., & Maier, S. (1999). Implications of immune-to-brain communication for sickness and pain. *Proceedings of the National Academy of Sciences of the United States of America, 96*(14), 7710-7713.

Weiner H.W. (1992). Perturbing the Organism: The Biology of Stressful Experience. Chicago: Univ. Chicago Press.

West, J., Otte, C., Geher, K., Johnson, J., & Mohr, D. (2004). Effects of hatha yoga and african dance on perceived stress, affect, and salivary cortisol. *Annals of Behavioral Medicine, 28*(2), 114-118.

White, M. (2009). *Arts development in community health : A social tonic*. Oxford ; New York: Radcliffe Pub.

Wilkinson, Anna V, Waters, Andrew J, Bygren, Lars Olov, & Tarlov, Alvin R. (2007). Are variations in rates of attending cultural activities associated with population health in the United States? *Bmc Public Health, 7*(1), 226.

Wittenborn, J. (1989). Causes, coping and consequences of stress at work. Edited by Cary L. Cooper and Roy Payne. Wiley, Chichester, 1988. *Stress Medicine, 5*(2), 131.

Appendix A: Instrument

Cox Mackay Stress-Arousal Checklist

For each of the mood-describing adjectives below, please check what best indicates your current state.

Adjective	**Definitely feel**	**Feel slightly**	**Do not understand, cannot decide**	**Definitely do not feel**
Tense	☐	☐	☐	☐
Relaxed	☐	☐	☐	☐
Vigorous	☐	☐	☐	☐
Restful	☐	☐	☐	☐
Active	☐	☐	☐	☐
Passive	☐	☐	☐	☐
Worried	☐	☐	☐	☐
Energetic	☐	☐	☐	☐
Drowsy	☐	☐	☐	☐
Bothered	☐	☐	☐	☐
Lively	☐	☐	☐	☐
Dejected	☐	☐	☐	☐
Comfortable	☐	☐	☐	☐
Distressed	☐	☐	☐	☐
Cheerfu	☐	☐	☐	☐
Peaceful	☐	☐	☐	☐
Activated	☐	☐	☐	☐
Tired	☐	☐	☐	☐

Adjective	**Definitely feel**	**Feel slightly**	**Do not understand, cannot decide**	**Definitely do not feel**
Idle	☐	☐	☐	☐
Up-tight	☐	☐	☐	☐
Alert	☐	☐	☐	☐
Uneasy	☐	☐	☐	☐
Stimulated	☐	☐	☐	☐
Aroused	☐	☐	☐	☐
Somnolent	☐	☐	☐	☐
Fearful	☐	☐	☐	☐
Apprehensive	☐	☐	☐	☐
Contented	☐	☐	☐	☐
Jittery	☐	☐	☐	☐
Sluggish	☐	☐	☐	☐
Pleasant	☐	☐	☐	☐
Sleepy	☐	☐	☐	☐
Nervous	☐	☐	☐	☐
Calm	☐	☐	☐	☐

Please tell me about yourself:

Age_____ Gender_____ Time you woke up this morning_____

Time it took you to get to the Museum_____

Your code word _____

Please use any code word to help me to match this form with the second one you will fill after your visit to the museum. Something that won't reveal your identity, but that you can remember and use on your second form. For example, your pet's name, your favorite meal, or your favorite actor.

Thank you!