Attention restoration theory as a framework for analysis of Tweets about urban green space: A case study

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# Introduction

Urban green space (UGS) takes many forms including pocket parks, medium-sized parks with amenities, and large parks with both managed and wild areas of biodiversity. National (Barrett, Miller, & Frumkin, 2014; Department of Health, 2015) and international health organizations (World Health Organization, WHO, 2017) identified the importance of outdoor green space to population health, wellbeing and health inequality reduction (Lee & Maheswaran, 2011; Mitchell & Popham, 2008). These settings impact outcomes such as cardiovascular and mental health (Richardson, Pearce, Mitchell, & Kingham, 2013), mortality (Gascon, Triguero-Mas, Martinez, et al, 2016; Sulander, Karvinen, Holopainen, 2016), and physical activity (Cheesbrough, Garvin, & Nykiforuk, 2019; Flowers, Freeman, & Gladwell, 2016; Lee et al., 2012; Sallis et al., 2016). Encouraging UGS use is important due to its internationally recognised potential to influence population health and wellbeing (World Health Organization, 2016); these health impacts contribute to a demand for landscape design to provide opportunity for physical activity (Hunter et al, 2015) and improvements to other health and wellbeing-related outcomes.

Despite growing evidence of health benefits associated with UGS, less is known about what influences their use. Proximity matters (Apkinar, 2016; Arneberger & Eder, 2015; Lin, Fuller, Bush, Gaston, & Shanahan, 2014; Park, 2017; Schipperijn et al., 2010), as does the presence of well-maintained amenities such a play areas, seating or toilets (McCormack, Rock, Toohey, & Hignall, 2010; Park, 2017). UGS users also reported a range of visit motivations including physical activity, relaxation, and socialising (Park, 2017; Žlender & Ward Thompson, 2017).

UGS use also contributes to recovery from cognitive fatigue. Attention Restoration Theory (ART, Kaplan & Kaplan, 1989; Kaplan, 1995) suggests settings with natural elements provide recovery from the cognitive fatigue induced by complex urban environments. This recovery, known as attention restoration, is considered a consequence of four setting characteristics: *being away* from daily responsibilities, *fascination* induced through inherently interesting stimuli, *extent* evoked by qualities that create ‘another world’ (p. 173, Kaplan, 1995), and *compatibility* with behavioural goals. Evidence for attention restoration after use of locations with these characteristics is generally positive (Berman, Jonides & Kaplan, 2008; Berman et al., 2012; Bowler, Buyung-Ali, Knight, & Pullin, 2010; Weng & Chiang, 2014) and users report seeking out UGS for its cognitive benefits (Irvine, Warber, Devine-Wright, & Gaston, 2013).

ART is a theory widely used in landscape research (Han, 2018) and useful for the management of these places (Stack & Shultis, 2013). However, ART-based studies often employ self-report measures (e.g. Bowler et al., 2010; Blind Review 2015; 2018; Brooks, Ottley, Arbuthnott, & Sevigny, 2017) and/or opportunity samples of location users (Irvine, et al., 2013). One limitation of self-report methods is they *may* prompt respondents to consider the setting in a manner directly aligned to ART, potentially precluding researchers from determining the inherent perceptions about the setting. Social media provides an opportunity to capture user views independent of a specific research context. In the current study, it was used to gather unsolicited perceptions of three UGS’ in Northeast England.

There is value in capturing unsolicited ‘real time’ data without prompts from researchers using social media, a sentiment expressed by others (Roberts, 2017). Twitter was considered the most appropriate for the current study because of its reach, with over 300 million users (CNN, 2017). Five UGS studies were identified focused on using Twitter data. Roberts (2017) used Twitter to understand usage patterns associated with planned events but did not explore Tweet meaning. Another study explored park visitation, reporting Twitter was a good proxy for location use compared to traditional surveys (Donahue et al., 2018). Neither thematically analysed Tweet meanings. However, three studies analysed did so (Roberts, Sadler, & Chapman, 2018; Plunz,et al., 2019; Schwartz, Dodds, O’Neil-Dunne, Danforth & Ricketts, 2019). In each, Tweets were analysed for the presence of general sentiment (i.e. positive/negative valence). One used an established, psychological framework of five basic emotions (Roberts et al., 2018). Two others used automated computer analysis to identify general sentiment (Plunz et al., 2018) or rate Tweets on a happiness scale (Schwartz et. al, 2019). We are unaware of any studies using a landscape-focused theoretical framework to analyse Tweet meaning. In the current study, Tweets were content analysed using ART (Kaplan & Kaplan, 1989; Kaplan 1995) as the analysis framework.

If Twitter is a potential data source for ART research, it could be expected the most important characteristics of restorative places identified when using ART self-report measures would also be similarly expressed in Tweets about UGS. Unfortunately, few studies using ART measures have assessed the relative importance of restorative characteristics; across those that did, descriptive trends were mixed regarding which one was most prevalent (Bodin & Hartig, 2003; Franěk, 2013; Herzog, Maguire, & Nebel, 2003; Hug, Hartig, Hansmann, Seeland, & Hornung, 2009; Korpela & Hartig, 1996; Laumann et al., 2001; Scopellitti & Giulianni, 2004; Stigsdotter, Corazon, Sidenius, Kristiansen, & Graham, 2017). However, in five of eight studies, *being away* was the first or second highest rated characteristic; four of the eight studies reported *compatibility* as first or second rated. There was considerable variability in the relative importance of *extent* across the studies. *Fascination*, the ‘central component’ of restorative environments (p. 172, Kaplan, 1995), was rated lowest in five studies; although, Kaplan also noted it was ‘necessary, but not sufficient’ for restoration (p. 172). Based on the findings across studies, the first hypothesis was *being away* would be the most prevalent characteristics within Tweets, followed by *compatibility*, *extent*, and *fascination* reported least.

Another central tenet of ART is settings with increasing presence and diversity of nature should be more restorative because of the inherently fascinating qualities they possess. There is some indication UGS biodiversity and less evidence of human involvement (i.e. wildness) can positively impact visitor wellbeing (Colley, Brown & Montarzino, 2016; Fuller, Irvine, Devine-Wright, Warren, & Gaston, 2007) and perceived restorativeness of the setting (Carrus et al., 2013; Carrus et al., 2015; Colley et al., 2016). For example, plant richness improved user’s ability for reflection, an aspect of restoration focused on the consideration of personal issues or our role in the broader scope of life (Kaplan & Kaplan, 1989). The second hypothesis was that *fascination* would be positively associated with UGS biodiversity. Specifically, more Tweets about the fascinating aspects of the setting would be expected as park biodiversity increased and evidence of human involvement decreased.

There are two main contributions of this study. It used Twitter to gather unsolicited views of UGS to further explore its suitability as a data source for UGS research. Additionally, the few studies that analysed UGS Tweets focused on the data as a proxy for usage or the broad expression of sentiment. The second contribution was to provide a case study analysis of Tweet meaning using a deductive approach with a theoretical framework commonly used in landscape research .

# Methods

## Study Locations

Newcastle and Gateshead sit on either side of the River Tyne in North East England (estimated population 500,000). In 2011, these local governments published a joint green infrastructure strategy to use “the network of multi-functional green and undeveloped land..which supports the activity, health and wellbeing of local people and wildlife…to achieve better quality, more effective functioning and greater diversity of our green infrastructure.” (2011, p. 7). Within this strategy, the benefits of UGS’ as resources encouraging relaxation and exercise were prioritised (p. 16).

Three city-centre UGS’ within this strategy were the focus of the study. Jesmond Dene is a bio-diverse 160-hectare valley with unmanaged/wild and managed nature, a scenic waterfall, and children’s facilities. The two other locations were traditional Victorian parks. Leazes Park is 14-hectares with extensive tree cover, some areas of managed nature, a pond and located adjacent to a hospital and university. Saltwell Park, an 8-hectare park, has a large pond, open expanses with children’s facilities, an education centre, fitness facilities, large areas of managed nature, and an historic building. All locations bordered residential areas. Five sites from the strategy were excluded because they were open countryside on the cities’ outer edges (*N* = 4) or a riverside location.

## Procedure

Data collection and coding.Data collection (January-June) used Twitter Stream to capture data real time/up to nine days retrospectively (Blind review, 2017). Text, imagery, hyperlinks and account information were captured with user-defined search parameters stored as search strings using specified terms and Boolean search values. Terms included park names, hash tags including park names, Newcastle or Gateshead Newcastle Gateshead. The application used application-user authentication to connect to the Twitter data system using an amalgamated single string query to improve search efficiency. Tweets containing any words in the amalgamated query string were periodically returned to the application and filtered to ensure individual tweets correctly linked to its source search parameter. Harvested data was stored on a secure, internal server where further querying and analysis took place. Twitter Stream returned 5624 Tweets/re-Tweets; 550 were usable for the study (9.78%).

A coding handbook, based on Resch and colleagues (2016), was created to ensure procedural consistency between researchers. It included coding instructions, definitions of restorative characteristics based on published work (e.g. Herzog, et. al, 2003; Kaplan, 1995) and subordinate concepts within categories (e.g. *being away*: escape, break; *fascination*: beauty, interesting). In a training exercise, author A and a research assistant separately coded several tweets to extract its primary thematic meaning and coded it into one ART categories. For the full analysis, each Tweet was coded into one ART category by (Author A). An example was: Completed a run in (park). In a good mood! The primary meaning referred to an activity and was categorised as *compatibility*. All Tweets reported some type of leisure activity, defined as activities done for enjoyment and by choice (Adams, Leibbrandt, & Moon, 2011). Sample Tweets by attention restoration characteristic and location are provided in Table 1.

*Ethics.* Tweets were treated as publicly-available, non-sensitive data. Procedures were approved by the (Blind) University ethics committee and implemented British Psychological Society guidelines for social media research (2017). Twitter privacy policy (2016) was adhered to; no demographic data was obtained. Re-Tweets were excluded to protect the privacy of the original author, who may not have a public profile. Advertisements and tweets related to events (e.g. charity run) were excluded to decrease ‘noise’ in the data and improve social media measurement validity (Qiu, Chan & Chan, 2018).

Data analysis.The SPSS random data generator selected a 10% sample of Tweets for independent coding by the research assistant. Inter-rater reliability was 84%, a value considered to be ‘strong’ (McHugh, 2012). To test the hypotheses, five chi-square goodness-of-fit tests were implemented (adjusted *p* =.01). These determined whether the observed frequency distribution of coded characteristics differed overall (HY1) and within each location (HY2).

# Results

A summary of Tweets by attention restoration characteristics overall and location is presented in Table 2. The first hypothesis focused on the prevalence of each ART characteristic. Across UGS’, the primary meaning of 51.60% of Tweets was consistent with *fascination* (e.g. beauty, wonder, novelty); 43.50% focused on *compatibility* with goals such as physical activity, creative pursuits (e.g. photography) and socialising. Fewer than 5% of Tweets had a primary meaning that referred to *being away* and none referred to *extent*, which was excluded from further analysis. *Being away* occurred less than both *fascination* and *compatibility* (*x2* = 207.81, *N* = 550; *df* = 2, *p* <.001) but the latter two did not differ significantly in prevalence (*x2* = 3.70, *N* = 524; *df* = 1, *p* =.06). The second hypothesis explored whether characteristics varied with level of biodiversity; and was tested by comparing characteristics within locations. These analyses excluded *being away* and *extent* due to their low prevalence. In Jesmond Dene and Leazes Park, *fascination* was reported significantly more than *compatibility* (*x2*Jesmond = 7.31, *N* = 342, *df* = 1, *p* =.01; *x2*Leazes = 6.04, *N* = 73, *df* = 1, *p* =.01). The opposite pattern was reported in Saltwell Park (*x2* = 6.89, *N*= 109, *df* = 1, *p* =.01).

# Discussion

There were two intended contributions of this study. The first was to use Twitter to gather unsolicited views of urban green space (UGS) and explore its suitability as a data source for UGS research. Additionally, this study explored the meaning of Tweets using attention restoration theory (ART, Kaplan & Kaplan, 1989; Kaplan, 1995) as the analysis framework. Unsolicited user views were analysed in respect of four characteristics of attention restoration (Kaplan, 1995). Three of the characteristics of restorative places were present in Tweets; this provided preliminary evidence to support the potential for ART to be used as a framework to analyse Twitter data in UGS research.

The findings partially supported the prediction that the prevalence of the four ART characteristics would be similar to the patterns identified using traditional survey methods. The most frequently reported restorative characteristic in the primary meaning of Tweets was *fascination*. All UGS’ in the current study drew user attention to their interesting and stimulating qualities (Hartig, Korpela, Evans & Gärling, 1997; Kaplan, 1995), a finding similar to others (Beiling, Plieninger, Pirker, & Vogl, 2014; Colley et al., 2016). This is in contrast to studies where *fascination* was one of the lowest rated characteristics using survey measures of perceived restoration (Bodin & Hartig, 2003; Herzog et al., 2003; Hug et al., 2009; Korpela & Hartig, 1996). A possible explanation for this finding in the current study may be nature closely adjacent to the urban environment makes its fascinating aspects more salient; therefore, users Tweeted about these aspects of UGS. The current findings support the positive restorative potential of UGS’ in this regard, when considered with prior reports that well-maintained small UGS had this important restorative characteristic (Peschardt & Stigsdotter, 2013).

The high number of Tweets about *compatibility* was as hypothesized. *Compatibility* referred to facilitation of physical activity or leisure pursuits such as photography or socialising, as reported in earlier studies (Beute & de Kort, 2018; Irvine et al, 2013; Sreetheran, 2017) and consistent with ART (Hartig et al., 1997, Herzog et al., 2003). The number of *compatibility* Tweets reinforced it as one of the highest rated aspects of natural environments when using traditional self-report questionnaire-based methods (Bodin & Hartig, 2003; Herzog et al., 2003; Laumann et. al, 2001; Scopelliti & Giuliani, 2004).

However, *being away* was reported in less than 5% of Tweets, contrary to expectation and inconsistent with studies where it was the highest rated perceived restorative aspect (Herzog et al., 2003; Stigsdotter et al., 2017). It may be the current study settings were integrated into users’ daily lives as thoroughfares to the city/place of work, so did not provide feelings of being removed from daily routines. Although, a recent study of office workers found nearby green space readily induced feelings of *being away* (Colley et. al, 2016), as did nearby urban green locations when users discussed their perceptions using photographs from their regular visits (Cheesbrough, et. al, 2019). The latter two findings indicate ‘every day’ places provide this sense of being away; but for locations in the current study this was not the most salient perception. Future studies could investigate what aspects of UGS’ specifically evoke feelings of being away and, in what context because the same location may serve different purposes at different times.

*Extent*, or the coherence of elements within the environment (Kaplan, 1995; Hartig et al., 1997),was not the primary message in any Tweet. It could be *extent* is less prominent to users or not the most immediate reaction; it may have been perceived but not included in Tweets. Alternatively, it may actually be the least important restorative characteristic (Stigsdotter, et. al, 2017; Franěk, 2013).

The low prevalence of *being* away and absence of *extent* should be interpreted with some caution. These findings may have been an artefact of media source character limitations; future studies could compare user perceptions across different social media or triangulate with survey or interview data. Yet, the absence of *extent* and presence of the other characteristics could be interpreted as support for a two-component classification of restorative characteristics (Tryväinen, et al. 2014): a general one encompassing perceptions of *being away*, *fascination*, and/or *compatibility*, as well as one focused on *coherence*, a concept related to *extent* referring to the way environmental features ‘fit’ as a whole (Hartig, Kaiser, & Bowler, 2001). The number of Tweets highlighting *compatibility* also reinforced the importance of continuing to include it when investigating restoration. Others have suggested it be eliminated from measures of perceived restorative potential (Pasini, Berto, Brondino, Hall & Ortner, 2014).

Future research could also explore wellbeing in Tweets about UGS. ART suggests the same restorative characteristics impact subjective wellbeing, with mood the most widely included outcome in nature-exposure research (Bowler, et al., 2010). Nature or UGS typically improved positive mood (Blind, 2015; Berman, et al., 2012; Brooks et al., 2017) and reduced negative mood (Han, 2017; Kinnafick & Thørgersen, 2014; Bowler et al., 2010). However, a recent meta-analysis reported a small effect on negative mood and moderately effect on positive mood (McMahon & Estes, 2015); others found no differential effect on mood between natural and urban environments (Gidlow et al., 2014) or between different natural environments (Marselle, Irvine, & Warber, 2013). These mixed findings may be due to an unaddressed distinction between emotion and mood, often interchanged by researchers (e.g. Brooks, et al., 2017; Han, 2017; McMahan & Estes, 2015; Nisbet & Zelenski, 2011) despite differing in duration, stability, and object-specificity (Beedie, Terry, & Lane, 2005). Beedie and colleagues (2011) proposed “emotion is defined as a feeling caused by a specific object and focused on that object…..mood is a set of feelings that are neither caused by nor focused on a specific object” (p. 229). Brief UGS exposure may not evoke change in mood but instead elicit emotions, as in other nature experiences (Faullant, Matzler, & Mooradian, 2011). Building on Roberts and colleagues (2018), Tweets could be analysed using basic emotions (Ekman, 1992) to provide a theoretically-based analysis. This approach would complement the use of the ART framework in the current study. Specifically, by using both clearly defined ART and emotion frameworks, it may extend our understanding of the mechanisms by which UGS result in restorative benefits, how long those take to occur, and identify potential influences for UGS use.

To test the second hypothesis regarding biodiversity, restorative characteristics were analysed within each UGS. *Fascination* in Tweets was hypothesized to be positively associated with increased biodiversity and reduced signs of human influence. The findings supported this. In the two most bio-diverse locations, *fascinating* characteristics were Tweeted about more than *compatibility*. In Saltwell Park, the smallest and least bio-diverse, the opposite pattern emerged. Although Leazes Park and Saltwell Park are both traditional Victorian parks, a large amount of Leazes Park is tree-covered, whereas Saltwell Park has larger, manicured open expanses around which most of the paths, facilities, and services are located. This is contrary to other findings indicating tree cover did not influence wellbeing (Fuller et al., 2007; Dallimer et al., 2012); it may be tree cover in Leazes Park encouraged bird species richness previously associated with restoration (Fuller et all, 2007). If the Tweet content is considered an indicator of usage motivation, it suggests bio-diversity, inclusion of areas of ‘wildness’, and infrastructure compatible with a range of user activities such as exercise or social interaction are important design considerations.

The findings have the potentialto facilitate links between landscape design and public health. Utilization of UGS for exercise and reducing social isolation are key public health indicators where this study was based (Department of Health, 2015). The evidence reinforced the positive impact UGS’ have due to compatibility with physical activity and social interaction. Landscape planners and urban designers could analyse social media specific to particular landscape initiatives in the context of endorsed health indicators. Twitter data can provide a good proxy for usage information (Donahue et. al., 2018), as well as evidence to investigate health benefits associated with projects and quantify their ‘value for money’ in preventative population health.

Study limitations.Twitter was a convenient method to access unsolicited user data; it also had disadvantages. Twitter applications only extract information from ‘active’ accounts based on Tweet volume and re-Tweeted mentions (Twitter, 2016); protected accounts cannot have data passively collected. Applications limit the amount of data sampled from the population of publicly-available Tweets (Gonzalez-Bailon, 2013). Users also have the ability to search for a location or venue within the Twitter interface, meaning they could be in one location but tag the message with a different one. In the current study, location metadata was not analysed. It was missing for most Tweets, typically because location services are disabled to save power or for security. Finally, the volume of Tweets required time-consuming data preparation to identify Tweets for analysis, which resulted in only approximately 10% being suitable to the research aims. In this respect, there is a distinct trade-off between ease of data access and the effort required to ensure scientifically robust data for analysis.

Twitters users differ from the general population (Donahue, et. al, 2018; Longley, Adnan, & Lansley, 2015) and only a small number of UGS users are represented by Twitter (Plunz et. al, 2019). Demographic data was not obtained to maintain user privacy. Twitter users are more motivated by self-promotion (Syn & Oh, 2015) and affiliation needs (Chen, 2015) compared with social media users. It is possible users were Tweeting simply to enhance their social profile by posting content they think others would like. In this regard, the data may have been generated for a different reason so were not representative of perceptions of UGS, a concern expressed by others (Plunz, et al., 2019). Even if social enhancement was the motivation, we suggest Tweets still communicated salient aspects of the UGS. However, we acknowledge collectively these considerations limit generalisability of the findings.

Some readers may query whether Tweets indicate user perceptions of the restorative characteristics of the environment. Yet, like other social research contexts, social media content is believed to be a proxy for participant perceptions (Qiu et al, 2018). In this regard, we argue the use of ART as a deductive thematic framework was similar to analysis of Tweets using basic emotions (Resch, et al., 2016; Roberts, et al., 2018) or qualitative analysis of word associations with nature (Beute & de Kort, 2018); and, therefore, methodologically robust. A study comparing manual, automated, and semi-automated Tweet analysis (Chapman et al., 2018) found manual coding also provides more accurate message coding. Although time consuming, manual coding identified subjective meanings that may have been missed/misclassified by automated procedures. Yet, the relatively recent arrival of Twitter to the research landscape does present scientific challenges. Therefore, future studies should use convergent methods to triangulate unsolicited social media data with methods such as ‘go along’ interviews (Colley et al., 2016) or photo voice (Cheesbrough, et. al, 2019), behavioural data of usage frequency/duration, and quantitative ratings of restoration.

*Ethical reflections*

Twitter provides efficient, unobtrusive data collection; but requires reflection on the ethics of its use (for more detailed debates see Lomborg & Bechmann, 2014; Wheeler, 2018; Zimmer, Nicholas & Proferes, 2014). Although Twitter terms and conditions specify academic institutions as third-party data users (Fiesler & Proferes, 2018), some might question whether agreement implies informed consent. One argument is Twitter data is in the public domain; therefore, does not require the provision of informed consent. Conversely, others may believe this data does not preclude the need for ethical approval, informed consent and right of withdraw. In reality, these decisions are context-dependent. Researchers should balance the study’s scientific aims with minimisation of harm and user privacy/anonymity. Indeed, Twitter user’s perceptions on data use indicate their views are also context dependent, with academic research better received than that conducted by business or government agencies (Fiesler & Proferes, 2018; Williams, Burnap, & Sloan, 2017).

For researchers considering Twitter as a data source, we make several recommendations based on this study and others (e.g. Bruckmann, 2002; Wheeler, 2018; Williams et al., 2017). Explicit ethics statements are essential in published work but often absent (Zimmer & Proferes, 2014). At very least, justification should be provided when ethical review and/or consent were not sought. It is also necessary to consider whether information considered public by researchers was viewed differently by users (BPS, 2017). In the current study, the data was considered publicly available and non-sensitive; guidelines for this type of study design were followed (e.g. BPS, 2017). To maintain user privacy, re-Tweets should be excluded as they may have originated from a private account and were only subsequently made public by another user (Zimmer & Proferes, 2014). An exception would be when re-Tweets were integral to the research aim; even then, the public nature of the original Tweet should be confirmed. Bruckman’s (2002) guidance on heavily disguising user identities in internet mediated research was also implemented through non-collection of demographics and use of paraphrase in exemplar Tweets provided. When direct quotations are used, consent should be obtained due to Twitter terms and conditions, social research principles (BPS, 2017), and user expectations (Fiesler & Proferes, 2018; Williams et al, 2017).

Conclusion.In landscape research, prior studies typically investigated the restorative benefits of urban green space using self-report methods grounded in attention restoration theory, thereby potentially eliciting these responses. The current study, analysing unsolicited Tweets about urban green spaces in North East England using attention restoration theory as a framework, suggested Twitter users perceived their restorative characteristics, particularly fascination and compatibility. It also indicated that people do simply Tweet about urban green space without prompting, supporting it as a potential resource for landscape researchers and management professionals, as highlighted by others (Chapman et. al, 2018; Roberts et. al, 2018). Given recent findings that communication from family and friends is a factor in developing attachment to national parks (Rickard & Stedman, 2015), Twitter can be an useful communication tool for landscape management in this regard; but there are specific ethical considerations with its use. The restorative potential of urban green spaces was further substantiated here, contributing to a growing evidence base highlighting their positive impact (Bieling, et. al, 2014; Blind 2015; 2018). The evidence presented is relevant to park and leisure managers, environmental psychologists, urban design professionals, landscape architects, and public health officials interested in encouraging UGS use, particularly for their varied potential restorative and wellbeing benefits.

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Table 1. Sample Tweets by Attention Restoration Characteristic and Location

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|   |   |   |   |   |   |   |
|  |  | Location |
|  |  |  |  |  |  |  |
| ARTa Category |  | Jesmond Dene |  | Leazes Park |  | Saltwell Park |
|   |   |   |   |   |   |   |
| Being Away |  | Another world and so close to home  |  | Lunch outside in the park is better than the office!! |  | Relaxing in (park name) |
|  |  |  |  |  |  |  |
| Fascination |  | The power and force of nature is something to behold!  |  | Order in the random flowers blooming and showing signs of spring!  |  | Appreciating the varied colours of nature in autumn. |
|  |  |  |  |  |  |  |
| Compatibility |  | Bike ride time achieved. Active commute to work through the park was enjoyable. |  | Socializing and eating in the park! |  | Playing in the park |
|  |  |  |  |  |  |  |
| Extent |  | --  |  | --  |  | --  |
|   |   |   |   |   |   |   |
|  |  |  |  |  |  |  |
| a ART refers to attention restoration theory (Kaplan, 1995).Note: Original Tweets were paraphrased to protect user privacy anonymity. |  |  |

Table 2. Attention Restoration Characteristic Content Overall and by Location

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|   |  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|  |  |  |  |  |  |  | Location |
|  |  |  | Overall (*N* = 550) |  | Jesmond Dene (N = 355) |  | Leazes Park (*N* = 79) |  | Saltwell Park (*N* = 116) |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Restoration  |  |  | *N* |  | % |  | *N* |  | % |  | *N* |  | % |  | *N* |  | % |
|   |  |   |  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Being away |  |  | 26 |  | 4.70 |  | 13 |  | 3.70 |  | 6 |  | 7.60 |  | 7 |  | 6.00 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  Fascination |  |  | 284 |  | 51.60 |  | 196 |  | 55.20 |  | 47 |  | 59.50 |  | 41 |  | 35.30 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  Compatibility |  |  | 240 |  | 43.60 |  | 146 |  | 41.10 |  | 26 |  | 32.90 |  | 68 |  | 58.60 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Extent |  |  | 0 |  | 0.00 |  | 0 |  | 0.00 |  | 0 |  | 0.00 |  | 0 |  | 0.00 |
|   |  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Note: Overall, the distribution of fascination and compatibility was equivalent but differed from being away. Within locations, fascination and compatibility differed. All *x2* *p*<=.01. Being away  |
|  | and extent were excluded from location-specific analyses due to their low prevalence. Numbers may not sum to 100 due to rounding. |  |  |