



INSTITUTO
UNIVERSITÁRIO
DE LISBOA

The Writing is on the Wall: The impact of street art on environmental consciousness

Luana Tarouca Moreira

Master's in Social and Organizational Psychology

Supervisor:

Ph.D., Patrícia Paula Lourenço Arriaga Ferreira,
Associate Professor, ISCTE – Instituto Universitário de Lisboa

September, 2023



CIÊNCIAS SOCIAIS
E HUMANAS

The Writing is on the Wall: The impact of street art on environmental consciousness

Luana Tarouca Moreira

Master's in Social and Organizational Psychology

Supervisor:

Ph.D. Patrícia Paula Lourenço Arriaga Ferreira,
Associate Professor, ISCTE – Instituto Universitário de Lisboa

September, 2023

A presente dissertação foi parcialmente financiada por fundos nacionais através da FCT - Fundação para a Ciência e Tecnologia, I.P., atribuídos à Unidade de I&D - Centro de Investigação e Intervenção Social do Iscte (Cis-Iscte, UID/PSI/03125/2019).

*To everyone who made me feel like their support
was always a guarantee.*

Acknowledgments

First and foremost, thank you to all the 262 people who took the time to answer our survey and shared their unique perspectives with us.

Thank you to Professor Patrícia Arriaga for all the guidance and informed advice.

To ISCTE-IUL for 5 years of academic support and opportunities for development, and every professor that passionately shared their knowledge throughout my bachelor's and master's degree.

To my workplace and dedicated colleagues who showed their encouragement through actions and words when most needed.

To my family and friends who always responded to my doubts and anxious confessions with a “But why wouldn’t you be able to do it?”, with a genuine incredulous expression - your support made this possible and is the foundation that this entire body of work stands on.

To myself, who sometimes struggled with writing a single line but wrote over 2000 anyway.

And finally, to everyone who thrives for a more sustainable world with every action and who has expressed themselves artistically, sharing a powerful message with their community.

I hope your efforts feel acknowledged.

Resumo

A urgência para um desenvolvimento sustentável tem crescido globalmente nos últimos anos. Paralelamente, a arte urbana tem surgido como um instrumento criativo para aumentar a consciencialização, promover a sustentabilidade e envolver emocionalmente diversos públicos. Existe, porém, uma lacuna na investigação face à compreensão do impacto da arte urbana.

Com esta dissertação, procurámos investigar este impacto através de um desenho experimental com 155 participantes. Com recurso a um inquérito online, expusemos dois grupos a 15 imagens de arte urbana relacionadas com os temas ambiental vs. social. A amostra, maioritariamente feminina e portuguesa, abrangeu idades entre os 18 e 69 anos. Foram realizadas análises de covariância, tratando o grupo como a variável independente, e variáveis dependentes, a reflexão acerca dos ODS, a consciência ambiental e social, e respostas emocionais de valência, ativação, medo, esperança. O interesse dos participantes por arte urbana foi usado como covariável atendendo à sua relação com as variáveis dependentes.

Os resultados revelaram que as imagens de arte urbana possuem capacidades semelhantes em fomentar a consciência ambiental e social, enquanto as respostas emocionais variaram entre os temas, com a arte urbana social a evocar mais esperança e a arte ambiental a induzir mais medo. O interesse individual por arte urbana demonstrou estar significativamente associado com as respostas emocionais e cognitivas dos participantes. Este estudo contribui para os ODS da Agenda 2030, destacando o papel das emoções na comunicação climática e nas estratégias de mobilização através da arte urbana para os desafios globais. Providencia ainda recomendações para estudos futuros.

Palavras-chave: Arte urbana, consciencialização ambiental, emoções, desenvolvimento sustentável

Abstract

The urgency for sustainable development has been increasing globally in recent years. In parallel, street art has emerged as a powerful creative instrument to raise awareness, promote sustainability, and emotionally engage diverse audiences. There is, however, a considerable research gap in understanding the impact of street art.

With this dissertation, we sought to investigate this impact through an experimental design with 155 participants. Using an online survey, we exposed two groups to 15 street art images related to environmental vs. social themes. The sample, which was mainly female and Portuguese, ranged in age from 18 to 69. Subsequently, analyses of covariance were carried out, treating the group as the independent variable, and dependent variables, reflection on the SDGs, environmental and social consciousness and emotional responses of valence, arousal, fear, and hope. Participants' interest in street art was used as a covariate due to its' link with the dependent variables.

The results revealed that street art images have similar abilities to foster environmental and social consciousness, while emotional responses varied between themes, with social street art evoking more hope and environmental street art inducing more fear. Individual interest in street art proved to be significantly associated with participants' emotional and cognitive responses. Overall, this study contributes to the SDGs of the 2030 Agenda by highlighting the role of emotions in climate communication and mobilization strategies through street art for global challenges. It further provides recommendations for future studies.

Keywords: Street art, environmental consciousness, emotions, sustainable development

Index

1. Introduction	1
1.1. Sustainable Development	3
1.2. Environmental Consciousness	4
1.3. Street Art	8
1.4. Emotions and Art	10
2. Aims and Hypothesis	12
3. Method	14
3.1. Pre-test of the Visual Stimuli	14
3.2. Participants	16
3.3. Design	17
3.4. Measures	17
3.4.1. Independent Variable	17
3.4.2. Dependent Variables	18
3.4.3. Individual Variables	20
3.5. Procedure	22
3.6. Data Analysis	23
4. Results	24
4.1. Descriptive statistics and Correlation Analysis among the Variables	24
4.2. Hypothesis testing	27
4.2.1. Thoughtful Reflection, Environmental Consciousness and Social Consciousness	27
4.2.2. Valence and Arousal	28
4.2.3. Fear and Hope	28
5. Discussion	29
5.1. Limitations and Considerations for Future Studies	33
6. Conclusion	35
7. References	38
8. Appendix	51
Appendix A - Survey	51
Appendix B – Advertising Image to recruit participants	67

Index of Tables

Table 1. Details about the pictures used in the study.....	15
Table 2. Sociodemographic Characterization of Participants in Total and by Group	24
Table 3. Intercorrelations for Study Variables as a Function of the Group (‘Climate Action’ and ‘Reducing Inequalities’).....	25
Table 4. Means, Standard Deviations, and One-Way Analyses of Co-variance in Individual and Emotional Responses	27

Glossary

UN – United Nations

SD – Sustainable Development

SDGs – Sustainable Development Goals

ANCOVA – Analysis of Covariance

1. Introduction

What is the role of street art in sustainable development? How can the perception of street art affect an individual's environmental consciousness? What gaps can artistic expression, specifically street art, fill in terms of environmental consciousness communication? What type of emotional responses affect this judgment?

To answer these questions, we conducted an experimental study that bridges the gap between sustainability, art, and emotions. More specifically, we exposed participants to two different categories of street art artworks, addressing either climate action or reducing inequalities. By doing so, we sought to examine differences between these two groups and assess the potential of this creative medium in provoking thoughtful reflection of its themes, raise environmental and social consciousness and engage emotionally (i.e., in terms of hope, fear, valence and arousal).

These questions are relevant because sustainable development (SD) has been a subject of ever-growing interest since urgent concerns of climate change (e.g., warming, sea-level rise, and extreme weather events) were further discussed in the Sustainable Development Goals (SDGs) as a global effort for sustainable development through 2030, with particular emphasis on SDG 13 (Climate Action). This goal underscores the need for climate resilience, integration of climate measures, and raising awareness for mitigation and adaptation. The crucial link between environmental awareness and eco-friendly practices is stressed, promoting responsible action, aligned with SD principles. When exploring environmental campaigns' role in addressing challenges through visual communication, the role of art has been emphasized, more specifically in terms of filling emotional gaps in climate communication (e.g., Curtis, 2009; Sommer et al., 2019).

In the field of psychology, various theories explored this connection, showcasing the intricate relationship between emotions and art, finding that art's emotional impact results from the interplay of perceptual, cognitive, and emotional processes (e.g., Lazarus, 1966; Schachter & Singer, 1962). Researchers also highlight the dimensions of valence and arousal as being providers of a multidimensional perspective of emotion research across various stimuli, including visual stimuli (e.g., artworks) (Russell, 1980).

Street art, in particular, has shown to be a valuable form of visual communication and has historically served as a canvas for societal messages and expressions (Bacharach, 2015). This art form, while often controversial due to legal and property rights concerns, distinguishes itself from graffiti through its intentions. Historically tied to societal changes, street art's emergence in Paris during the 1980s marked a significant turning point, with

artists venturing into public spaces for self-expression and activism. While street art has been recognized for its ability to express social and political messages, its potential to elicit serious reflection on environmental issues has received little recognition. As a result, by investigating how street art can provoke deep reflection and emotional resonance on environmental and social themes, this study addresses a gap in the existing research. We further responded to this overlooked intersection by investigating how exposure to street art with varied thematic approaches (i.e., social vs. environmental) impacts individual responses.

Keeping in mind the objectives established by global organizations, such as the United Nations (UN), World Health Organization (WHO), and the World Health Group, we aim to contribute to the broader dialogue on effective communication strategies, offering insights that could contribute to fostering a more environmentally conscious society and catalyze positive change. Thus, this study assumes a timely role in contributing to both the fields of psychology and environmental communication.

Furthermore, it not only aims to address the UN's Sustainable Development Goals outlined in the 2030 Agenda, namely SDG13 (Climate Action), but also to explore the individual potential of street art in reshaping individual perceptions, emotions, and consciousness regarding environmental and social issues. This process starts with investigating the current state of the art when it comes to the discourse that surrounds these themes.

The following literature review further contextualizes the research within the broader sphere of global sustainability initiatives and explores the intersection of art, psychology, and the environment. It is divided into four subsections: (1.1) Sustainable Development, the goals of the 2030 Agenda, changes in the climate system, global challenges and an individuals' role in supporting policies, discoveries and collaborations; (1.2.) Environmental Consciousness, definition and development, role of campaigns in mobilizing action, climate change communication, use of images and visual media, historical role of art and it's current emotional impact; (1.3) Street Art, definition and historical origins, influential figures, global movement, interplay with emotions; and (1.4) Emotions and Art, resurgence of interest in emotions and art within psychology, impactful theories, multidimensional perspective on emotions in psychology.

1.1. Sustainable Development

“We are meeting at a time of immense challenges to sustainable development [...] Climate change is one of the greatest [...]”
(UN, 2015)

Climate change refers to long-lasting, major changes in the climate system due to natural climatic variability or human activities (Coomer, 1979). These changes include increases in atmospheric and ocean temperatures, diminishing ice levels, rising sea levels, acidification of the oceans, and increased concentrations of greenhouse gases (Parks, 2009). In particular, rising global temperatures are exacerbating extreme weather events, leading to more frequent and intense hurricanes, floods, heat waves and droughts. Sea-level rise caused by heatwaves melting ice sheets and glaciers is threatening coastal communities and ecosystems, forcing displacement and loss of livelihoods. In addition, ocean acidification is disrupting marine ecosystems, affecting the delicate balance of fisheries, coral reefs and marine life. Furthermore, biodiversity loss is accelerating as climate change alters habitats and migration patterns, putting many plant and animal species at risk of extinction. These intertwined challenges exacerbate social inequalities and disproportionately impact vulnerable communities that have limited resources to cope with escalating impacts. The urgency of mitigating and adapting to these climate-related problems is therefore more evident than ever, underlining the importance of global collaboration to ensure a sustainable future for both the planet and its inhabitants (UN, 2015).

Sustainable Development (SD) has been defined as the type of “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland, 1987, p. 54). The core of sustainable development is inter- and intragenerational equity, which is primarily supported by three interacting but distinct pillars: the environment, the economy, and society (Mensah, 2019).

Reflecting these ideals, the Sustainable Development Goals (SDGs) were initially announced in 2015, to ensure a more sustainable future for everyone and chart the sustainability route through 2030 (Mio et al., 2020). Thus, all 193 UN member countries agreed to follow the 2030 Agenda for Sustainable Development and a thorough global action plan for "people, planet, and prosperity" that includes 17 SDGs, and 169 targets was adopted (Nerini et al., 2019).

One of the SDGs established was SDG 13 (Climate Action). The 13th SDG emphasizes the urgent need to take decisive action to fight climate change and its impacts. More concretely, - and as reflected in subsections 13.1., 13.2 and 13.3, respectively - it refers to the necessity of

“... resilience and adaptive capacity to climate-related risks and natural disasters; the integration of climate change measures in national policies and strategies; and education, awareness, and capacity (human and institutional) in mitigation, adaptation, impact reduction and early warning of climate change” (UN, 2015, p. 23).

These proven subjects of growing social and global concern are of high priority for, not only the 2030 Agenda, but also The World Health Organization, the United Nations (UN) Environment Programme, and the UN Framework Convention on Climate Change (Oláh et al., 2020; Sommer et al., 2019). It is essential, according to these institutions, to recognize the potential impacts of climate change on every aspect of sustainable development to raise awareness and policy support for climate initiatives, while at the same time strategizing adaptation systems that mitigate these effects whilst enhancing progress across a spectrum of Sustainable Development Goals (Nerini et al., 2019; Zhenmin & Espinosa, 2019). The urgent need to promote awareness on its origins, outcomes and possible solutions emerged from these circumstances (e.g., Stern et al., 2022).

To mitigate the effects of climate change, environmental awareness promotes the adoption of environmentally friendly practices while simultaneously raising both urgency and responsibility. This awareness not only promotes a deeper understanding of environmental issues but also nurtures environmental sensitivity, fostering the desired ethics and values necessary for sustainable living. It was recognized as a key component of environmental education as it empowers individuals, including students, to develop multi-level environmental consciousness (Fang et al., 2023).

Ultimately, a well-informed and environmentally conscious global population, that understands their individual role, is better equipped to support policies, discoveries, and collaborations that advance the objectives of SDG 13, of preserving the world for present and future generations. Thus, the role of environmental consciousness in sustainable development is amplified.

1.2. Environmental Consciousness

Environmental awareness or Consciousness can be broadly defined as the development of environmental sensitivity through the conscious individual perception of

environmental problems (Gadenne et al., 2009). This environmental sensitivity has implications in terms of attitudes (affect, cognition, behavior), in the sense that individuals, who possess this consciousness of the environment and favorable attitudes, are expected to give importance to the environment and behave accordingly in their daily activities, taking precautions to protect the environment and showing concern for it (Gadenne et al., 2009). Consequently, it creates a predisposition to reactions to environmental issues, by sensitizing individuals to the significance and intricacies of environmental challenges (Ito & Li, 2019), and promoting stronger emotional engagement and cognitive appraisal of the potential consequences (Martínez-Borreguero et al., 2020).

As the foundational understanding of environmental consciousness takes root, it naturally mobilizes a multitude of actions, among which, environmental campaigns emerge as significant agents of change (Gulliver et al., 2020).

Environmental activist groups and their campaigns play a crucial role in inspiring action and mobilizing people to address environmental challenges (Gulliver et al., 2020), serving as conduits for climate change communication across various mediums (Wang et al., 2018).

Both verbal and visual components are frequently used in traditional climate change communication, but the visual component has been proven to be more noticeable and effective (e.g., Casas & Williams, 2019; Hart & Feldman, 2016; Klöckner & Sommer, 2021).

While verbal communication (e.g., speeches, reports, and articles) is crucial for expressing complicated scientific information and policy debates, the visual element (e.g., images or other forms of visual media) is equally important in capturing attention, demystifying complex ideas for a wider audience, and evoking emotions (Casas & Williams, 2019; Pfau et al., 2006; Sheppard, 2005; Smith & Joffe, 2013). Adding to this, several scientists have concluded that their academic fields do not encourage direct public involvement (Curtis et al., 2012), and have emphasized that strictly presenting factual information is less likely to lead to lasting emotional and behavioral changes (Jacobson & Monroe, 2007; Weber, 2006). Research in climate communication has noticed a dependence on mediated and rationalized interactions, with a noticeable lack of pathways for direct emotional engagement and public participation (Curtis et al., 2012; Jacobson & Monroe, 2007; Roosen et al., 2018).

One of the ways environmental campaigns sought to incorporate this knowledge in its' practices has been through artistic endeavors. Historically, art has played a key role in drawing attention to a range of social issues, raising awareness and changing perceptions

(e.g., the role of feminist art in the 'women's liberation' movement of the 1960s and 1970s) (Roosen et al., 2018).

There are also several examples of art referencing climate change. One notable example, regarding the issue of ocean pollution, is the work of Boyan Slat, inventor and founder of “The Ocean Cleanup” (Meyer, 2019). He sought to combat plastic pollution in the oceans and developed a project that used passive floating barriers to collect plastic debris from the ocean's surface. Combining engineering and artistic vision, Slat created a significant visual representation of the scale of the issue and inspired worldwide awareness and action against marine pollution.

Another initiative that merges art and environmentalism is the 'Vortex' project by Ethan Estess. This initiative brought artists and environmentalists together to create works of art from plastic waste picked up at beaches and oceans (Rodriguez, 2020). The result of this process is a series of sculptures and installations raising awareness about plastic pollution, and repurposing waste to create thought provoking art pieces.

Additionally, the distinguished street artist Banksy contributed to the discourse on climate change. He painted the words 'I DON'T BELIEVE IN GLOBAL WARMING' on a wall beside the Regent's Canal in London, with the words 'global warming' partially disappearing under the water (Siddique, 2009).

More recently, the 2030 Agenda has led to various initiatives using art to raise public awareness of its objectives. Projects such as “Towards 2030: What are you doing?”, created by the Lavazza group, who invited multiple street artists to create a mural for each SDG, are some of the social awareness initiatives that aim to spread the 2030 SDGs through street art. This project was carried out by a group of Italian and international street artists in the city of Turin and, according to Fox and Macleod (2021), stands as a notable example of a good practice that effectively enhanced awareness of the SDGs, through citizen engagement.

In light of arts' potential as a powerful communication channel, several studies have shown that art can help disseminate scientific information by facilitating engagement and stimulating emotions that aid communication between researchers, professionals, and citizens (Arce-Nazario, 2016; Baldwin & Chandler, 2010; Curtis et al., 2012; Marks et al., 2016).

Curtis (2010) conducted a study involving interviews with participants of a community arts project that resulted in an environmentally focused exhibition. The researcher found, through this process, that this project generated a profound emotional reaction among participants, leading to community growth, heightened environmental consciousness, and subsequent adoption of pro-environmental behaviors (Curtis, 2010). Its effectiveness as a

means of communication has been highlighted by its strong emotional response, which is stimulated by the environmental art. Some participants stated that they had moved from mere entertainment into a more fundamental understanding of the environment's message (Curtis, 2010).

In truth, the concept of art can provide people with a clear picture of the problem and their individual experiences, which is particularly relevant in terms of climate change at a time when it's widely perceived to be an abstract issue that does not directly threaten them. The effects of climate change, biodiversity loss and pollution can be exposed by artists in the form of paintings, sculptures, installations or multimedia presentations that make those issues more understandable to a broader audience. The use of metaphors, analogies and narratives that are not commonly used in traditional means of climate change communication, are also usually employed by artists. This is an important factor that facilitates people's exploration of meanings behind works or the artist's intentions, particularly when they are acknowledged as having a social impact (López-Sintas et al., 2012).

Within this framework, artists argue that environmental art invokes "different ways of seeing", reflecting on the world we live in and our own role within it (Chandler et al., 2014). Similarly, reflecting on issues embedded in Climate Activism is conducive to a reflection on the current climate paradigm and how we confront it with the desired future (i.e., sustainable development).

In parallel, given the importance of the interconnection of these themes and the increasing number of artistic initiatives on an environmental scope (e.g., "Towards 2030: What are you doing?", in Turin), a growing number of scientific articles have been published that assess the advantages of this type of initiatives and the impact they can have on the awareness of the community (Curtis, 2009; Marks et al., 2016; Opermanis et al., 2015; Sommer & Klöckner, 2021).

When discussing specific emotions that have been linked with the transformative influence of environmental initiatives, hope and fear emerge as being particularly relevant.

When it comes to emotional appeals in climate communication, the predominant approach often gravitates towards negative emotional appeals, particularly fear-driven narratives (e.g., disaster depictions, climate change threats, habitat loss, resource depletion) (Hulme, 2008; O'Neill & Nicholson-Cole, 2009). While fear appeals hold the potential to influence behavior (Bamberg & Möser, 2007; Meijnders et al., 2001) by instilling urgency, they can also carry the risk of unintended outcomes, such as existential anxiety and disengagement (Ojala, 2012; O'Neill & Nicholson-Cole, 2009; Swim et al., 2009). In

contrast, research suggests that positive emotional appeals, notably hope, can provide a more effective avenue for fostering climate engagement (e.g., showcasing renewable solutions, conservation, and global cooperation) (Chadwick, 2015; Feldman & Hart, 2016; Moser, 2007; Pooley & O'Connor, 2000; Smith & Leiserowitz, 2014; Swim et al., 2009).

As mentioned above, from the wide range of artistic expressions present in environmental awareness initiatives and campaigns, street art assumes a special role both historically and in the current day.

1.3. Street Art

Street art is a form of visual expression created in public spaces, that draws its canvas from urban landscapes (e.g., streets, buildings, public infrastructure) and distinguishes itself by its accessibility to a broad audience, not being confined to traditional galleries and/or museums (Bacharach, 2015).

Despite its impact, street art is not a topic devoid of controversy, as it often generates discussions about legality due to its unconventional settings and the legal ambiguities it often navigates (i.e., property rights, public space usage, and artistic freedom) (McAuliffe & Iveson, 2011; Vanderveen & Van Eijk, 2016).

While distinctions between street art and related concepts such as Graffiti have posed challenges for researchers, a definition by Blanché (2016) seeks to clarify: street art involves intentional communication with a broad audience through images, figures, and shapes, while Graffiti tends to focus on writing (i.e., stylized lettering, known as "tags"). This distinction is further underscored by the characterization of street art as an evolved iteration of Graffiti, representing a nuanced shift away from vandalism (Hampson, 2018). Expanding on this, street art shifts its focus away from letters, although they may still be of use, to emphasize the power of visual imagery. The contextual use of space, combined with a diverse set of materials beyond the conventional spray can (e.g., sculpture, stencils, wheatpastes) is at the heart of street art's distinct identity (Daichendt, 2013).

Historically, graffiti has been associated with illegal activity, frequently involving the unauthorized marking of public or private property. While street art can also be created without permission, it can also often be endorsed or commissioned by local communities, businesses, or authorities to enhance public spaces (Blanché, 2016). Furthermore, street art has been more often associated with activism, being described as "a trigger for political and social discussions" (Baumgarth, & Wieker, 2020), in contrast to Graffiti which has been interpreted as being more focused on the artist's individual identity and name recognition

within the graffiti community. However, street art can also be purely aesthetic, challenging conventional artistic norms while enhancing a city's visual landscape. Nevertheless, it has been increasingly recognized as a legitimate art form and has generally gained acceptance in mainstream art circles (Ross et al., 2020).

Regarding historical origin, it is difficult to pinpoint a specific timeline, but researchers seem to point to Paris, in the 1980s, as a significant milestone in the development of street art as an artistic and cultural movement (Baumgarth, & Wieker, 2020). More and more artists started to make use of public space as their canvases during this period, venturing beyond the limits of traditional art spaces. More accessible and democratic art could be made available thanks to this transition from traditional artistic settings into a city's own streets and often the works of these artists interlinked with the city narrative (i.e., frequently addressing social and political issues that reflected this period's cultural context) (Fieni, 2016). In parallel, British artists Martha Cooper and Henry Chalfant (1984) wrote the book "Subway Art", which contributed significantly to showcasing this subversive art form to an increased audience while further defining its cultural significance. Moreover, the use of stencils on street art during that period was pioneered by artists such as Blek le Rat in France and Banksy in the United Kingdom. These techniques allowed for greater details and easy replication of images (Blanché, 2015). However, while the 1980s played a significant role in the history of street art, it's important to note that similar forms of artistic expression (e.g., Graffiti, public murals), have historical precedents in other regions and cultures around the world, each contributing to the dynamic and diverse nature of this artistic movement. For instance, large-scale murals with political and social messages were being produced by Mexican artists such as Diego Rivera, José Clemente Orozco, and David Alfaro Siqueiros at the beginning of the 20th century, laying the foundation for public art that engaged with societal issues (Rochfort, 2006).

The spread of street art as a global movement has since occurred in the 2000s. Artists from across the globe and cultures have adopted this form for expressing their ideas and challenging society's norms, with many cities hosting Mural Festivals to invite artists to produce large-scale public artworks that contribute to the revitalization of the neighborhoods (MacDowall, 2019).

It is important to recognize that street art's evolution has been influenced by a multitude of factors (e.g., political climate, cultural shifts, and advancements in artistic techniques). To become a global phenomenon that continues to evolve and impact contemporary art and urban culture, street art has transcended geographical boundaries

(Banet-Weiser, 2011; Borghini et al., 2010; Droney, 2010). This impact has even extended to branding and advertising (e.g., art infusion effect, Baumgarth, & Wieker, 2020).

Interestingly, when it comes to the diverse emotional reactions to street art, "fear" (Vanderveen & Van Eijk, 2016), "awe" (Kramer, 2019) and "hope" (Thompson et al., 2023) emerge as being significantly associated with this art form. The global impact of street art, as well as its adaptability and resonance, suggests that the vast emotive potential it possesses plays a vital role in shaping its cultural relevance and communicative power.

1.4. Emotions and Art

Historically, psychology has explored the relationship between art-related preferences, evaluations, and emotions through experimental studies (Silvia, 2005). Interestingly, both art and emotion experienced a resurgence within the field of psychology in the same time frame. While some emotion researchers formulated theories on basic emotions (Ekman & Friesen, 1971; Izard, 1971; Tomkins, 1962), other authors evaluated the aesthetic dimensions of art (Berlyne, 1971, 1972, 1974). Although the following years witnessed limited interaction between the domains of emotion and art within psychology (e.g., Tan, 2000), recent research emphasizes the potential of emotional exploration as a foundation for understanding responses to art (Silvia, 2005). In empirical aesthetics, the importance of emotional reactions in the perception of art has gained momentum (Pelowski et al., 2017; Silvia & Brown, 2007; Vessel et al., 2012). As these two lines of study advanced, their convergence became evident, and several studies have been conducted to establish their links (e.g., Cheung et al., 2019; Noy & Noy-Sharav, 2013). This interplay aligns well with the concepts discussed in the previous subsection regarding awareness campaigns, as the resonance of art's emotional impact proves to be crucial to these campaigns, by harnessing artworks' capacity to elicit powerful emotions in individuals.

Multiple psychological theories expound on this intricate relationship, all collectively underlining the complex interplay of physiological, cognitive, and physical factors that contribute to people's emotions when they engage with art. According to the Aesthetic Experience Theory (e.g., Parson, 1987; Ramachandran & Hirstein, 1999), art's emotional impact is due to interactions between perceptual, cognitive, and emotional processes during visual encounters, that result in distinctive emotional reactions. The Appraisal Theory (Lazarus, 1966; Scherer, 1999) states that emotions come from cognitive evaluations, where individuals consider an image's (e.g., artworks) significance based on their own goals,

values, and beliefs, which produce a variety of emotional responses. In addition, according to the Arousal Theory (Schachter & Singer, 1962), the emotional effects of art would be caused by physiological arousal levels induced by viewing artwork, with different arousal levels prompting different emotional reactions.

Furthermore, researchers such as Russell and Lang (1980) have played important roles in popularizing and formally defining the qualities of valence and arousal which are key components for understanding emotions responding to various stimuli, including visual stimuli. By combining the two dimensions, Russell's Circumplex Model of Affect (1980) enhances our understanding of emotional experiences. Valence, which represents emotional positivity or negativity, aligns with the Circumplex Model's horizontal axis, spanning from negative (unpleasant) to positive (pleasant) emotions. Arousal, denoting emotional intensity, is represented along the vertical axis of the model, spanning from low (calm) to high (excited) arousal states. In this way, by facilitating a nuanced depiction of emotional experiences, this model's framework allows discrete emotions to be classified into quadrants within the valence-arousal space. This approach helps researchers comprehend the interaction between emotional positivity/negativity and intensity, proposing a multidimensional perspective that has greatly influenced the study of emotions in psychology.

However, despite the impact of both fields, there is a notable lack of studies that investigate the different discrete emotional responses to street art and what they can add to the wider discourse. For example, while some studies compare emotional responses to different art forms (e.g., visual art, music) (e.g., Miu et al., 2016), no studies we have found directly compare emotional responses to different street art themes. Each theme can carry its own set of meanings, symbolism, and emotional triggers, which can in turn influence how individuals perceive, interpret, and engage with the artworks. For instance, street art that portrays environmental issues might stir feelings of urgency, concern, or even fear about the state of the planet. On the other hand, street art focused on themes of unity and equality may evoke emotions of hope, empathy, and a sense of collective purpose (Kleres & Wettergren, 2017). This interaction can be further influenced by individual variability (e.g., personal backgrounds, experiences, values, and interests, such as interest in street art itself, which could either amplify or minimize the impact of exposure to said art form) as each individual possesses a unique perspective, cultural context and emotional predispositions (e.g., Leontiev, 2000; Sherman & Morrissey, 2017; Silvia, 2005).

An example of this interaction was studied by Gartus and Leder (2014) who found that participants with a high interest in graffiti tended to rate graffiti art more positively (i.e.,

higher valence scores) and interestingly than modern art, and this effect was stronger in a street context than in a museum context, further suggesting that individual differences in art interests and preferences can influence emotional reactions when exposed to various artworks.

However, despite these insights, there is also a noticeable gap in literature regarding whether emotional responses to street art can lead to desired outcomes such as increased awareness, attitude change, or behavioral intention. This thesis seeks to contribute to these gaps in literature.

2. Aims and Hypothesis

The main aim of this experimental study is to examine the extent to which street art can raise individuals' consciousness regarding the importance of climate action and reducing inequalities. For this purpose, participants will be randomly assigned to two different conditions, in which they are exposed to street art images that target one of two sustainable development goals: Climate Action (SDG13) or Reducing Inequalities (SDG10). Accordingly, in this two-group experimental design, the SDG13 group will be exposed to street art pieces focused on environmental themes, while the SDG10 will be presented with street artworks centered on social causes.

Based on the studies and literature findings that reflect on the impact of street art on environmental consciousness, we hypothesized the following:

H1: Participants in the "Climate Action" (SDG13) condition will report higher levels of Environmental Consciousness compared to participants in the "Reducing Inequalities" (SDG10) condition.

In addition, due to the themes depicted in the "Reducing Inequalities" (SDG10) condition, we expect the opposite pattern of results in social consciousness:

H2: Participants in the "Reducing Inequalities" (SDG10) condition will report higher levels of Social Consciousness compared to participants in the "Climate Action" (SDG13) condition.

Furthermore, this study seeks to examine the influence of these different types of street art on participants' reflection about the themes portrayed and emotional responses (i.e., valence, arousal, fear, and hope). As such, during the exposure to the street artworks, we will collect their self-reported emotional responses.

Given that there is no literature investigating emotional responses to the addressed SDG themes, the analyses of the emotional responses will be exploratory. In particular, we

questioned whether participants in the "Climate Action" (SDG13) condition would exhibit significantly different emotional responses (Q1) in terms of valence (Q1a), arousal (Q1b), fear (Q1c), and hope (Q1d) compared to participants in the "Reducing Inequalities" (SDG10) condition.

After the exposure to the street artworks, we ask for participants' assessment of their reflective thoughts to the artworks shown regarding its' depicted themes, predicting the following:

H3: In the 'Climate Action' group, the more reflection on the theme, the stronger the report of environmental consciousness.

H4: In the 'Reducing Inequalities' group, the more reflection on the theme, the stronger the report of social consciousness.

Additionally, we aim to understand if interest in street art (i.e., an individuals' attitudes and engagement with street art) is related to the dependent variables and used it as a covariate to adjust or control for its potential role when examining the effects of our street art themes manipulation on the dependent variables.

3. Method

This section is organized into six subsections: (3.1) Pre-test, (3.2) Participants, (3.3) Design, (3.4) Measures, (3.5) Procedure and (3.6) Data Analysis, for an effective overview of the methodology that guided the present study.

3.1. Pre-test of the Visual Stimuli

The first step of the investigation was to select a set of images for both conditions that would be employed in the subsequent (main) experimental study. For this purpose, we conducted a pre-test to select the stimuli before applying them to a larger scale group (e.g., Leon et al., 2011) and ensure that the selected street art photographs were in line with the intended themes of environmental and social issues.

Firstly, we collected several street art photographs, using as main criteria images that reflected the themes of the UN 2030 Agenda¹. For this dissertation, our aim was to select artworks depicting the themes of Climate Action (SDG13) and Reducing Inequalities (SDG 10). During the collection of the artworks, information was gathered for each picture (e.g., artist, title of the work, date, location, photographer or artist copyrights).

The majority of the Street Art images were searched online on websites (e.g., *Street Art Cities*; <https://streetartcities.com/>) as well as scouring through social media accounts (some artists also directly sent us the original versions of the images appearing in their online profiles) and news articles. To narrow our scope, among the types of Street Art identified (Baumgarth & Wieker, 2020), the current focus would be on paintings (i.e., type C). Therefore, only wall murals were considered, excluding street art artworks on floors or other settings commonly present in public spaces (e.g., fire hydrants).

Afterwards, the images were edited to remove distracting elements (e.g., parked cars, surrounding buildings) using softwares such as *Smart Photo Editor* and/or *PhotoScape*. Each image was inserted into a black background, sized at 1024x768 pixels. For copyright purposes, we asked for authorization for the use of the images and, considering the artists/photographers who responded affirmatively, a total of 297 images were in the initial database.

After the collection phase, we conducted the pre-test. The respective online survey comprised a randomized selection of 40 images from the initial database (i.e., each participant was exposed to a unique, randomly generated set of 40 images selected from the

¹ The database on street artworks is part of an ongoing study coordinated by Patrícia Arriaga, which includes a broad dataset of images and is being conducted independently from the present dissertation.

297 available images). Participants were presented with these images and asked to identify which SDGs (one or more) they associated with each image. In this survey, we aimed to understand the inherent association participants made between the street art visuals and the SDGs to ensure that the images used in the experimental study were the ones that most resonated with participants in terms of their perceived alignment with the themes in question.

A total of 141 responses were collected (42 participants collected from master's students at ISCTE and social networks, and the remaining 99 participants through the Clickworker platform).

For selecting the pictures, we established a criterion: each image had to receive a rating agreement of 75% or higher in relation to be related to either SDG 13 or SDG 10, with no overlapping ratings between the two SDGs.

Based on the above criterion, we selected 30 pictures, 15 for each condition, that were evaluated each by 4 to 17 participants.

Table 1

Details about the pictures used in the study

Artist	Artwork Title	Year	Location
Eduardo Kobra	The World is Burning	<i>Unknown</i>	Brazil
Daniela Guerreiro, Nuno Viegas and Élsio Menau	À moda Quarteirense	2020	Portugal
Nevercrew	Brink	2022	Switzerland
WOSKerski	Untitled	Unknown	England
Nevercrew	Black machine	2015	Italy
Mabel Vicentef	La Cosecha de Judías Verdes	2015	Argentina
Mabel Vicentef	Lucilia in Albania	2019	Albania
Krimsone and Scott Nagy	Reduce, Reuse, Recycle	2020	Australia
Fijodor	Connecting Nature	2022	Italy
Fijodor	Green Up	2020	Italy
Fijodor	Gattigre in equilibrio precario	2020	Italy
Fijodor	Untitled	2020	Italy
Fijodor	Atlante	2020	Spain
Dadospuncero (Da2)	Untitled	2022	Spain
Dadospuncero (Da2)	Caballastica	2019	Russia
Nuno Nomen	Projecto "O Bairro i o Mundo"	2014	Portugal
Dan Manrique Arias	Hands in Solidarity	1997	United States of America

Artist	Artwork Title	Year	Location
Nark	<i>Untitled</i>	2021	Portugal
Eduardo Kobra	Paz entre as Nações	2019	Norway
Moxaico	<i>Untitled</i>	2021	Spain
Eduardo Kobra	Ellis Island	2018	United States of America
Theic Licuado	Todos somos um	2016	Portugal
Iljin	Lucretia's Women's Rights	2018	United States of America
Moh Awudu	We are in this together	2020	Ghana
Moh Awudu	Child protection project	2019	Ghana
Richt	<i>Untitled</i>	2022	England
Janín Garcin	Unidas	2021	United States of America
Janín Garcin	Llamarada/Juntas somos más fuertes	2021	Mexico
Vedran Poricanin	Zajedno Cvjetamo/Together We Bloom	2022	Bosnia and Herzegovina
Levalet	Esperando la jubilación	2016	Spain

Note. In Green are highlighted the details regarding the pictures included in the ‘Climate Action’ (SDG13) condition; In Orange are highlighted the details regarding the pictures included in the ‘Reducing Inequalities’ (SDG10) condition.

As can be seen in Table 1, the artworks used were created by 23 artists and are located in 15 different countries, with a majority being located in Europe ($N = 8$). The majority are also recent (i.e., painted less than a decade ago) ($N = 27$). The images included in the ‘Climate Action’ (SDG13) condition portrayed themes such as ocean and air pollution, global warming, loss of biodiversity, waste, recycling, and natural landscapes. The images included in the ‘Reducing Inequalities’ (SDG10) condition portrayed themes such as solidarity, unity, social inclusion, and equality.

3.2. Participants

In total, 262 participants, who were required to be at least 18 years old and have proficiency in speaking/understanding Portuguese, answered the survey. However, as per the previously established exclusion criteria, participants who stated they did not pay attention to the pictures during the exposure (i.e., in response to an attention check question, after exposure to the street art artworks) ($N = 3$) or did not answer ($N = 104$) were not included in the final sample. As such, the present study relied on the voluntary participation of 155 individuals (59.2 % completion rate).

The age of the participants ranged from 18 to 69 years, with an average of approximately 33 years ($M = 33.40$; $SD = 12.99$). The sample is mostly female (78.1% vs. 21.3% male), with one person (0.6%) preferring not to answer this question.

Furthermore, a vast majority of participants are Portuguese (92.9%), currently single (marital status) (66.7%) and their highest completed academic degree is a bachelor's degree (41.7%), closely followed by those with a master's degree or post-graduation qualification (39.1%). The majority have no previous art experience (79.7%).

In relation to the participant's perception of income, 71.5% of participants stated that their current income accommodates their current living situation. On average, the participants perceive themselves to be slightly above the midpoint perspective about their social status ($M = 5.94$).

3.3. Design

A survey with an experimental design was constructed, and two *between-subjects* conditions were established: in the "climate action" condition, participants are exposed to images previously classified as being more associated with environmental causes (i.e., SDG 13, Climate Action); in the comparison condition, participants are exposed to images more associated with the social theme of "inequalities" (i.e., SDG 10, Reducing Inequalities). Participants were randomly assigned to only one of the two conditions.

3.4. Measures²

3.4.1. Independent Variable

The independent variable reflects the two SDG conditions of street art artworks that the participants were exposed to. Participants were randomly assigned to one of two distinct conditions: (a) 'Climate Action': exposure to 15 pictures of street art focusing on environmental themes (e.g., climate change, biodiversity; identified in the pretest as being most associated with SDG 13); or (b) 'Reducing Inequalities': exposure to 15 pictures of street art focusing on social causes (e.g., social inclusion, unity; identified in the pretest as being most associated with SDG 10).

² Some variables from the survey were not used in this study, specifically i) an open-ended question asking participants to describe any additional emotions they felt when presented with each visual stimulus; and ii) whether they were familiarized with the depicted image. For this reason, they will not be detailed in our study.

In each condition, 15 images were randomly presented to each participant. During a block that included each image, participants were also asked to report their feelings upon viewing the image (see Section 3.4.2.) and a minimum exposure time of 6 seconds was required for each block.

3.4.2. Dependent Variables

During the exposure to each image, participants were asked to report how they felt towards the images, in the following emotional and cognitive measures:

Valence. Evaluated with one item using a 9-point rating scale ranging from 1 (“Muito Desprazer, Negativo(a)”/ “Very Displeased, Negative”) to 9 (“Muito Prazer, Positivo(a)”/ “Very Pleased, Positive”).

Arousal. Evaluated by one item. The ratings ranged on a scale of 1 (“Muito Calmo(a)” / “Very Calm”) to 9 (“Muito Ativado(a)”/ “Very Activated”), with higher ratings indicating a higher level of psychological activation.

Fear. Evaluated by one item, on a scale of 1 (“Nada Assustado(a)/Medo” / “Not At All Scared/Fearful”) to 9 (“Muito Assustado(a)/Medo” / “Very Scared/Fearful”), with higher ratings indicating a more fearful reaction.

Hope. Evaluated by one item, on a scale of 1 (“Nenhuma Esperança/Otimismo” / “Not At All Hopeful/Optimistic”) to 9 (“Muita Esperança/Otimismo” / “Very Hopeful/Optimistic”), with higher ratings indicating a more hopeful and optimistic reaction.

After exposure to the images, the survey included a question about the extent to which the images provoked reflection on the depicted theme and a series of questions pertaining to environmental and social consciousness.

Thoughtful Reflection. Evaluated by one item, on a 5-point likert scale. The ratings ranged from 1 (Not At All) to 5 (Extremely).

Environmental Consciousness. Evaluated by eight items, from the long version of the Sustainability Consciousness Questionnaire (Gericke, et al. 2019). In its entirety, this Questionnaire encompasses the behavioral, attitudinal, and knowledge dimensions, reflected in the social, environmental, and economic pillars. This Questionnaire has two versions, a short version (that does not provide as much specification on inequality and environmental issues) and a long version (comprising 50 items in total).

To reduce the number of items, we intentionally omitted the knowledge dimension. The reason for this exclusion stems from the nature of our experimental study. As part of our research, participants were exposed to a variety of street artworks related to environmental and social issues. Given the short-term and temporary nature of this exposure, we did not anticipate that brief encounters with the artworks would significantly impact participants' immediate knowledge of the subjects presented. Therefore, we focused on measuring participants' attitudes and behaviors, which we considered to be more relevant to our research goals. Similarly, we recognized that the economic pillar was less directly aligned with our research objectives (social vs. environmental) and was also consequently omitted.

We further removed items with a factor weight below .500. By removing items with weaker factor weights, we aimed to increase the precision and accuracy of the assessment and focus on items with stronger and more consistent relationships with the intended constructs. Of note, this item selection process was conducted in accordance with established practices in psychometrics to ensure the validity and reliability of our measurement instruments (Black & Babin, 2019).

Lastly, given the nature of our experimental study, in which participants were exposed to street art related to environmental or social issues over a relatively short period of time, we concluded that assessing current behavior in this context may not provide meaningful insights. Therefore, we adapted items from the behavioral dimension to measure participants' behavioral intentions (e.g., from “Eu reciclo o máximo que posso”/“I recycle as much as I can” to “Pretendo reciclar o máximo que for possível”/ “I intend to recycle as much as I can”). This adaptation allowed us to examine participants' tendencies and intentions toward ongoing behavior rather than their immediate actions, adapting them to the experimental design and short-term exposure to thematic stimuli.

In the end, the number of items to be assessed in the survey, in regard to environmental consciousness, totaled eight (to be answered on a scale of 1, Strongly Disagree, to 5, Strongly Agree). Four of these items assess attitudes (e.g., opinion regarding laws and regulations that protect the environment) and four assess behavioral intentions towards environmental protection (e.g., picking rubbish from public spaces). Items 1 (“Acho que o uso de mais recursos naturais do que o necessário não ameaça a saúde e o bem-estar das pessoas no futuro” / “I think that using more natural resources than we need does not threaten the health and well-being of people in the future”) and 4 (“Acho que é aceitável que cada um de nós use toda a água que desejar” / “I think it is OK that each one of us uses as much water as we want”) were inverted before analysis. However, both inverted

items were then removed, for the sake of internal consistency and the final version of the scale proved adequately consistent ($\alpha = .71$).

Social Consciousness. Evaluated by ten items, from the long version of the Sustainability Consciousness Questionnaire (Gericke, et al. 2019). Similarly, this measure registered the same changes described and justified above (e.g., both the knowledge dimension and items with a factor weight lower than .500 were removed; items in the behavioral dimension were adapted to measure behavioral intention).

As such, the social consciousness subscale included five items assessing attitudes (e.g., how important they consider it to be that men and women have the same opportunities in education and in the labor market) and five items assessing behavioral intentions (e.g., treating all people with respect). The scale proved to be adequately consistent ($\alpha = .69$).

It is of note that two of the included items in this instrument were originally from the economic pillar. As mentioned, given the thematic focus of our study, the economic pillar was (mostly) removed. However, a noteworthy consideration emerged during the pretest phase of our study. Participants consistently linked poverty to the social dimension of sustainable development (SDG10), which is a core focus of our research. It is important to emphasize that while poverty is closely related to SDG1 (no poverty), our study focuses primarily on SDG10, which includes the goal of reducing inequalities, including poverty-related inequalities.

Given this contextual interpretation by participants and the explicit depiction of poverty in the context of social inequality (SDG10) in our study of street art works, we consciously chose to include two poverty-related (e.g., “I think it is important to reduce poverty” for attitudes, and “I intend to do things which help poor people” for behavioral intention) items from the Questionnaire's economic dimension.

3.4.3. Individual Variables

Interest in Street Art. Taken from the Graffiti (or Street Art) Interest Questionnaire (Gartus & Leder, 2014), which contains 10 items to be answered on a 9-point scale. The ratings ranged from 1 (Not at all) to 9 (Completely). This scale assesses attitudes and engagement with street art, including interest, aesthetic appreciation, emotional reactions (pleasure or disturbance) and views on its artistic nature and legitimacy.

Items 3 (“Acho que a arte urbana é geralmente feia” / “I think street art is always ugly”), 6 (“Em geral, a arte urbana perturba-me” / “I often feel disturbed by street art”), 8 (“Acho que a arte urbana deveria ser removida o mais cedo possível do espaço público” / “I think street art should be removed as quickly as possible from public places”) and 10 (“A arte urbana é puramente vandalismo” / “Street art is just pure vandalism”) were inverted before analysis. The scale proved to have excellent consistency ($\alpha = .89$).

Sociodemographic data. We included sociodemographic questions about age, gender, education level, nationality, marital status, country of residence, perception of current income, subjective social status, and artistic experience. Education was measured in a 9-point scale (1= “Ensino básico de 1º ciclo frequentado (mas não concluído)” / “1st cycle basic education attended (but not completed)”; 8= “Doutoramento” / “PhD”; 9 would indicate ‘Prefiro não responder’ / “Rather not answer”), with higher values indicating higher levels of education. Perception of current income was measured in a 5-point scale (1= “O rendimento actual permite viver confortavelmente” / “The current income allows for a comfortable living”; 4= “É muito difícil viver com o rendimento actual” / “It is very difficult to live with the current income”; 5 would indicate “Não sei” / “I do not know”), with higher values indicating more financial difficulty. Individual's perception of their relative social standing within their community, was measured with the MacArthur Scale of Subjective Social Status (Adler et al., 2000), by asking them to place themselves on a visualized ladder representing different social statuses (with higher levels indicating a stronger social standing).

Lastly, for artistic experience, we asked if participants have any regular activity involving professional or participation in group activities to which they could answer “Yes” (Part-time, or Full-time) or “No” (Not currently, or ever).

Attention Check. To ensure the validity of the collected data, an item that assessed participants’ attentiveness during the exposure to the different street artworks was included. Participants could either state “Sim, prestei atenção”/“Yes, I paid attention”, “Não prestei atenção. Respondi aleatoriamente a várias perguntas” / “I didn’t pay attention. I randomly answered several questions” or not answer. This measure was used as an exclusion criteria as inattentive participants (i.e., participants who stated they did not pay attention or didn’t answer the question entirely) may not correctly describe their true genuine emotional responses and thus, their answers could affect internal validity (Abbey & Meloy, 2017).

All the instruments were translated to Portuguese using the back-translation method. This means one person translated the original scale to Portuguese and another person - who was not made aware of the initial statements - translated them back to English. The two

versions were then compared. This method has proved to be consistently reliable as it aims to achieve semantic equivalence between the original and translated versions of the scale, maintaining the psychometric properties of an established scale in a translated version (Ozolins, 2009).

3.5. Procedure

The survey (Appendix A) was designed according to the ethical principles of ISCTE-IUL. Approval by the Ethical Committee of ISCTE was received through email (REFs. 118/2022; 14/11/2022, and later updated in 26/03/2023). Moreover, the study was pre-registered under the title “The Effect of Street Art on Environment/Social Awareness (working title)” on the website “AsPredicted” (#127708; <https://aspredicted.org/>).

Both surveys (pre-test and main study) were developed using the Qualtrics XM platform. The expected duration of each survey was about 20-30 minutes. Both questionnaires were shared on social media (e.g., Facebook, LinkedIn, Instagram) as well as in the researchers' contact networks (i.e., family, colleagues, friends). In the main survey, no compensation was offered for participation in the main study. To facilitate exposure and promote participation in the main study on social media, an "advertising" image was created using *Canva*, a graphic design platform (Appendix B).

Informed consent was obtained from all participants at the beginning of the survey. It included the study identification, researchers involved, email contacts, and institution; description of the general study aim and estimated time; the voluntary nature of the collaboration, and information on any benefits associated with the study and/or participation. Following the survey's completion, participants were provided with a debriefing that outlined the research objectives and predicted outcomes. Data collection spanned April 6th (2023) to July 5th (2023).

3.6. Data Analysis

All data analyses were performed using the IBM Statistics SPSS program (version 29.0).

The data was pre-analyzed considering the necessary assumptions for each statistical test. The internal consistency (Cronbach's alpha) of the items described above (see subsection 3.5) was evaluated, considering values around .90 as "excellent", around .80 as "very good" and around .70 as "adequate" (Kline, 2015). For the analysis concerning the comparison of the groups in relation to individual variables (sociodemographic and individual traits), the t-

test for independent samples and chi-square tests were used. To test the hypotheses, analyses of covariance (ANCOVAs) were used, exploring the impact of the group (independent variable) on each of the following dependent variables: thoughtful reflection (about the portrayed themes), sustainable consciousness (environmental, social) and emotions (valence, arousal, hope, fear). In addition, interest in street art was included as a covariate. Cohen's (1992) guidelines were used for interpreting the ANCOVAs (η_p^2) results with values close to .01 being considered "low", values close to .06 being considered "moderate" and values around .14 being considered "high". We further explored the linear correlations (*two-tailed*) between the dependent variables, also using Cohen's (1992) guidelines to interpret the effect size of Pearson's Correlation Coefficient (r): around .10 being considered "low", .30 being considered "moderate" and .50 being considered "high".

4. Results

4.1. Descriptive statistics and Correlation Analysis among the Variables

Firstly, we compared both groups regarding sociodemographic information, artistic background, and interest in street art, to ensure that the two groups have similar characteristics. As presented in Table 2, the two groups do not differ in any of the sociodemographic variables, indicating that these characteristics are equally distributed.

Table 2

Sociodemographic Characterization of Participants in Total and by Group

Sociodemographic	Group						χ^2	p
	Total sample		SDG13		SDG10			
	N	%	n	%	N	%		
Gender							3.85	0.12*
Men	33	21.3	21	26.9	12	25.6		
Women	121	78.1	57	73.1	64	83.1		
Nationality								
Portuguese	146	92.9	74	92.5	72	92.3		
Other	11	7.1	6	7.5	6	7.7		
Marital Status							5.01	0.08
Single	102	66.7	53	68.8	49	64.5		
Married or Non-marital partnership	40	26.1	22	28.6	18	23.7		
Divorced/widowed	11	7.2	2	2.6	9	11.8		
Education							4.87	0.18
Mandatory Education	18	11.9	9	11.8	9	12.0		
Bachelor	63	41.7	38	50.0	25	33.3		
Master/Post-graduation	59	39.1	25	32.9	34	45.3		
Doctorate	11	7.3	4	5.3	7	9.3		
Current Income							0.24	0.62
Current income allows for comfortable living	108	71.5	53	69.7	55	73.3		
Current income doesn't allow for comfortable living	43	28.5	23	30.3	20	26.7		
Artistic Experience							0.03	0.87
Yes (part-time or full-time)	31	20.3	16	20.8	15	19.7		
No	122	79.7	61	79.2	61	80.3		

	<i>M</i>	<i>DP</i>	<i>M</i>	<i>DP</i>	<i>M</i>	<i>DP</i>	<i>t</i>	<i>p</i>
Age	33.40	12.99	32.44	12.35	34.35	13.61	-0.91	.364
Subjective Social Status	5.94	1.59	5.97	1.62	5.91	1.56	0.24	.406
Interest in Street Art	6.71	1.35	6.57	1.62	6.86	1.10	-1.33	.095

*For gender, the chi-square test was not valid as the expected frequency was below 5. Thus, the Monte Carlo value was used instead, as statistically suggested (Mehta & Patel, 2011).

We also performed correlations between interest in street art and the dependent variables (see Table 3) to determine if interest in street art could be a predictor that we needed to control. Furthermore, it allowed us to understand the pattern of linear relationships among the dependent variables.

Table 3

Intercorrelations for Study Variables as a Function of the Group (‘Climate Action’ and ‘Reducing Inequalities’)

Variable	1	2	3	4	5	6	7	8
1. Thoughtful Reflection	-	0.30**	0.23*	0.18	0.28*	0.12	0.12	0.39**
2. Environmental Consciousness	0.37**	-	0.58**	0.03	0.24*	0.12	-0.05	0.36**
3. Social Consciousness	0.26*	0.62**	-	-0.10	-0.03	0.02	-0.12	0.30**
4. Valence	0.24*	0.13	0.22	-	-0.04	0.36**	0.74**	0.30**
5. Arousal	-0.12	-0.19	-0.20	-0.05	-	0.46**	0.01	-0.01
6. Fear	0.10	-0.11	-0.21	0.40**	0.25*	-	-0.16	-0.10
7. Hope	0.46	0.38**	0.31**	0.77**	-0.04	-0.26*	-	0.13
8. Interest in Street Art	0.30*	0.11	0.14	0.54**	-0.15	-0.08	0.43**	-

Note. The results for the ‘Climate Action’ sample ($n = 78$) are shown above the diagonal. The results for the ‘Reducing Inequalities’ sample ($n = 75$) are shown below the diagonal.

* $p < .05$. ** $p < .01$.

Table 3 displays the bivariate correlations among Interest in Street Art and the dependent variables for group ‘Climate Action’ and ‘Reducing Inequalities’. We can see that in both groups, higher levels of environmental consciousness were strongly and positively associated with higher levels of social consciousness ($r(78) = .58, p < .001$; $r(75) = .62, p < .001$).

Additionally, both environmental and social consciousness were moderately correlated to reflective potential. Participants who reported having a more thoughtful reflection in response to the artworks shown, also reported higher levels of environmental ($r(78) = .30, p = .007$; $r(75) = .37, p = .001$) and social consciousness ($r(78) = .23, p = .039$; $r(75) = .26, p = .021$).

Across both groups, we were also able to assess that positive emotional responses (valence) were negatively correlated with fear ($r(78) = -.36, p = .001$; $r(75) = -.40, p < .001$) and positively correlated with hope ($r(78) = .74, p < .001$; $r(75) = .77, p < .001$). Thus, participants who reported having a more positive emotional response tended to experience less fear and more hope when exposed to street art in both the environmental and social contexts.

Higher levels of fear further proved to be associated with increased levels of arousal ($r(78) = .46, p < .001$; $r(75) = .25, p = .026$), with the correlation being stronger in the ‘Climate Action’ group.

Interest in Street Art was positively and moderately correlated to reporting more reflective thoughts about the themes portrayed, $r(78) = .39, p < .001$, and, $r(75) = .30, p = .010$, and to a more pleasurable emotional response (i.e., positive valence) to the artworks, $r(78) = .30, p = .008$, and, $r(75) = .54, p < .001$.

In the ‘Reducing Inequalities’ group specifically, hope seems to be an especially relevant variable, as it was significantly correlated with fear ($r(75) = -.26, p = .025$), interest in street art ($r(75) = .43, p < .001$), social consciousness ($r(75) = .31, p = .006$) and environmental consciousness ($r(75) = .38, p < .001$). In addition, participants who had a more positive emotional response (valence) also reported more reflective thoughts about the theme ($r(75) = .24, p = .37$).

On the other hand, in the ‘Climate Action’ group, participants’ levels of arousal, proved to be positively correlated to both reflective thoughts, meaning participants who showed higher mean levels of arousal also reported more reflective thoughts about the environmental theme ($r(78) = .28, p = .015$), and reported higher levels of environmental consciousness ($r(78) = .24, p = .033$). Interestingly, higher levels of interest in street art were

also moderately correlated to higher levels of environmental consciousness ($r(78) = .36, p < .001$).

Overall, it is necessary to emphasize that interest in street art proved to be significantly correlated with most dependent variables included in the present study, and can, therefore, prove to be a covariate of interest in determining a potential influence on the observed effects.

4.2. Hypothesis testing

One-way analyses of covariance (ANCOVAs) were conducted to test for mean differences between the two groups (climate vs. social) on each dependent variable whilst controlling for individual interest in street art. Levene's test (for homogeneity of variance) and normality checks were carried out and all assumptions were met.

A summary of the descriptive statistics (i.e., means and standard deviations) for the individual and dependent variables in the analysis is presented in Table 4, as well as the values of the ANCOVAs.

Table 4

Means, Standard Deviations, and One-Way Analyses of Co-variance in Individual and Emotional Responses

Measure	SDG10		SDG13		$F(1,150)$	η^2
	M	SD	M	SD		
Reflective potential	3.23	0.97	3.28	1.03	0.89	0.01
Environmental consciousness	4.48	0.43	4.52	0.47	0.19	0.01
Social consciousness	4.71	0.31	4.70	0.27	0.08	0.00
Valence	6.31	1.10	4.80	1.10	1.05***	0.33
Arousal	4.93	1.28	5.20	1.07	1.39	0.01
Fear	2.63	1.30	3.87	1.44	1.86***	0.17
Hope	6.21	1.11	4.60	1.02	1.08***	0.36

*** $p < .001$

4.2.1. Thoughtful Reflection, Environmental Consciousness and Social Consciousness

There were no significant differences between groups in regards to thoughtful reflection about the themes portrayed, $F(1, 150) = 0.89, p = .40, \eta_p^2 = .005$, environmental consciousness, $F(1,150) = 0.19, p = .44, \eta_p^2 = .004$) and social consciousness, $F(1,150) =$

0.08, $p = .89$, $\eta_p^2 < .001$. Therefore, Hypotheses 1 and 2 are not supported. However, in all comparisons, the covariate, interest in street art, remained statistically significant in the models ($p < .001$; $p = .005$), with effect sizes of $\eta_p^2 = .12$, $\eta_p^2 = .07$ and $\eta_p^2 = .05$, respectively. These results suggest that participants' interest in street art significantly contributes to explaining the variance in mean levels of thoughtful reflection, environmental consciousness, and social consciousness in both group conditions.

4.2.2. Valence and Arousal

Regarding reported valence, we identified significant differences between groups, $F(1,150) = 1.05$, $p < .001$, $\eta_p^2 = .327$. Specifically, participants in the 'Reducing Inequalities' condition reported having a more positive or pleasurable emotion ($M = 6.26$, $SE = 0.12$) to the artworks than participants in the 'Climate Action' condition ($M = 4.84$, $SE = 0.12$).

Furthermore, the value of the interest in street art remained statistically significant, with a strong effect size ($\eta_p^2 = .14$), suggesting that participants' interest in street art significantly contributes to explaining the variance in average levels of reported valence.

On the other hand, there were no significant differences between groups in self-reported levels of arousal (Figure 2), $F(1,150) = 1.39$, $p = .182$, $\eta_p^2 = .012$, and the value of the interest in street art was not statistically significant, suggesting that participants' interest in street art does not significantly contribute to explaining the variance in arousal.

4.2.3. Fear and Hope

In regards to fear and hope, there were significant differences between groups in both reported levels of fear, $F(1,150) = 1.86$, $p < .001$, $\eta_p^2 = .167$, and hope, $F(1,150) = 1.08$, $p < .001$, $\eta_p^2 = .360$ (Figure 3). Participants in the 'Climate Action' condition reported higher levels of fear ($M = 3.86$, $SE = 0.16$) in reaction to the presented artworks than participants in the 'Reducing Inequalities' condition ($M = 2.65$, $SE = 0.16$). In contrast, participants in the 'Reducing Inequalities' condition reported higher levels of hope ($M = 6.18$, $SE = 0.12$) in reaction to the presented artworks than participants in the 'Climate Action' condition ($M = 4.63$, $SE = 0.12$). Moreover, in the case of fear, participants' interest in street art does not significantly contribute to explaining the variance in average levels of fear ($p = .26$), although it significantly contributed to explaining the variance in the levels of hope ($p = .003$), with a low effect size ($\eta_p^2 = .057$).

5. Discussion

Through an experimental design, we sought to contribute to the current understanding of the impact of street art on environmental awareness. We gathered data from a mostly Portuguese sample, through an online survey, and the results revealed some insights into participants' responses to different themes depicted in street art.

Firstly, contrary to our initial predictions (H1 and H2), we found no significant differences in environmental and social consciousness between the two groups exposed to different street art themes. This finding challenges our initial hypothesis that exposure to either social or environmental themes would lead to increased consciousness regarding corresponding social or environmental behaviors and attitudes. Furthermore, in both conditions, a strong positive correlation between environmental and social consciousness was observed, suggesting that individuals reporting higher environmental consciousness tend to also perceive themselves as higher in social consciousness.

It is important to note, however, that, in the absence of a control group unexposed to visual stimuli or exposed to unrelated street artworks, this study does not preclude us from definitively concluding whether environmental and social consciousness also share similar awareness-promoting potential.

The strongest evidence, however, to support street art's impact on raising awareness of the issues presented was found in the results related to thoughtful reflection and its' association with environmental and social consciousness and emotional responses. Similarly, to the first hypotheses, there were no significant differences in participant's perceptions of street art's thoughtful reflection between the 'Climate Action' and 'Reducing Inequalities' conditions. Thus, participants' thoughtful reflection, in terms of encouraging contemplation or self-reflection, was not significantly influenced by the thematic focus of the street artworks but indicating that both environmental and social street art seem to have similar capabilities to evoke reflection. However, it is noteworthy that in both groups, participants reported a moderate level (between "Enough" and "Very Much") of thoughtful reflection in response to the themes depicted in the artworks. Moreover, our correlation analysis shed light on the relationship between thoughtful reflection and environmental and social consciousness.

Across groups, participants who engaged in more thoughtful reflection in response to the artworks also tended to express higher levels of environmental and social consciousness, which aligns with our predictions (H3 and H4) and previous research (e.g., Chandler et al., 2014; Heras-Saizarbitoria et al., 2022). Furthermore, in the "Reducing Inequalities" condition, thoughtful reflection was associated with significantly higher levels of hope and

slightly more positive emotional valence. Conversely, in the “Climate Action” condition, thoughtful reflection had a statistically significant but weak positive relationship with arousal, suggesting that more reflection is associated with slightly higher emotional intensity.

In relation to our exploratory questions, our findings provided valuable insights in relation to the emotions elicited. Results indicated that participants exposed to social vs. environmental street artworks demonstrated significantly different emotional responses on valence (Q1a), fear (Q1c), and hope (Q1d). More specifically, participants exposed to social-themed street art reported more pleasurable or positive emotional reactions, while those in the environmental art condition exhibited lower positive valence. This could indicate that social street art may have a stronger positive emotional impact compared to environmental street art. However, an important factor to consider is the content of the themes depicted in each category. As can be deduced from the description of the images included in the study (see method subsection 3.2), the images in the pre-test linked to environmental themes featured more visuals illustrating the adverse consequences of climate change (e.g., global warming, loss of biodiversity). In contrast, the images linked to social themes portrayed predominantly positive scenarios with equality and union being at the forefront. Participants in the ‘Climate Action’ condition reported higher levels of fear, which could be attributed to the artwork's focus on climate-related issues and its consequences, as explained above. Feelings of concern, anxiety, or even sadness may be triggered by images of the environment and the negative effects of climate change, leading to a reduction in reported emotional valence. On the other hand, participants in the ‘Reducing Inequalities’ condition reported higher levels of hope, suggesting that artworks addressing social causes (in a more positive light) may evoke hope or optimism. Positive emotions may be produced in society through images with a joyful element and mutual values that are associated with an increased level of emotional valence. These results imply that different street art themes can elicit distinct emotional responses, with environmental themes potentially invoking more fear and social themes evoking hope.

Overall, these findings are consistent with the idea that emotional reactions are distinctly influenced by thematic content in street art and confirm the role of emotion engagement as part of climate communication. This latter conclusion is also consistent with the studies of Curtis (2010) which emphasized the connection between community engagement for environmental awareness and emotional resonance, and the recent studies of Brosch (2021) and Davidson and Kecinski (2022) that further explored the central role of emotion as a trigger for collective change.

Additionally, the fact that both fear and hope were impacted demonstrates the importance of studying the emotions in activism and sustainability awareness initiatives. Across both conditions, emotional responses showed significant correlations with environmental consciousness, social consciousness, and reflection about the themes portrayed. Interestingly, both valence and fear exhibited significant correlations with various other variables in both conditions, further suggesting that emotions play a significant role in response to street art's themes.

Nonetheless, reported levels of arousal (Q1b) did not differ significantly between the two groups. This suggests that the emotional intensity (or arousal) triggered by the presented street artworks may not have been strongly influenced by thematic focus (i.e., environmental or social themes). It is also relevant to report that, in both conditions, there was a lack of significant correlations between reported levels of arousal and other variables. Therefore, consideration should be given to the fact that arousal, as measured in this study, is less sensitive to thematic differences in street art and other individual or contextual factors, not included in the study, may influence it.

In practice, these results highlight the potential of street art as a powerful tool to elicit emotional responses. The fact that environment-related street art elicited higher levels of fear suggests that art focusing on climate-related negative consequences may evoke concern in viewers and this insight can help activists and organizations design campaigns that leverage fear-driven narratives to inspire behavior change and affirmative engagement in climate action. However, it is crucial to acknowledge the risks of strategies based on fear. Research in psychology and communication has shown that while fear can be a powerful motivator (e.g., Kleres & Wettergren, 2017), excessive or sustained fear can lead to feelings of anxiety, helplessness, and even disengagement (e.g., Kundzewicz et al., 2020). Furthermore, in our findings, fear was not related with environmental consciousness in any condition. Therefore, to avoid unintended adverse effects, more research is required to understand the use of fear as part of climate action campaigns.

On the other hand, the higher levels of hope in response to social street art suggest that art focused on social causes can inspire optimism and potentially a belief in the potential for positive change. These insights can, in turn, inform campaigns that the use of narratives eliciting hope may mobilize individuals to address social inequalities and encourage collective action. Nevertheless, because we have not measured actual behavior, future studies should examine whether such narratives lead to tangible changes in behavior and contribute to reducing social inequalities. Theoretically our results underscore the relationship between

emotions and communication strategies in sustainable awareness initiatives through street art. Research has shown that emotions such as fear and hope are not only associated with artistic contexts, but also play a vital role in promoting meaningful engagement with social and environmental issues (Kleres & Wettergren, 2017). This is consistent with previous research highlighting the potential for positive emotional stimuli, such as hope to drive climate engagement (e.g., Chadwick, 2015; Ojala, 2012). However, the concern about the risks of fear-driven strategies, supported by psychological research (e.g., Wullenkord et al., 2021) indicate potential adverse effects such as anxiety and disinterest, which should be considered.

Lastly, we used interest in street art as a covariate due to its association with individual emotional and cognitive responses to street art (e.g., Gartus & Leder, 2014). Its' inclusion showed that participants' interest in street art remained a significant predictor across multiple dependent variables (i.e., reflection on the themes portrayed, environmental and social consciousness, valence, hope) after controlling for the impact of the thematic group, suggesting that it can be considered a consistent preference that impacts individual's responses. There were however exceptions, with interest in street art not emerging as a statistically significant predictor of arousal and fear, suggesting that participants' pre-existing interest in this form of art may not impact the arousal and the fear felt in response to street art artworks.

There were variations in the correlations among the variables within each group condition, but certain common trends emerged. Higher reflection upon the thematic artworks and increased emotional responses were related to increased environmental and social consciousness, suggesting that street art can be effective in influencing environmental and social awareness by engaging reflections and emotions, regardless of thematic focus. This conclusion is further, and partly, supported by Chandler et al. (2014), whose study delved into the power of art and creativity in promoting self-reflection (and operating as a catalyst for change) and found promising results, despite not drawing any conclusions based on how different themes could affect this capacity.

Altogether, our results underscore the effectiveness of street art in eliciting emotions, raising reflection about the themes depicted, environmental and social awareness. Differences in emotional valence, fear, and hope between the two art conditions suggest that the thematic choice in street art can play a crucial role in shaping specific emotional responses, potentially influencing participants' engagement with environmental and social issues. The consistent finding about the role of interest in street art across dimensions suggests that individuals with a higher interest in the art form are more likely to be influenced by its communicative power

and message (regardless of the specific subject depicted). Our study also suggests that various thematic aspects of street art can have an impact on emotions, despite not revealing any significant differences between environmental consciousness and reflection about the theme displayed as a result of the thematic exposure.

5.1. Limitations and Considerations for Future Studies

This study presents several limitations that warrant consideration.

Firstly, the controlled experimental design applied online might not fully reflect the reactions that people can have when encountering street art in its natural urban space. Researchers like Daichendt (2013) have argued that street art makes contextual use of its space to deliver a message. As such, one could argue that the present study, by also selecting and sometimes editing the pictures to remove the contextual elements that may function as distractions (e.g., cars, people walking), may compromise part of the intended message, suggesting a potential partial loss of the intended message. It would be interesting for future research to explore participants' assessments of street art murals with and without their physical context to gain a more complete understanding.

Secondly, the sample size of this study ($N = 155$) is relatively small, limiting the generalizability of the findings. Addressing this through larger sample sizes could enhance the robustness of the results, especially considering the study's convenience sampling strategy. It's important to acknowledge that our participant recruitment process was primarily motivated by convenience, which may have introduced some biases into the sample composition. In addition, the only feedback we received from participants that could explain the difficulty in recruiting more participants was about the length of the survey, with some finding the 20-minute completion time to be lengthy and attention-demanding.

In relation to the visual stimuli, with 15 images per condition, the specific artworks chosen do not necessarily represent the entirety of street art related to environmental or social themes which further limits the generalizability of the findings as differences in artistic style, quality, and message could influence the outcomes.

The present study only accounted for the immediate effects of exposure to street art, thus it would also be interesting for future studies to assess the long-term impacts on environmental consciousness and behavior change. It is possible that the short-term responses we observed in the study may not necessarily translate into sustained behavioral or attitude changes.

Additionally, this study relied on participant's self-report of emotions, consciousness levels and interests. Self-report measures can be influenced by social desirability bias or inaccuracies in self-assessment (e.g., Huang et al., 1998). This is particularly relevant in our study given the sensitive and socially pertinent nature of the themes involved. Participants could respond in a way they perceive as socially desirable rather than expressing their true feelings (e.g., overstate their level of environmental or social consciousness due to a desire to present themselves in a favorable light), which could, in turn, affect the validity of the results.

Furthermore, even though the absence of significant differences between the two groups in environmental and social consciousness may indicate that both have similar capacities to promote awareness, these effects should be considered preliminary without the inclusion of a control group, for a more in-depth assessment. Without it, we cannot isolate the influence of the visual stimuli and definitively conclude that the observed effects are solely due to this exposure. Thus, future studies should include a control group that is not exposed to any images or a group that is exposed to street not aligned with the themes addressed in our study, so that greater conclusions can be drawn about the effectiveness of exposure to street art images in raising environmental and social consciousness.

Although the methodology and results of the present study have yielded valuable insights, there is still a considerable lack of information in existing literature on how emotions can be influenced by street art. Thus, we would further recommend future studies to include additional discrete emotions (e.g., guilt, sadness, curiosity), to gain a more holistic view of this interaction. In addition, examining further the mechanisms that underline the observed correlations between variables, especially regarding the emotional responses elicited by different themes of street art, could yield valuable insights both in theory and practice.

We believe that adding other potential covariates would also be important as other relevant individual differences might affect participants' responses (e.g., environmental consciousness levels, art preferences, cultural background). While the study is based on a range of emotions and levels of awareness, it does not examine any additional possible psychological factors that may mediate or moderate the observed effects, which could include personality characteristics, values, attitudes, as well as social norms (e.g., Lilje & Mosler, 2016; Taufique, 2022; Yu & Yu, 2017).

In summary, to address these limitations, enhance the study's validity, and provide a more understanding of the impact of street art on environmental awareness, future research could replicate the study with a larger and more diverse sample, consider the physical context

of street art in assessments, include a control group, and explore the long-term impacts of street art exposure on consciousness and behavior change. Incorporating a broader range of emotions and examining additional psychological factors that mediate or moderate the observed effects (i.e., personality traits, values, attitudes, and social norms) could offer additional insights into the mechanisms underlying street art's influence.

6. Conclusion

This study revealed that exposure to two distinct street art themes aligned with Sustainable Development Goals 13 (Climate Action) and 10 (Reducing Inequalities) did not necessarily lead to significant differences in participant's levels of environmental awareness and social awareness. In addition, it has been observed a strong positive correlation between environmental awareness and social awareness, indicating that individuals with an increased consciousness of environmental issues are also more conscious of social issues.

Most importantly, however, participants reported a moderate level of thoughtful reflection after exposure to the thematic focus, indicating that street art can, as predicted, foster contemplation and reflection on the part of the viewers. Correlation analysis further showed that an increase in environmental and societal consciousness was related to a more thoughtful reflection after exposure to the street artworks.

Across a range of dimensions, the importance of individual interest in street art has shown to be a relevant factor in predicting the responses. Participants with a heightened interest in street art consistently displayed higher environmental and social consciousness and a stronger perception of street art's reflective potential, indicating a consistent preference predicting engagement and responses. Therefore, in analyzing the influence of art, it is important to take account of how participants are receptive to street art.

In terms of emotions, there was a marked difference in reactions among participants who had been exposed to environmental and social street art. Positive emotions were triggered in social themes of street art, while a higher level of fear was generated by environmental themes. It follows from this divergence that certain themes can provoke an emotionally specific response, with social arts encouraging hope and environmental art stimulating a sense of fear which may be driven by the more negative aspects it portrays (e.g., rising sea levels). Significant correlations were observed between emotional valence, fear and other variables suggesting that emotion played a role in responding to art's themes.

Further emphasizing the significance of the covariate, participants' pre-existing affinity for street art consistently impacted their emotional responses. The theoretical

implications of these findings highlighted the complex interplay of emotions, communication strategies, and sustainability awareness, while the practical implications indicated the potential of environmental-inspired street art to incite fear and urgency and social-inspired street art to inspire hope.

In accordance with our objectives, this study's experimental design, encompassing variables such as thoughtful reflection, consciousness levels, emotional responses, and individual predispositions, has potential to contribute to the Sustainable Development Goals (SDGs) of the UN's 2030 Agenda. The findings have shown that, with respect to the Sustainable Development Goals' aims of sustainability, there is a need for efficient communication strategies aimed at responding effectively to critical world issues via street art as well as facilitating targeted awareness campaigns in both environment and social matters.

In summary, this study's findings, comparing the impact of environmental-themed street art (SDG13) with social-themed street art (SDG10), and its analysis suggest that street art's emotional impact is influenced by both thematic content and individual predispositions. Different themes can elicit various emotions which may have practical implications for activism, as well as theoretical insights about the emotional appeal and communication strategies. Our work showed that street art can elicit emotions and participants' active process of thinking and reflection. Overall, we believe our study contributes with some important insight into the debate on effective communication and engagement, for activists and communicators aiming to leverage the emotional and reflective power of street art to address global challenges.

7. References

- Abbey, J. D., & Meloy, M. G. (2017). Attention by design: Using attention checks to detect inattentive respondents and improve data quality. *Journal of Operations Management*, 53, 63-70. <https://doi.org/10.1016/j.jom.2017.06.001>
- Adler, N. E., Epel, E. S., Castellazzo, G., & Ickovics, J. R. (2000). Relationship of subjective and objective social status with psychological and physiological functioning: Preliminary data in healthy, White women. *Health Psychology*, 19(6), 586-592. <https://doi.org/10.1037/0278-6133.19.6.586>
- Arce-Nazario, J. A. (2016). Translating land-use science to a museum exhibit. *Journal of Land Use Science*, 11(4), 417-428. <https://doi.org/10.1080/1747423X.2016.1172129>
- Bacharach, S. (2015). Street Art and Consent. *The British Journal of Aesthetics*, 55(4), 481-495. <https://doi.org/10.1093/aesthj/ayv030>
- Baldwin, C., & Chandler, L. (2010). "At the water's edge": community voices on climate change. *Local Environment*, 15(7), 637-649. <https://doi.org/10.1080/13549839.2010.498810>
- Bamberg, S., & Möser, G. (2007). Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. *Journal of Environmental Psychology*, 27(1), 14-25. <https://doi.org/10.1016/j.jenvp.2006.12.002>
- Banet-Weiser, S. (2011). Convergence on the street: Rethinking the authentic/commercial binary. *Cultural Studies*, 25(4-5), 641-658. <https://doi.org/10.1080/09502386.2011.600553>
- Baumgarth, C., & Wieker, J. B. (2020). From the classical art to the urban art infusion effect: The effect of street art and graffiti on the consumer evaluation of products. *Creativity and Innovation Management*, 29, 116-127. <https://doi.org/10.1111/caim.12362>
- Berlyne, D. E. (1971). *Aesthetics and psychobiology*. Appleton-Century-Crofts.
- Berlyne, D. E. (1972). Ends and means of experimental aesthetics. *Canadian Journal of Psychology*, 26(4), 303-325. <https://doi.org/10.1037/h0082439>

- Berlyne, D. E. (1974). *Studies in the new experimental aesthetics: Steps toward an objective psychology of aesthetic appreciation*. Hemisphere.
- Black, W., & Babin, B. J. (2019). Multivariate data analysis: Its approach, evolution, and impact. In B.J., Babin & M. Sarstedt (Eds.), *The Great Facilitator: Reflections on the Contributions of Joseph F. Hair, Jr. to Marketing and Business Research* (pp. 121-130). Springer International Publishing. https://doi.org/10.1007/978-3-030-06031-2_16
- Blanché, U. (2015). Street Art and related terms. *SAUC-Street Art and Urban Creativity*, 1(1), 32-39. <https://doi.org/10.25765/sauc.v1i1.14>
- Blanché, U. (2016). *Banksy: Urban art in a material world*. Tectum Wissenschaftsverlag.
- Borghini, S., Visconti, L. M., Anderson, L., & Sherry, Jr, J. F. (2010). Symbiotic postures of commercial advertising and street art. *Journal of Advertising*, 39(3), 113-126. <https://doi.org/10.2753/JOA0091-3367390308>
- Brosch, T. (2021). Affect and emotions as drivers of climate change perception and action: a review. *Current Opinion in Behavioral Sciences*, 42, 15-21. <https://doi.org/10.1016/j.cobeha.2021.02.001>
- Brundtland, G. (1987). *Report of the World Commission on Environment and Development: Our Common Future*. United Nations. <https://doi.org/10.1080/07488008808408783>
- Casas, A., & Williams, N. W. (2019). Images that matter: Online protests and the mobilizing role of pictures. *Political Research Quarterly*, 72(2), 360-375. <https://doi.org/10.1177/1065912918786805>
- Chadwick, A. E. (2015). Toward a theory of persuasive hope: Effects of cognitive appraisals, hope appeals, and hope in the context of climate change. *Health Communication*, 30(6), 598-611. <https://doi.org/10.1080/10410236.2014.916777>
- Chandler, L., Baldwin, C., & Marks, M. (2014). Catalysts for change: Creative practice as an environmental engagement tool. *Leonardo*, 47(5), 506-507. https://doi.org/10.1162/LEON_a_00825
- Cheung, M. C., Law, D., Yip, J., & Wong, C. W. (2019). Emotional responses to visual art and commercial stimuli: implications for creativity and aesthetics. *Frontiers in Psychology*, 10, 14-24. <https://doi.org/10.3389/fpsyg.2019.00014>

- Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112(1), 155–159.
<https://doi.org/10.1037/0033-2909.112.1.155>
- Coomer, J. (1979). *Quest for a Sustainable Society*. Oxford: Pergamon Press.
- Cooper, M., & Chalfant, H. (1984). *Subway art*. Macmillan.
- Curtis, D. J. (2009). Creating inspiration: the role of the arts in creating empathy for ecological restoration. *Ecological Management & Restoration*, 10(3), 174-184.
<https://doi.org/10.1111/j.1442-8903.2009.00487.x>
- Curtis, D. J. (2010). Plague and the Moonflower: A regional community celebrates the environment. *Music and Arts in Action*, 3(1), 65-85. <http://hdl.handle.net/10036/3931>
- Curtis, D. J., Reid, N., & Ballard, G. (2012). Communicating ecology through art: what scientists think. *Ecology and Society*, 17(2), 3-18. <http://doi.org/10.5751/ES-04670-170203>
- Daichendt, G. J. (2013). Artist-driven initiatives for art education: What we can learn from street art. *Art Education*, 66(5), 6-12.
<https://doi.org/10.1080/00043125.2013.11519234>
- Davidson, D. J., & Kecinski, M. (2022). Emotional pathways to climate change responses. *WIREs Climate Change*, 13(2), 1-19. <https://doi.org/10.1002/wcc.751>
- Droney, D. (2010). The Business of “Getting Up”: Street Art and Marketing in Los Angeles. *Visual Anthropology*, 23(2), 98-114.
<https://doi.org/10.1080/08949460903472952>
- Ekman, P., & Friesen, W. V. (1971). Constants across cultures in the face and emotion. *Journal of Personality and Social Psychology*, 17(2), 124-129. <https://doi.org/10.1037/h0030377>
- Fang, M., Ma, T., Li, H., Han, T., Wang, J., Li, Z., & Zhou, J. (2023). Association of the awareness of the epidemic, mental health status with mobile phone screen use time in Chinese college students during COVID-19 isolation and control. *PLoS Global Public Health*, 3(2), 1-8. <https://doi.org/10.1371/journal.pgph.0001259>

- Feldman, L., & Hart, P. S. (2016). Using political efficacy messages to increase climate activism: The mediating role of emotions. *Science Communication*, 38(1), 99-127. <https://doi.org/10.1177/1075547015617941>
- Fieni, D. (2016). *Graffiti and street art in Paris*. Routledge.
- Fox, S., & Macleod, A. (2023). Localizing the SDGs in cities: reflections from an action research project in Bristol, UK. *Urban Geography*, 44(3), 517-537. <https://doi.org/10.1080/02723638.2021.1953286>
- Gadenne, D. L., Kennedy, J., & McKeiver, C. (2009). An empirical study of environmental awareness and practices in SMEs. *Journal of Business Ethics*, 84, 45-63. <https://doi.org/10.1007/s10551-008-9672-9>
- Gartus, A., & Leder, H. (2014). The white cube of the museum versus the gray cube of the street: The role of context in aesthetic evaluations. *Psychology of Aesthetics, Creativity, and the Arts*, 8(3), 311-320. <https://doi.org/10.1037/a0036847>
- Gericke, N., Boeve-de Pauw, J., Berglund, T., & Olsson, D. (2019). The Sustainability Consciousness Questionnaire: The theoretical development and empirical validation of an evaluation instrument for stakeholders working with sustainable development. *Sustainable Development*, 27(1), 35-49. <https://doi.org/10.1002/sd.1859>
- Gulliver, R., Chapman, C. M., Solly, K. N., & Schultz, T. (2020). Testing the impact of images in environmental campaigns. *Journal of Environmental Psychology*, 71, 1-11. <https://doi.org/10.1016/j.jenvp.2020.101468>
- Hampson, M. F. (2018). *Rebranding Street Art: An Examination of Street Art and Evolution into Mainstream Advertising, Branding, and Propaganda* [Bachelor's Thesis, Portland State University]. University Honors Theses. <https://doi.org/10.15760/honors.642>
- Hart, P. S., & Feldman, L. (2016). The impact of climate change-related imagery and text on public opinion and behavior change. *Science Communication*, 38(4), 415-441. <https://doi.org/10.1177/1075547016655357>
- Heras-Saizarbitoria, I., Urbieto, L., & Boiral, O. (2022). Organizations' engagement with sustainable development goals: From cherry-picking to SDG-washing?. *Corporate Social Responsibility and Environmental Management*, 29(2), 316-328. <https://doi.org/10.1002/csr.2202>

- Huang, C. Y., Liao, H. Y., & Chang, S. H. (1998). Social desirability and the Clinical Self-Report Inventory: methodological reconsideration. *Journal of Clinical Psychology*, 54(4), 517-528. [https://doi.org/10.1002/\(SICI\)1097-4679\(199806\)54:4%3C517::AID-JCLP13%3E3.0.CO;2-I](https://doi.org/10.1002/(SICI)1097-4679(199806)54:4%3C517::AID-JCLP13%3E3.0.CO;2-I)
- Hulme, M. (2008). The conquering of climate: discourses of fear and their dissolution. *Geographical Journal*, 174(1), 5-16. <https://doi.org/10.1111/j.1475-4959.2008.00266.x>
- Ito, K., & Li, L. M. W. (2019). Holism and pro-environmental commitment: An examination on the mediating roles of affective and cognitive determinants. *Personality and Individual Differences*, 149, 160-166. <https://doi.org/10.1016/J.PAID.2019.05.055>
- Izard, C. E. (1971). *The face of emotion*. Appleton-Century-Crofts.
- Jacobson, S. K., & Monroe, M. C. (2007). Promoting conservation through the arts: outreach for hearts and minds. *Conservation Biology*, 21(1), 7-10. <https://doi.org/10.1111/j.1523-1739.2006.00596.x>
- Kleres, J., & Wettergren, Å. (2017). Fear, hope, anger, and guilt in climate activism. *Social Movement Studies*, 16(5), 507-519. <https://doi.org/10.1080/14742837.2017.1344546>
- Kline, P. (2015). *A Handbook of Test Construction (Psychology Revivals): Introduction to Psychometric Design*. Routledge.
- Klößner, C. A., & Sommer, L. K. (2021). Visual art inspired by climate change—An analysis of audience reactions to 37 artworks presented during 21st UN climate summit in Paris. *PloS ONE*, 16(2), 1-18. <https://doi.org/10.1371/journal.pone.0247331>
- Kramer, R. (2019). Graffiti and Street Art: Creative Practices Amid 'Corporatization' and 'Corporate Appropriation'. In E. Bonadio (Ed.), *The Cambridge Handbook of Copyright in Street Art and Graffiti* (pp. 26-40). Cambridge University Press. <http://hdl.handle.net/2292/49016>
- Kundzewicz, Z. W., Mateczak, P., Otto, I. M., & Otto, P. E. (2020). From “atmosfear” to climate action. *Environmental Science & Policy*, 105, 75-83. <https://doi.org/10.1016/j.envsci.2019.12.012>
- Lazarus, R. S. (1966). *Psychological Stress and the Coping Process*. McGraw-Hill.

- Leon, A., Davis, L., & Kraemer, H. (2011). The role and interpretation of pilot studies in clinical research. *Journal of Psychiatric Research*, 45(5), 626-629. <https://doi.org/10.1016/j.jpsychires.2010.10.008>
- Leontiev, D. A. (2000). The Perception of Art: Psychological Mechanisms, Factors, and Processes. *Journal of Russian & East European Psychology*, 38(3), 45-63. <http://doi.org/10.2753/RPO1061-0405380345>
- Lilje, J., & Mosler, H. J. (2016). Continuation of health behaviors: Psychosocial factors sustaining drinking water chlorination in a longitudinal study from Chad. *Sustainability*, 8(11), 1149-1169. <https://doi.org/10.3390/SU8111149>
- López-Sintas, J., García-Álvarez, E., & Pérez-Rubiales, E. (2012). The unforgettable aesthetic experience: The relationship between the originality of artworks and local culture. *Poetics*, 40(4), 337-358. <https://doi.org/10.1016/j.poetic.2012.05.003>
- MacDowall, L. (2019). *Instafame: Graffiti and street art in the Instagram era*. Intellect Books.
- Marks, M., Chandler, L., & Baldwin, C. (2016). Re-imagining the environment: using an environmental art festival to encourage pro-environmental behaviour and a sense of place. *Local Environment*, 21(3), 310-329. <https://doi.org/10.1080/13549839.2014.958984>
- Martínez-Borreguero, G., Maestre-Jiménez, J., Mateos-Núñez, M., & Naranjo-Correa, F. L. (2020). Analysis of environmental awareness, emotions and level of self-efficacy of teachers in training within the framework of waste for the achievement of sustainable development. *Sustainability*, 12(6), 2563-2586. <https://doi.org/10.3390/su12062563>
- McAuliffe, C., & Iveson, K. (2011). Art and crime (and other things besides...): Conceptualizing graffiti in the city. *Geography Compass*, 5(3), 128-143. <https://doi.org/10.1111/j.1749-8198.2011.00414.x>
- Mehta, C. R., & Patel, N. R. (2011). *IBM SPSS exact tests*. Armonk, NY: IBM Corporation.
- Meijnders, A. L., Midden, C. J., & Wilke, H. A. (2001). Role of negative emotion in communication about CO2 risks. *Risk Analysis*, 21(5), 955-967. <https://doi.org/10.1111/0272-4332.215164>

- Mensah, J. (2019). Sustainable development: Meaning, history, principles, pillars, and implications for human action: Literature review. *Cogent Social Sciences*, 5(1), 1-21. <https://doi.org/10.1080/23311886.2019.1653531>
- Meyer, R. (2019, October 28). *The Ocean Cleanup successfully collects ocean plastic, aims to scale design*. Mongabay News. <https://news.mongabay.com/2019/10/the-ocean-cleanup-successfully-collects-ocean-plastic-aims-to-scale-design/>
- Mio, C., Panfilo, S., & Blundo, B. (2020). Sustainable development goals and the strategic role of business: A systematic literature review. *Business Strategy and the Environment*, 29(8), 3220-3245. <https://doi.org/10.1002/bse.2568>
- Miu, A. C., Pițur, S., & Szentágotai-Tátar, A. (2016). Aesthetic emotions across arts: A comparison between painting and music. *Frontiers in Psychology*, 6, 1951-1960. <https://doi.org/10.3389/fpsyg.2015.01951>
- Moser, S. C. (2007). More bad news: the risk of neglecting emotional responses to climate change information. In S. C. Moser & L. Dilling (Eds.), *Creating a climate for change: Communicating climate change and facilitating social change* (pp. 64–80). Cambridge University Press. <https://doi.org/10.1017/CBO9780511535871.006>
- Nerini, F. F., Sovacool, B., Hughes, N., Cozzi, L., Cosgrave, E., Howells, M., ... & Milligan, B. (2019). Connecting climate action with other Sustainable Development Goals. *Nature Sustainability*, 2(8), 674-680. <https://doi.org/10.1038/s41893-019-0334-y>
- Noy, P., & Noy-Sharav, D. (2013). Art and emotions. *International Journal of Applied Psychoanalytic Studies*, 10(2), 100-107. <https://doi.org/10.1002/aps.1352>
- Ojala, M. (2012). Regulating Worry, Promoting Hope: How Do Children, Adolescents, and Young Adults Cope with Climate Change?. *International Journal of Environmental and Science Education*, 7(4), 537-561. <https://doi.org/10.1080/13504622.2011.637157>
- Oláh, J., Aburumman, N., Popp, J., Khan, M. A., Haddad, H., & Kitukutha, N. (2020). Impact of Industry 4.0 on environmental sustainability. *Sustainability*, 12(11), 4674-4695. <https://doi.org/10.3390/su12114674>

- O'Neill, S., & Nicholson-Cole, S. (2009). "Fear won't do it" promoting positive engagement with climate change through visual and iconic representations. *Science Communication*, 30(3), 355-379. <https://doi.org/10.1177/1075547008329201>
- Opermanis, O., Kalnins, S. N., & Aunins, A. (2015). Merging science and arts to communicate nature conservation. *Journal for Nature Conservation*, 28, 67-77. <https://doi.org/10.1016/j.jnc.2015.09.005>
- Ozolins, U. (2009). Back translation as a means of giving translators a voice. *The International Journal of Translation & Interpreting Research*, 1(2), 1-13. <https://search.informit.org/doi/10.3316/informit.935270026672584>
- Parks, N. (2009). UN update: climate change hitting sooner and stronger. *Environmental Science & Technology*, 43(22), 8475-8476. <https://doi.org/10.1021/es903062g>
- Parsons, M. J. (1987). *How we understand art: A cognitive developmental account of aesthetic experience*. Cambridge University Press.
- Pelowski, M., Markey, P. S., Forster, M., Gerger, G., & Leder, H. (2017). Move me, astonish me... delight my eyes and brain: The Vienna Integrated Model of top-down and bottom-up processes in Art Perception (VIMAP) and corresponding affective, evaluative, and neurophysiological correlates. *Physics of Life Reviews*, 21, 80-125. <https://doi.org/10.1016/j.plrev.2017.02.003>
- Pfau, M., Haigh, M., Fifrick, A., Holl, D., Tedesco, A., Cope, J., ... & Martin, M. (2006). The effects of print news photographs of the casualties of war. *Journalism & Mass Communication Quarterly*, 83(1), 150-168. <https://doi.org/10.1177/107769900608300110>
- Pooley, J. A., & O'Connor, M. (2000). Environmental education and attitudes: Emotions and beliefs are what is needed. *Environment and behavior*, 32(5), 711-723. <https://doi.org/10.1177/0013916500325007>
- Ramachandran, V. S., & Hirstein, W. (1999). The science of art: A neurological theory of aesthetic experience. *Journal of consciousness Studies*, 6(6-7), 15-51. <https://philarchive.org/rec/RAMTSO-5>

Rochfort, D. (2006). *The Sickie, the Serpent, and the Soil: History, Revolution, Nationhood, and Modernity in the Murals of Diego Rivera, José Clemente Orozco, and David Alfaro Siqueiros*. Duke University Press.

Rodriguez, K. (2020, May 27). *How This Marine Biologist Uses Art to Bridge the Gap Between Us and Science*. Men's Journal.
<https://www.mensjournal.com/adventure/how-marine-biologist-ethan-estess-bridges-the-gap-between-us-and-science-with-art>

Roosen, L. J., Klöckner, C. A., & Swim, J. K. (2018). Visual art as a way to communicate climate change: a psychological perspective on climate change-related art. *World Art*, 8(1), 85-110. <https://doi.org/10.1080/21500894.2017.1375002>

Ross, J. I., Lennon, J. F., & Kramer, R. (2020). Moving beyond Banksy and Fairey: Interrogating the co-optation and commodification of modern graffiti and street art. *Visual Inquiry: Learning & Teaching Art*, 9(1-2), 5-23.
https://doi.org/10.1386/vi_00007_2

Russel, J. (1980). A circumplex model of emotions. *Journal of Personality and Social Psychology*, 39, 1161-1178. <https://doi.org/10.1037/h0077714>

Schachter, S., & Singer, J. (1962). Cognitive, social, and physiological determinants of emotional state. *Psychological Review*, 69(5), 379-399. <https://doi.org/10.1037/h0046234>

Scherer, K. R. (1999). Appraisal theory. In T. Dalgleish & M. J. Power (Eds.), *Handbook of Cognition and Emotion* (pp. 637–663). John Wiley & Sons Ltd. <https://doi.org/10.1002/0470013494.ch30>

Sheppard, S. R. (2005). Landscape visualisation and climate change: the potential for influencing perceptions and behaviour. *Environmental Science & Policy*, 8(6), 637-654. <https://doi.org/10.1016/j.envsci.2005.08.002>

Sherman, A., & Morrissey, C. (2017). What is art good for? The socio-epistemic value of art. *Frontiers in human neuroscience*, 11, 411-428.
<http://doi.org/10.3389/fnhum.2017.00411>

- Silvia, P. J. (2005). Emotional responses to art: From collation and arousal to cognition and emotion. *Review of General Psychology*, 9(4), 342-357. <https://doi.org/10.1037/1089-2680.9.4.342>
- Silvia, P. J., & Brown, E. M. (2007). Anger, disgust, and the negative aesthetic emotions: Expanding an appraisal model of aesthetic experience. *Psychology of Aesthetics, Creativity, and the Arts*, 1(2), 100-106. <https://psycnet.apa.org/doi/10.1037/1931-3896.1.2.100>
- Smith, N., & Joffe, H. (2013). How the public engages with global warming: A social representations approach. *Public Understanding of Science*, 22(1), 16-32. <https://doi.org/10.1177/0963662512440913>
- Smith, N., & Leiserowitz, A. (2014). The role of emotion in global warming policy support and opposition. *Risk Analysis*, 34(5), 937-948. <https://doi.org/10.1111/risa.12140>
- Sommer, L. K., & Klöckner, C. A. (2021). Does activist art have the capacity to raise awareness in audiences? —A study on climate change art at the ArtCOP21 event in Paris. *Psychology of Aesthetics, Creativity, and the Arts*, 15(1), 60-77. <https://doi.org/10.1037/aca0000247>
- Sommer, L. K., Swim, J. K., Keller, E., & Klöckner, C. A. (2019). “Pollution Pods”: The merging of art and psychology to engage the public in climate change. *Global Environmental Change*, 59, 1-13. <https://doi.org/10.1016/j.gloenvcha.2019.101992>
- Stern, N., Stiglitz, J., & Taylor, C. (2022). The economics of immense risk, urgent action and radical change: towards new approaches to the economics of climate change. *Journal of Economic Methodology*, 29(3), 181-216. <https://doi.org/10.1080/1350178X.2022.2040740>
- Swim, J., Clayton, S., Doherty, T., Gifford, R., Howard, G., Reser, J., ... & Weber, E. (2009). *Psychology and global climate change: Addressing a multi-faceted phenomenon and set of challenges. A report by the American Psychological Association's task force on the interface between psychology and global climate change*. American Psychological Association, Washington.
- Tan, E.S. (2000). Emotion, art and the humanities. In M. Lewis and J.M. Haviland-Jones (Eds.), *Handbook of Emotions* (2^a ed., pp. 116-136). New York: Guilford Press

- Taufique, K. M. R. (2022). Integrating environmental values and emotion in green marketing communications inducing sustainable consumer behaviour. *Journal of Marketing Communications*, 28(3), 272-290. <https://doi.org/10.1080/13527266.2020.1866645>
- Thompson, B., Jürgens, A. S., & Lamberts, R. (2023). Street art as a vehicle for environmental science communication. *Journal of Science Communication*, 22(4), 1-20. <https://doi.org/10.22323/2.22040201>
- Tomkins, S. (1962). *Affect imagery consciousness: Volume I: The positive affects*. Springer publishing company.
- United Nations (UN). (2015). *Transforming our world: The 2030 Agenda for sustainable development*. UN General Assembly. <https://sustainabledevelopment.un.org/post2015/transformingourworld/publication>
- Vanderveen, G., & Van Eijk, G. (2016). Criminal but beautiful: A study on graffiti and the role of value judgments and context in perceiving disorder. *European Journal on Criminal Policy and Research*, 22, 107-125. <https://doi.org/10.1007/s10610-015-9288-4>
- Vessel, E. A., Starr, G. G., & Rubin, N. (2012). The brain on art: intense aesthetic experience activates the default mode network. *Frontiers in Human Neuroscience*, 6, 66-83. <https://doi.org/10.3389/fnhum.2012.00066>
- Wang, S., Corner, A., Chapman, D., & Markowitz, E. (2018). Public engagement with climate imagery in a changing digital landscape. *WIREs Climate Change*, 9(2), 1-37. <https://doi.org/10.1002/wcc.509>
- Weber, E. U. (2006). Experience-based and description-based perceptions of long-term risk: Why global warming does not scare us (yet). *Climatic Change*, 77(1-2), 103-120. <https://doi.org/10.1007/s10584-006-9060-3>
- Wullenkord, M. C., Tröger, J., Hamann, K. R., Loy, L. S., & Reese, G. (2021). Anxiety and climate change: A validation of the Climate Anxiety Scale in a German-speaking quota sample and an investigation of psychological correlates. *Climatic Change*, 168(3-4), 20-43. <https://doi.org/10.1007/s10584-021-03234-6>
- Yu, T. Y., & Yu, T. K. (2017). The moderating effects of students' personality traits on pro-environmental behavioral intentions in response to climate change. *International*

Journal of Environmental Research and Public Health, 14(12), 1472-1492.

<https://doi.org/10.3390/ijerph14121472>

Zhenmin, L., & Espinosa, P. (2019). Tackling climate change to accelerate sustainable development. *Nature Climate Change*, 9(7), 494-496. <https://doi.org/10.1038/s41558-019-0519-4>

8. Appendix

Appendix A - Survey

Português ▼

consent

Bem-vindo(a)!

Vimos solicitar a sua colaboração num estudo que está a ser conduzido no Iscte-Instituto Universitário de Lisboa pelas investigadoras Patrícia Arriaga e Luana Moreira. Para participar é importante que tenha idade igual ou superior a 18 anos.

O objetivo deste estudo é recolher opiniões e respostas afetivas perante arte urbana. Para o efeito, será exposto(a) a 15 imagens de arte urbana, sendo solicitado a responder a um conjunto de questões sobre as imagens.

Iremos ainda colocar outras questões sobre si, incluindo informação sociodemográfica.

Estimamos que a sua participação neste estudo não ultrapasse 20 minutos do seu tempo.

As respostas que iremos recolher serão totalmente anónimas, pelo que não serão recolhidos quaisquer dados que permitam a sua identificação. Os dados que fornecer serão analisados em conjunto com os dados de outros participantes para fins educativos e de investigação. Para aderir a práticas de ciência aberta, pretendemos partilhar publicamente os dados anónimos finais com outros investigadores no repositório "Open Science Framework". Trata-se de um repositório público que promove práticas de ciência aberta.

A sua participação no estudo é também voluntária, pelo que poderá interromper a sua participação a qualquer momento, sem ter de prestar qualquer justificação. Embora não sejam conhecidos benefícios imediatos para si através do seu envolvimento neste estudo, a sua participação contribuirá para o avanço científico acerca das opiniões e impacto da arte urbana nas pessoas.

Não há riscos conhecidos associados à sua participação neste estudo. É possível que algumas pessoas reajam emocionalmente às imagens e que outras podem considerar aborrecido responder a inquéritos desta natureza.

Caso pretenda esclarecer alguma dúvida ou deixar um comentário, pode contactar as investigadoras responsáveis pelo estudo através dos seguintes endereços de email: Patrícia Arriaga (patricia.arriaga@iscte-iul.pt), Luana Moreira (ltmaa@iscte-iul.pt)

Face a estas informações, indique se aceita participar neste estudo e, em caso afirmativo, clique no botão do canto direito para continuar na página seguinte. O preenchimento do questionário presume que compreendeu e que aceita as condições do presente estudo, consentindo participar.

- ☐ ACEITO
- ☐ NÃO ACEITO

Demog

Qual é a sua idade? Por favor, escreva um número



Com que género se identifica?

- ☐ Homem
- ☐ Mulher
- ☐ Outro
- ☐ Prefiro não responder

instr

Observe cada uma das seguintes imagens de ARTE URBANA e, a seguir, indique **em que medida essa imagem evoca em si uma determinada emoção**, usando escalas de 9 pontos. Pode escolher os extremos ou pontos intermédios para cada escala. As suas respostas devem ser rápidas, espontâneas e honestas.

006

(image removed)

Perante a imagem sinto...

Muito Desprazer, Negativo(a)	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	Muito Prazer, Positivo(a)
Muito Calmo(a)	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	Muito Ativado(a)
Nada Assustado(a) / Medo	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	Muito Assustado(a) / Medo
Nenhuma Esperança / Otimismo	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	Muita Esperança / Otimismo

O que mais sentiu ao ver a imagem? Por favor, escreva o que sentiu:



Já conhecia a imagem?

- ☐ Sim
- ☐ Não

Atencao

Para validação das suas respostas, é muito importante que nos informe se respondeu com atenção durante a exposição às imagens anteriores.

- ☐ Sim, prestei atenção.

18/06/23, 19:30

Qualtrics Survey Software

☐ Não prestei atenção. Respondi aleatoriamente a várias perguntas.

No geral, em que medida as imagens que acabou de visualizar o(a) fizeram refletir sobre a(s) temática(s) abordada(s)?

Nada Um pouco Suficiente Muito Extremamente

SCQ_IAU

Por favor, indique o seu grau de concordância ou discordância com as seguintes afirmações.

Discordo Fortemente 1 Discordo Parcialmente Não Concordo Nem Discordo Concordo Parcialmente Concordo Fortemente 5

Acho que é importante que as pessoas na sociedade exerçam os seus direitos democráticos e se envolvam em assuntos importantes.

☐ ☐ ☐ ☐ ☐

Discordo Fortemente 1 Discordo Parcialmente Não Concordo Nem Discordo Concordo Parcialmente Concordo Fortemente 5

Pretendo melhorar o meu estilo de vida pessoal de modo a contribuir para a redução do desperdício (por exemplo, deitar fora menos comida, não desperdiçar materiais).

☐ ☐ ☐ ☐ ☐

Discordo Fortemente 1 Discordo Parcialmente Não Concordo Nem Discordo Concordo Parcialmente Concordo Fortemente 5

Acho que é aceitável que cada um de nós use toda a água que desejar.

☐ ☐ ☐ ☐ ☐

Discordo Fortemente 1 Discordo Parcialmente Não Concordo Nem Discordo Concordo Parcialmente Concordo Fortemente 5

Discordo Fortemente	Discordo Parcialmente	Não Concordo Nem Discordo	Concordo Parcialmente	Concordo Fortemente
1				5
1				5

Acho que o uso de mais recursos naturais do que o necessário não ameaça a saúde e o bem-estar das pessoas no futuro.

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Discordo Fortemente	Discordo Parcialmente	Não Concordo Nem Discordo	Concordo Parcialmente	Concordo Fortemente
1				5

Procurarei apanhar lixo quando o vir no campo ou em locais públicos.

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Discordo Fortemente	Discordo Parcialmente	Não Concordo Nem Discordo	Concordo Parcialmente	Concordo Fortemente
1				5

Pretendo apoiar uma organização humanitária ou de solidariedade, ou um grupo ambiental.

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Discordo Fortemente	Discordo Parcialmente	Não Concordo Nem Discordo	Concordo Parcialmente	Concordo Fortemente
1				5

Procurarei respeitar do mesmo modo homens e mulheres, meninos e meninas.

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Discordo Fortemente	Discordo Parcialmente	Não Concordo Nem Discordo	Concordo Parcialmente	Concordo Fortemente
1				5

Acho que é importante reduzir a pobreza.

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Discordo Fortemente	Discordo Parcialmente	Não Concordo Nem Discordo	Concordo Parcialmente	Concordo Fortemente
1				5

Sempre que possível procurarei separar os restos de comida antes de os colocar no lixo comum.

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Discordo Fortemente	Discordo Parcialmente	Não Concordo Nem Discordo	Concordo Parcialmente	Concordo Fortemente
1				5

18/06/23, 19:30

Qualtrics Survey Software

Discordo
Fortemente
1

Discordo
Parcialmente

Não Concordo
Nem Discordo

Concordo
Parcialmente

Concordo
Fortemente
5

Procurarei tratar todas as pessoas com o mesmo respeito, mesmo que tenham um *background* cultural diferente do meu.

☐☐☐☐☐

Discordo
Fortemente
1

Discordo
Parcialmente

Não Concordo
Nem Discordo

Concordo
Parcialmente

Concordo
Fortemente
5

Quando usar um computador ou um telemóvel para conversar, enviar mensagens, jogar ou realizar outras atividades sociais, procurarei tratar sempre os outros com respeito.

☐☐☐☐☐

Discordo
Fortemente
1

Discordo
Parcialmente

Não Concordo
Nem Discordo

Concordo
Parcialmente

Concordo
Fortemente
5

Acho que precisamos de leis e regulamentos mais rigorosos para proteger o meio ambiente.

☐☐☐☐☐

Discordo
Fortemente
1

Discordo
Parcialmente

Não Concordo
Nem Discordo

Concordo
Parcialmente

Concordo
Fortemente
5

Acho que nós, que vivemos no presente, devíamos garantir que as pessoas no futuro possam desfrutar da mesma qualidade de vida que temos atualmente.

☐☐☐☐☐

Discordo
Fortemente
1

Discordo
Parcialmente

Não Concordo
Nem Discordo

Concordo
Parcialmente

Concordo
Fortemente
5

Acho que é importante tomar medidas contra problemas relacionados com as alterações climáticas.

☐☐☐☐☐

Discordo
Fortemente
1

Discordo
Parcialmente

Não Concordo
Nem Discordo

Concordo
Parcialmente

Concordo
Fortemente
5

Acho que devem ser dadas as mesmas oportunidades às mulheres e aos homens por todo o mundo na educação e no emprego.

☐☐☐☐☐

Discordo Fortemente 1	Discordo Parcialmente	Não Concordo Nem Discordo	Concordo Parcialmente	Concordo Fortemente 5
Discordo Fortemente 1	Discordo Parcialmente	Não Concordo Nem Discordo	Concordo Parcialmente	Concordo Fortemente 5

Acho que todos deveriam ter a oportunidade de adquirir o conhecimento, os valores e as competências necessárias para viver de forma sustentável.

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Discordo Fortemente 1	Discordo Parcialmente	Não Concordo Nem Discordo	Concordo Parcialmente	Concordo Fortemente 5

Pretendo reciclar o máximo que for possível.

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Discordo Fortemente 1	Discordo Parcialmente	Não Concordo Nem Discordo	Concordo Parcialmente	Concordo Fortemente 5

Pretendo fazer coisas que ajudam as pessoas pobres.

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

Em que medida concorda com cada uma das seguintes afirmações?

	1	2	3	4	5	6	7	8	9
	Nada								Completamente
Acho que a arte urbana deveria ser removida o mais cedo possível do espaço público.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Costumo parar e olhar para arte urbana com detalhe.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

18/06/23, 19:30

Qualtrics Survey Software

	1	2	3	4	5	6	7	8	9
	Nada								Completamente
Eu já adquiri (ou gostaria de adquirir) um livro sobre arte urbana.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Acho que a arte urbana é uma expressão artística legítima.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A arte urbana é puramente vandalismo.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A arte urbana pode contribuir para chamar a atenção das pessoas para problemas da sociedade (sociais, económicos, ambientais).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interesso-me por arte urbana.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A arte urbana pode tornar um pedaço de parede num trabalho de arte.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	1	2	3	4	5	6	7	8	9
	Nada								Completamente
Em geral, a arte urbana perturba-me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Acho que a arte urbana é geralmente feia.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Quando vejo arte urbana fico muitas vezes agradado(a).

1 2 3 4 5 6 7 8 9

Nada Completamente

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

Exper_Arte

Tem algum tipo de atividade regular que envolva atividades artísticas ou culturais [profissional ou participação em algum grupo]?

- ☐ Sim, a tempo parcial. Qual?
- ☐ Sim, a tempo inteiro. Qual?
- ☐ Não tenho atualmente, mas já tive no passado. Qual?
-
- ☐ Não tenho, nem nunca tive.

Demog2

Qual é a sua nacionalidade?

- ☐ Portuguesa
- ☐ Brasileira
- ☐ Inglesa
- ☐ Americana

18/06/23, 19:30

Qualtrics Survey Software

☐ Outra. Qual?

Qual é o grau de escolaridade mais elevado que concluiu?

- ☐ Ensino básico de 1º ciclo frequentado (mas não concluído)
- ☐ Ensino básico do 1º ciclo (até ao 4º Ano)
- ☐ Ensino básico do 2º Ciclo (até 6º Ano)
- ☐ Ensino básico do 3º Ciclo (até 9º Ano)
- ☐ Ensino secundário (até 12º ano), seja através dos cursos científico-humanísticos ou cursos profissionais
- ☐ Ensino Superior: Licenciatura
- ☐ Ensino Superior: Pós-graduação ou Mestrado
- ☐ Ensino Superior: Doutoramento
- ☐ Prefiro Não responder

Qual é o seu estado civil?

- ☐ Solteiro/a
- ☐ Casado/a ou em União de facto
- ☐ Divorciado/a
- ☐ Viúvo/a

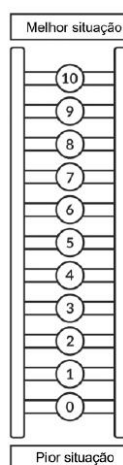
Em que país reside na atualidade?

Qual das seguintes descrições se aproxima mais do que sente relativamente ao rendimento atual das pessoas que vivem nesta casa?

- ☐ O rendimento actual permite viver confortavelmente
- ☐ O rendimento actual dá para viver
- ☐ É difícil viver com o rendimento actual
- ☐ É muito difícil viver com o rendimento actual
- ☐ Não sei

Por fim, pense nesta escada como uma representação da posição das pessoas no seu País.

No topo da escada ("10") encontram-se as pessoas que estão em melhor situação ou mais bem posicionadas - as que têm mais dinheiro, mais grau de escolaridade e/ou os empregos mais respeitados.



18/06/23, 19:30

Qualtrics Survey Software

Na parte inferior da escada ("0") encontram-se as pessoas que estão em pior situação ou pior posicionadas – as que têm menos dinheiro, menos escolaridade, empregos menos respeitados e/ou estão desempregadas.

Em que ponto da escala diria que se encontra atualmente? Por favor, escreva o número que melhor caracteriza a sua situação, a variar entre 0 e 10.

Debriefing

Muito obrigada por ter participado neste estudo!

Este projeto tem como objetivo primordial testar em que medida a arte urbana poderá consciencializar as pessoas para a importância da ação climática e redução das desigualdades. Por serem dois objetivos de desenvolvimento sustentável distintos, foram criadas duas condições: numa condição os participantes foram expostos a fotografias de arte urbana previamente classificadas como sendo alusivas à importância da ação climática, enquanto na outra condição os participantes foram expostos a fotografias de arte urbana alusivas à importância da inclusão e/ou redução das desigualdades. Após a visualização das fotografias todos os participantes neste estudo responderam a uma escala de conscienciosidade para a sustentabilidade ambiental e social de modo a analisar a sua relação com as avaliações prévias das fotografias. É esperado que as pessoas expostas aos trabalhos artísticos alusivos à importância da ação climática reportem atitudes mais favoráveis de consciência

ambiental, enquanto as pessoas expostas aos trabalhos artísticos sobre desigualdades relatam atitudes mais favoráveis a reduzir ou eliminar desigualdades sociais. Foi também avaliado o interesse das pessoas por arte urbana, na medida em que este interesse pode afetar as respostas às fotografias.

Reforçamos os dados de contato, que pode utilizar caso deseje colocar uma dúvida, partilhar algum comentário, ou assinalar a sua intenção de receber informação sobre os principais resultados e conclusões do estudo:

Pela equipa,

Patrícia Arriaga (patricia.arriaga@iscte-iul.pt)

Luana Moreira (ltmaa@iscte-iul.pt)

Avance para a página seguinte para terminar a sua participação.

Powered by Qualtrics

Appendix B – Advertising Image to recruit participants

PARTICIPE NUM ESTUDO SOBRE...

ARTE URBANA





Agradecemos
o seu
contributo!

iscte INSTITUTO
UNIVERSITÁRIO
DE LISBOA