# The Effects of Online Media Consumption and Age on Attention:

# **An Online Survey in Ireland**

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# N00182584

# Declaration

This Thesis is entirely my own work and has not been previously submitted to this or any other third level institution.

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#### **Abstract**

The aim of this study was to investigate whether consuming short-form online media, such as Twitter, more frequently than long-form online media, such as online newspaper articles, is related to attention in everyday life. A convenience sample of 61 participants were recruited: 25 females (41%) and 36 males (59%). Age range was 23 years to 77 years (M = 40.49, SD = 10.73). An online survey recorded the frequency of participants' consumption of short-form or long-form online media and their scores on the Everyday Life Attention Scale. Hypothesis 1, that there would be a difference in ELAS scores based on frequent media type consumption was not supported. Hypothesis 2, that there would be an interaction between frequent media type consumption and age on ELAS scores, was not supported. These findings suggest that frequency of consumption of short-form or long form online media makes no difference to attention in everyday life. This study raises awareness of the issues related to assumptions made about attention and the need for further observation taking context into more consideration.

#### Introduction

The internet statistics organization Statista estimated as of January 2020 that there are 4.54 billion active internet users and growing (Clement, 2020). During the last twelve months, nearly one million people every day accessed the internet for the first time. Much of the time that people spend when using internet connected devices is on social network apps or websites like Facebook, Twitter, Pinterest and Instagram, also referred to as social media. According to the wearesocial.com Global Digital Report 2018, the average time spent on social network services by users was 144 minutes per day. This represented an increase of one hour a day compared with 2012. Every day the total number of social media users increases. In 2017 just less than 2.5 billion people were active on social media worldwide and by 2021 it is expected that 3 billion people will be social media users (nearly 40 percent of the global population).

Just as the number of internet and social media users are growing, and lifestyles become increasingly more digital, there seems to be a general acceptance that attention spans are shrinking. In 2015, Time magazine ran a feature in the Health + Neuroscience section exclaiming that 'You Now Have a Shorter Attention Span than a Goldfish' (McSpadden, 2015). The well-circulated article cited research conducted on 2,000 participants in Canada, including 112 electroencephalogram brain activity experiments. The general proposition was that since we are always just seconds from reaching for our phones because we constantly feel the need to check in with our digital lives, that we can no longer settle our minds to find focus and concentration for extended periods. The statistics referred to in the article travelled from USA Today to the New Scientist, The Telegraph and BBC before being debunked due to lack of evidence in 2016 (Policy Viz, 2016). Part of the problem with such a claim is that attention itself is highly task dependent as therefore difficult to evaluate without a specific context. The studies referred to were much more germane to grabbing consumer attention in advertising

and marketing (Weinreich, Obendorf, Herder & Mayer, 2008), and any claims are tempered with the acknowledgment that measurement is very dependent on context, perspective, environment and circumstance. There does not seem to be much evidence that goldfish have short attention spans either (Maybin, 2017). The present study uses a between groups approach to investigate the possible association between the types of media consumed and attention in everyday life.

#### **Literature Review**

Attention span can be thought of as the amount of concentrated time someone can spend on one task without becoming distracted (Johnson & Proctor, 2004). Sohlberg and Mateer (2001) developed a useful clinical model defining five types of attention: focused attention, sustained attention, selective attention, alternation attention, and divided attention. Focused attention is the most basic level to maintain and refers to a response to external stimuli, for example, being touched. Sustained attention means ongoing focus to carry out repetitive tasks, for example remembering instructions and executing on those instructions. Selective attention means staying focused while distractions are present. Distractions could be noise or movement. Alternating attention is the shift in focus between tasks that need different skills, for example shifting between asking questions and then typing the answers. Divided attention is the most difficult to maintain and refers to responding simultaneously to multiple tasks. This may be rapid switching of alternating attention and is often referred to as multi-tasking. For example, talking on the phone while following a cooking recipe. While the Sohlberg and Mateer (2001) model helps to understand the various and complex levels of attention, it also demonstrates how inadequate it is to attempt a measurement of attention span using only units of time.

Estimates for the length of human attention span are highly variable and depend on the precise definition of attention being used (Johnson & Proctor, 2004). People can choose repeatedly to re-focus on the same thing. This ability to renew attention permits people to appear to pay attention to things that last for more than a few minutes, such as long films, podcasts or Netflix binges. Ability to spend time continuously on one task varies with age (Cepeda, Kramer & Gonzalez de Sather, 2001). For time-on-task measurements, the type of activity used in the test also affects the results, as people are generally capable of a longer attention span when they are doing something that they find enjoyable or perhaps motivating. Attention is also increased if the person can perform the task fluently, compared to a person who has difficulty performing the task,

or compared to the same person when they are just discovering the task. Tiredness, hunger, sounds, and emotional stress reduce the time focused on a task (Bruya, 2010).

Johnson and Titchener (1909) said that "attention is at the centre of the psychological enterprise" and for more than one hundred years since then researchers have been investigating how control of attention and our experience of attention shapes how we live. This century the study of attention has been one of the fastest growing fields within cognitive psychology and neuroscience (Posner & Rothbart, 2007).

Modern research on attention began with the analysis of the "cocktail party problem" by Colin Cherry in 1953 when he began to answer the question of how people select and focus on the conversation that they are interested in, and ignore the rest at a noisy party. Cherry performed several experiments which became known as dichotic listening tasks and which were extended by Donald Broadbent and others (Hampson and Morris, 1996). In a typical experiment, subjects would use a set of headphones to listen to two streams of words in different ears and actively pay attention to one stream, then afterwards the experimenter would question the subjects about the content of the other stream. Broadbent's model was criticized because replications found inconsistent results, and it also could not explain how individuals could sometime extract meaning from peripheral events that should have been filtered out. This led to Anne Treisman's Attenuation Theory (Treisman, 1964) which suggests that some stimuli are stronger than others according to various thresholds and stimuli are not filtered out completely but maybe unattended to after attenuation.

Researchers are still working to fully understand how people pay attention, but they do know that concentration and attention are part of the function of the brain's frontal lobe. Paying attention to something usually begins as an unintentional and inactive process when stimuli come into the brain through the nervous system. Visual stimuli from the eyes, auditory stimuli from the ears, olfactory stimuli from the nose, and other sensory stimuli such as temperature, touch, and taste all come into the frontal lobe, which begins to process it (Robert & Cho, 2018).

Understanding the limitations in our cognitive control (for example mind wandering, attention sustainability, working memory or ability to multi-task) is critical to appreciate the conflict between our goals and those limitations (Gazzaley & Rosen, 2016). Researchers are also keen to understand the effect that external stimuli have on cognitive control abilities and the further goal-oriented or psychological benefits associated with them. In 2013, McClelland, Acock, Piccinin, Rhea and Stallings reported on the relationship between preschool attention span-persistence and educational outcomes. After controlling for achievement levels at age 7, adopted status, child vocabulary skills, gender, and maternal education level their logistic regressions revealed that attention span-persistence at age 4 predicted math and reading achievement at age 21 and predicted 49% greater odds of completing college at age 25. In 2003, Brown and Ryan developed the Mindful Attention Awareness Scale (MAAS) as part of their study of mindfulness and its role in psychological well-being. The MAAS assesses individual differences in the frequency of mindful states over time. The scale is a 15-item (1-6 Likert scale) questionnaire to assess dispositional (or trait) mindfulness. Some people are more proficient at putting themselves into a state of mindfulness than others. Those scoring higher in mindfulness tend to report higher levels of pleasant effect, higher self-esteem, optimism, and self-actualization (Grossman, Niemann, Schmidt, & Walach, 2004). Also, lower levels of neuroticism, anxiety, depression, and unpleasant effect are reported in those scoring higher in mindfulness (Grossman, Niemann, Schmidt, & Walach, 2004). MAAS is a widely cited, valid and reliable measure of mindfulness, with Cronbach's alpha regularly greater than 0.8 (MacKillop & Anderson, 2007).

Any self-report measurement can be criticized because of bias, the ability of the participant to understand the question, honesty and exaggeration. Though the MAAS scale requests that the participant reflects on their experiences as they are, rather than how they think they should be, people may tend to answer inaccurately where subjective experience is concerned. It is very difficult to measure "present" state in a "post" state manner, however, it is also claimed that self-report measures can be good

approximations to other surveys and results tracked over time when there is a high level of anonymity and little fear of reprisal (Garcia & Gustavson, 1997).

The Everyday Life Attention Scale (ELAS) was recently developed to be used in the assessment and diagnosis of adults with ADHD (Groen, Fuermaier, Tucha, Weisbrod, Aschenbrenner & Tucha, 2018). The ELAS was developed to provide clinical researchers with a sensitive tool for the assessment of attentional capacities. The development of the tool considered limitations of existing attention questionnaires, for example, reliance on participant judgement of difficulty or frequency of a particular impairment or questions that do not set the context of a particular situation. The development of the ELAS considered these limitations by creating nine different situations that people commonly encounter in everyday life (e.g., reading or cooking). The ELAS contains questions about several attentional capacities in each of these nine situations, which are rated on an 11-point Likert scale of how much focus or unbroken time can be spent on the task. By asking for absolute values of attention capacity (that are labelled), participants are not required to make a self-judgement about their level of impairment. Instead, impairment is determined by the clinician who compares the respondent's score to normative data.

In a previous study (Groen et al., 2019), the ELAS was shown to be a reliable measure for attention capacities with good internal consistency for each of the nine situations. Also, the test-retest reliability after four weeks was good for the majority of situations. However, as recognised by the authors, the data of a large number of healthy participants is necessary to increase clinical utility. Furthermore, and also stated by the authors, the scale's reliability would be improved by being used with different cultures and in different languages. Whilst the present study will not in any way suggest that media consumption is related to ADHD, it is relevant to employ a credible, commonly used, and well-founded scale which has addressed many of the common restrictions with other attention-related questionnaires. Internal reliability assessments were run on each of the situational questions and Cronbach's alpha ranging between 0.51 and 0.70 were found depending on the situation.

The exact measurement of media exposure is crucial for studies on the effects of different types of media in communication, science, political science, sociology, psychology and economics (de Vreese & Neijens, 2016). In 2013, Ralph, Thomson, Cheyne & Smilek used an individual differences approach to investigate the possible association between media-multitasking and attention in everyday life. Mediamultitasking can be thought of as engagement with more than one medium at the same time, for example listening to music while reading a newspaper article online. In their study Ralph, Thomson, Cheyne & Smilek (2013) attempted to measure high levels of media-multitasking compared with low levels and find relationships with failures of attention (using an attention-related cognitive errors scale), mind-wandering (using spontaneous and deliberate mind-wandering scales), attentional control (using an attentional control switching and distractibility scale) and failures of memory (using a Memory failure scale). No correlation was found between media-multitasking and memory failures or distractibility, however, there were positive correlations with selfreported attentional failures and mind wandering. Furthermore, using structural equation modelling, they were able to evaluate some plausible causation suggesting that the external stimulation of media-multitasking may cause a deficit in the ability to sustain focused attention, as opposed to accepting the bi-directional premise that those who already are aware that they do not prefer to do only one thing at a time might be more predisposed to switch on the television while studying and therefore self-report high levels of media-multitasking.

In 2014, Ralph, Thomson, Cheyne & Smilek implemented a follow-up laboratory test where they compared self-reported levels of media-multitasking with performance on three sustained attention tasks. They found a high correlation between media-multitasking and a responsiveness task, but not with a sustained attention vigilance task and so the researchers concluded that media-multitasking does not affect sustained attention. Why the difference between self-reported attention lapse levels and laboratory experiments? One suggestion here might be that there is a difference between how required individual tasks capture our attention, and therefore how we

approach them compared with real-world everyday tasks. Another possibility is that in a test environment the readiness to respond affects focused attention more than it affects the stamina required to hold attention in a vigilance task.

The present study aims to investigate whether frequent use of certain types of media online can have an effect later in everyday tasks that require some level of sustained attention. Attention is important because it affects how much information can be remembered and retained, and how well the information is then processed. Length of attention span is important for specialists in marketing, sales, politics, education, medicine, and other fields in which people want to share a message with others.

Knowing how long people pay attention to different stimuli and how to limit distractions can help get messages across. There may exist an unwitting race to the bottom of attention span where people are willing to spend less and less time-consuming information, while marketers and educators try to make their messages shorter and sweeter, therefore, conditioning people to spend even less time again.

There may be other practical applications for a deeper understanding of the benefits or influences on attention. In online learning, for example, there is a clear trend towards micro-learning and, whilst there may be other benefits, appeasing our short attention spans is often referred to as the main goal or advantage (Perry, 2017). There is an argument however that instead of aiming for the shortest possible amount of time to get information across, online educators instead should be concerned with how to encourage deeper thinking and reflection. In a study related to Twitter use, Huberman, Romero & Wu (2008) found that scarcity of attention and the demands of a fast-paced, modern life makes people default to interacting with online social media networks that are fast to consume and reciprocate their attention. The enjoyment of reading a book or a long, well-crafted news article on the same topic seems not to be a factor, and the pedigree or credibility of the journalist is also secondary at best in some situations. Mindfulness training or taking time to read and reflect on a book may lead to better focus and attention overall (MacLean, Ferrer, Aichele, Bridwell, Zanesco, Jacobs &

Wallace, 2010), but does less mindful media consumption erode attention? Time and attention are limited resources. The brain allocates attention according to the constant assessment of the most relevant, satisfying and important information. When attention seemingly wanders, sub-systems in the brain are competing for what is perceived most desirable (Watson, 2017).

There does not seem to be any research published related to the many different ways that we can choose to consume media online and the association with attention. Andersen, Vreese & Albaek (2016) describe some of the challenges associated with "measuring media diet in a high choice environment" and propose that the best step forward to improve self-reporting constraints is to take into account both specific source and specific frequency of the exposure. Given the gaps identified in the existing literature, the proposed study will look for the link between the specific modes and frequencies in which we consume online media and the effect on attention in everyday life situations. More specifically, this study aims to research whether more frequent consumption of short-form media (for example microblogs on Twitter, social media content on Facebook or short videos on YouTube) compared with long-form media (for example, online blogs and newspaper articles) has an association with attention in everyday life situations. Predominantly in the digital marketing field, short-form is defined as 400-600 words (Schaefer, 2015).

# **Research Question:**

Is the type and frequency of content consumed online related to lower levels of attention in everyday life? Does age moderate the relationship between the type of content consumed online and attention in everyday life?

**Hypothesis 1**: There will be a difference in ELAS scores based on frequent media type consumption (short-form | long-form).

**Hypothesis 2**: There will be an interaction between frequent media type consumption (short-form | long-form) and age on ELAS scores.

#### Method

# Design

Self-report questionnaires are often used in psychological practices for the assessment of people's attentional capacities (Groen et al, 2018). There are limitations with survey studies compared with experiments, however since previous studies in the area have found that attention seems to vary based on everyday situations compared with specific vigilance or response task execution in a laboratory setting, this study will take an individual differences approach using a within-group, fixed online survey-based design. This is a relevant medium for the survey because the study relies on input from participants who are frequently online. Due to the nature of the study, measures of attention being challenging to define, but nonetheless measurable and observable, a quantitative design would be most effective (Robson & McCartan, 2016). There are various ways to define media consumption, exposure and preference. This study will employ the list-frequency technique as established by Andersen et al (2016). The responses will be compiled of a selection of popular media types which are representative of short-form (for example, Twitter is a micro-blog platform and therefore short-form) and long-form (for example, www.economist.com is an online newspaper and therefore contains long-form news articles).

There are 2 independent variables;

Independent variable 1: Type of content most frequently consumed online according to the List Frequency data collection technique (K=2 | short-form – long-form).

Independent variable 2: Age in years (18-24, 25-34, 35-44, 45-54, 65+)

There is one dependent variable;

Number of Low Attention Situations as measured by the Everyday Life Attention Scale (Groen et al., 2018)

# **Participants**

Employing a convenience sample method, students and other connections known to the researcher were gathered on WhatsApp and Facebook. Once the volunteers indicated that they were willing to take part they were provided with a link to the online survey to complete at their convenience.

One respondent was excluded due to a previous ADHD diagnosis, as it would affect the design and results whilst having no bearing on the hypotheses. All respondents were over the age of 18 years old. Three responses were excluded because of incomplete answers to some of the ELAS questions. There were 61 final participants. 25 females (41%) and 36 males (59%). Age range was 23 to 77 years (M = 40.49, SD = 10.73).

Participants were treated in accordance with the PSI Code of ethics and the AIOR Code of Ethics. Ethical approval was granted by the Department of Technology and Psychology Ethics Committee (DTPEC) at Dun Laoghaire Institute of Art, Design and Technology.

#### Materials

The online survey was designed and published using SurveyMonkey.com. As per the Ethics application (Appendix A), participants were provided with an Information Sheet (Appendix B), a Consent Form (Appendix C) before beginning the survey, and a Debrief Form (Appendix D) on completion of the survey. The participants were asked for demographic information (age and gender but not personally identifiable information). Level of education <School/Bachelors degree/Master degree/Doctorate> is required for the ELAS Scale scoring norms. They were also asked if they had ever been diagnosed with ADHD (Attention Deficit Hyper-Disorder)? <Y/N>.

The first part of the survey questionnaire employed the List-frequency technique (Andersen et al., 2016) to assess consumption of media types. Twitter, Instagram, Facebook, and Pinterest are listed as examples of 'short-form' media to be compared with 'long-form' examples such as newspaper and television outlets, news content aggregators and knowledge repositories. Question format as below:

In the past 2 weeks, which of the following Short-form online media channels have you looked at most frequently (Indicate by average # of days per week. If you did not look at any in the past 2 weeks, please select 0 for all)

Twitter	0	1	2	3	4	5	6	7
Instagram	0	1	2	3	4	5	6	7
Facebook	0	1	2	3	4	5	6	7
Pinterest	0	1	2	3	4	5	6	7
Other	0	1	2	3	4	5	6	7

In the past 2 weeks, which of the following "long-form" online media channels have you looked at most frequently (Indicate by average # of days per week. If you did not look at any in the past 2 weeks, please select 0 for all)

Newspaper publisher (Eg. economist.com, nytimes.com)	0	1	2	3	4	5	6	7
TV media outlet (Eg. CNN, RTE, BBC)	0	1	2	3	4	5	6	7
News content aggregator (Reddit, Flipboard)	0	1	2	3	4	5	6	7
Whitepapers, blogs or knowledge repository (Eg. Wikipedia)	0	1	2	3	4	5	6	7
Other	0	1	2	3	4	5	6	7

For both of these questions, if the participant selected 'Other' they were also asked to enter which other media they were referring to. They were also asked if they consumed this media mostly at the weekend or mostly during the normal work week.

The second main part of the survey questionnaire was comprised of the nine Everyday Life Attention Scale situations. The nine situations are as follows: (i) Reading (ii) Watching a movie (iii) Indoor activity (iv) Attending a lecture (v) Having a conversation (vi) Working on an assignment (vii) Cooking (viii) Cleaning up at home (ix) Driving.

After each of the situations, the participant was asked to answer five questions related to how long they could carry on the task without a break and how well they could focus. See Appendix E: ELAS Situational Questions for more detail.

Post-data collection the ELAS Scoring Tool and norm forms (Appendix F and G) were used to rate and assess participants attention levels.

#### Pilot

A Pilot survey was sent to the project supervisor and three fellow students to check for errors in the questions, ease of completion of the survey as well as the time needed to complete. No changes were applied to the main survey questionnaire based on the pilot test. Some adjustments were made including a cut-off date to the request to participate, a statement regarding data security and anonymity in the Participant information sheet (Appendix B). Feedback was that the design and requirement was clear. Mean average time spent was 9 minutes 10 seconds and this was incorporated into the request for volunteers and Participant information sheet.

#### Procedure

The survey was accessed online by the participants, and they were at liberty to complete in their own time. They were presented with an information sheet (Appendix B) and an invitation to take part in the research, followed by a consent form (Appendix C). After completing the survey questions, they concluded with a debrief form (Appendix D) which explained what the responses would be used for.

For each Everyday Life Scenario presented to the participants they were first asked if they could evaluate the situation, and then asked to use sliding scales with increments of ten to evaluate themselves on how long they could focus in the given scenario and then how well they could focus (11-point Likert scale).

Figure 1.
Survey Sliding Scale Example

How long (in minutes) can you engage in this without interruption?



How well can you focus on this? (0=Unable to focus on the task, 50 = Focus on the task is about 50%, 100 – Fully able to focus on the task i.e. 100%)



The completed survey data was downloaded from surveymonkey.com and then the Everyday Life Attention Scale responses were scored according to the ELAS Scoring Tool (Appendix F) to find the Number of Low Attention Situations for each participant. Participants were divided into 2 groups according to whether they consumed short-form media or long-form media more frequently. If the sum of Average Days per Week consuming the short-form media types was greater than the sum of Average Days per

Week consuming the long-form media types, then they were assigned to Group 1 and vice versa for Group 2.

# **Ethical Considerations**

A Department of Technology and Psychology Ethical Approval Form A was submitted, reviewed and approved by the Department of Technology and Psychology Ethics Committee (DTPEC) and the obligations were met as part of the survey process (See Appendix A). As mentioned, there were no respondents under the age of 18 and participants who declared themselves as previously having been diagnosed with ADHD, that could be considered a vulnerable group, were excluded from the study.

#### Results

#### **Descriptive Statistics**

There were 61 final participants. 25 females (41%) and 36 males (59%). Age range was 23 to 77 years (M = 40.49, SD = 10.73). Age group 0 (18-24 years) had two participants, Age group 1 (25-34 years) had twelve participants, Age group 2 (35-44years) had thirty participants, Age group 3 (45-54 years) had thirteen participants, and Age group 4 (65+ years) had four participants.

Participants were divided into 2 groups based on how frequently they consumed either short-form or long-form content. Group 1 is defined as the participants who consume short-form more often than long-form (N=34). Group 2 is defined as those who consume long-form content more frequently than short-form (N=27).

## **Inferential Statistics**

**Hypothesis 1**: There will be a difference in ELAS scores based on frequent media type consumption (short-form | long-form).

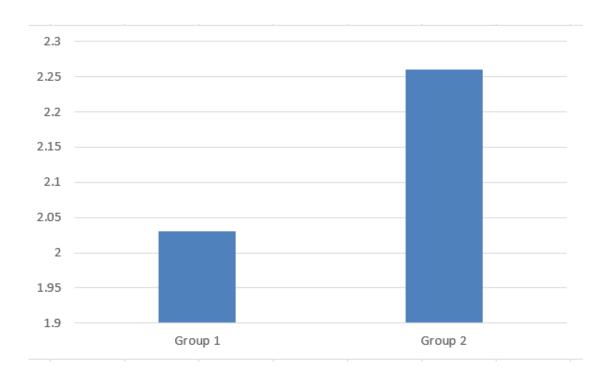
# **Independent t-test**

An independent-samples t-test was conducted to compare the number of Low Attention Situations as measured by the Everyday Life Attention Scale (ELAS) for the 2 groups.

There was no significant difference in scores for Group 1 (M = 2.03, SD = 1.45) and Group 2 (M = 2.26, SD = 2.03; t (SD = -0.52, SD = 0.52, SD = 0.

Figure 2.

Mean Average number of Low Attention Situations by Group (Short-form compared with Long-form)



**Hypothesis 2**: There will be an interaction between frequent media type consumption (short-form | long-form) and age on ELAS scores.

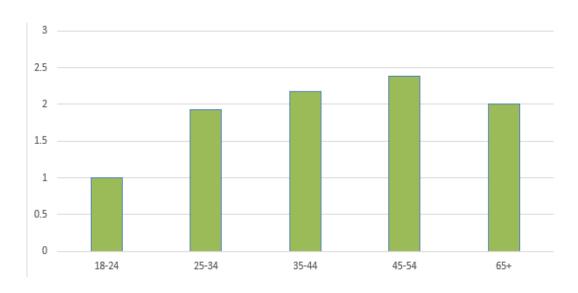
# 2-Way Anova

A two-way between-groups analysis of variance was conducted to explore the impact of the type of content viewed online and age on levels of attention in Everyday Life, as measured by the Everyday Life Attention Scale (ELSE). Participants were divided into five groups according to their age (Group 0: 18–24 years; Group 1: 25–34 years; Group 2: 35-44 years; Group 3: 45-54 years; Group 4: 55-64 years; Group 5: 65 years and above). Levene's Test of Equality of Error Variances was greater than 0.05. The interaction effect between Age Group and Content viewed (short-form or long-form) group was not statistically significant, F (2, 51) = 0.336, p = .85. Post-hoc comparisons

using the Tukey HSD test indicated that while the mean score for the 45-54 years age group was highest, the difference did not reach statistical significance.

Figure 3.

Average Number of Low Attention Situations by Age Group



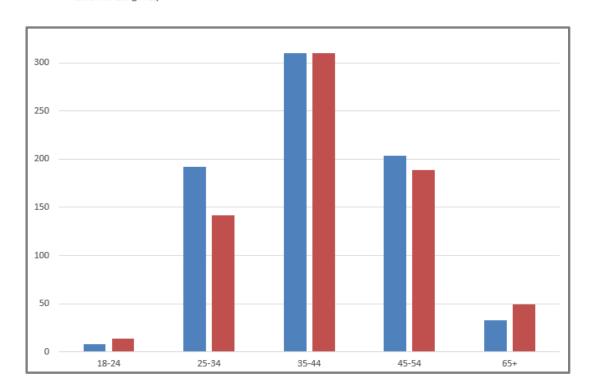
Note. Those participants in the Age category 45-54 reported the highest average Number of Low Attention Situations according to the Everyday Life Attention Scale.

Figure 4.

Frequency of Content Type viewed (Short-form or Long-form) by Age Group

Sum of Short Freq

Sum of Long Freq



Note. Participants in the Age category 45-54 also consumed more short-form content than long-form content, however, the difference was not significant.

#### Discussion

The aim of this study was to investigate whether frequent consumption of different forms of media online, more specifically short-form as compared with long-form, could have an effect on the level of attention required for everyday life tasks, and also whether age was a moderating factor. The first hypothesis that there would be a difference in Everyday Life Attention Scale scores based on the frequency of media type consumption (short-form | long-form) was not supported. The second hypothesis that there would be an interaction between frequently consumed media types (short-form | long-form) and Age on Everyday Life Attention Scale scores was also not supported.

This research suggests that individuals who consume short-form online media content more frequently than long-form online media content are no more or less likely to experience Low Attention Situations in Everyday life. The results of the current study are consistent with the findings of the laboratory tests of Ralph, Thomson, Cheyne & Smilek (2013) where it was found that high levels of media-multitasking did not affect sustained attention tasks in Everyday Life. Participants who reported consuming shortform online media more frequently than long-form online media registered fewer Low Attention Situations in Everyday life overall. These findings suggest that rapidly scrolling through media presented on Facebook or Twitter compared with immersion in a long newspaper article or white paper may not affect attention in the physical world. The findings were consistent with the claims of Cepeda, Kramer & Gonzalez de Sather (2001) that age should have an effect on attention in that there were more Low Attention Scenarios reported the older the participants were, except for the 65+ category which only had four participants and they reported some of the lowest scores overall. However, since the differences were not significant it seems as though it is not likely that one of the ways that older individuals must work on higher levels of attention is by limiting their consumption of short-form media as compared with long-form media. There is no way to know what the two participants in the 65+ category in this study were doing to maintain their low and relatively good ELAS scores.

There are several possible explanations consistent with previous research in attention that may account for the general outcomes overall; One possible rationalization is based on the premise that attention is highly contextual (Weinreich, Obendorf, Herder & Mayer, 2008; Elsen, Pieters, & Wedel, 2016). Even though an individual prefers to switch more rapidly from post to post when reading short-form media, behaviour in that context does not necessarily transfer outside that experience to other situations, like holding a conversation or listening to a lecture. There is a possibility that the consuming short-form media satiates an individual's need to consume many and varied amounts of information so that they might be able to settle their thoughts and attention for an appropriate length of time when they need to complete very different types of tasks. Outside the scope of this study exists the possibility that attention wanders while frequently spending time on the same online media consumption channel or within the same context.

In everyday life, there may be many more important factors influencing the ability to pay attention and focus for long periods compared with any possible effects of media consumption preference or habits, and even age. These factors may include motivation, personality, flow, enjoyment, perceived risk, social relationships or interaction, and presence. These days many people are developing their capacity for focus and attention through mindfulness practice (Brown & Ryan, 2003; Poissant, Mendrek, Talbot, Khoury, & Nolan, 2019; Mak, Whittingham, Cunnington & Boyd, 2018). Naturally, there may be other possible explanations as the measurement of attention is still a challenging and developing field.

This study may be one of the first to start to explore the idea that the form of online content could have an effect on attention in physical life everyday situations. Contrary to the findings of Ralph, Thomson, Cheyne & Smilek (2013) who found that media-multitasking was positively correlated to self-reported attentional failures and mind wandering, this study could make no such claims.

### Limitations

Given that the findings are based on a limited number of participants, the results from such analyses should, therefore, be treated with some caution, especially with regards to generalization because of under-representation of the overall population (Robson & McCartan, 2016). There are many factors and characteristics of the participants that were not specifically identified that could have a confounding effect on their ELAS results. For example, questions were not asked about their occupation or mindfulness practice.

One major drawback of the survey design was that frequency was characterized as the average number of days that short-form or long-form media was consumed during the previous two weeks, however, there was no measure for how often within those days that the different type of media was used. When a participant stated that they consumed long-form articles every day and short-form posts only three days a week it is unknown whether they read one long newspaper article every day but checked Facebook or Twitter one hundred times during those three days.

Gathering and analysing data utilizing a self-report survey questionnaire comes with numerous limitations. Participants may not be able to recall precisely or assess themselves accurately due to several biases including social acceptance, self-representation and self-perception. Surveys with scales can be especially subject to individual inclination to give an extreme or average response, and there may even be an influence based on what previous responses within the same questionnaire were (Garcia & Gustavson, 1997). Finally and most importantly, in this study, those people who volunteered to complete the survey were individuals who would be prepared to give the survey their attention for approximately ten to fifteen minutes already and so may not include a cohort who is particularly predisposed to difficulty with attentional control.

# Strengths

Despite the limitations of this study, the self-report survey technique did allow the rapid collection of data. Selection of ELAS as a measure is a strength of the current study because it has been previously shown to be a valid and reliable measure of attention. The survey allowed for an anonymous response which may promote truthful responses. The list-frequency technique allowed the researcher to divide the survey population into two relatively equal and balanced groups. The survey was completed by 96% of those who began the process which suggests a good survey design because participant fatigue was minimal. The design and methods were appropriate for the research question and consistent with initial research related to attention but investigating new areas of affect.

#### **Future Research**

Future studies on the topic are required to continue to investigate whether attention is affected by environmental or behavioural factors over time. One clear direction for future study would be to utilize the list-frequency technique to categorize individuals according to media type preference and frequency and then to use laboratory studies using behavioural measures of sustained attention as opposed to self-report measure. This might be achieved by designing an intervention or applying response tasks. Traditional laboratory tests offer more control (Robson & McCartan, 2016) however since attention can be influenced by many factors including motivation and enjoyment (Bruya, 2010) it would be challenging to account for the effect of the experiment environment itself. A mixed method study including self-report, attention response tasks, and a qualitative exploration would be useful to triangulate the data.

Further research on the ability to maintain attention while consuming the same type of media online, rather than looking for effects in a completely different situation or context, would help with understanding about whether there is a decline in

attention overall at all. For example, if an individual looks at Facebook or Twitter more frequently and for longer periods compared to another social media platform, do they tend to become more engrossed or more liable to distraction over time. Other important issues for future studies to resolve would be the effect of other variables such as gender, personality, occupation, and even mindfulness practice. The present study has focused on written forms of media, however, since audio and video media is growing in popularity it would also be useful to analyse preferences according to use of YouTube compared with watching movies and perhaps an equivalent comparison somehow related to audiobooks and podcasts.

#### Conclusion

The design and development of studies which deal with first defining "attention" and then measuring span and control in various contexts is challenging. Understanding of negative and positive environmental and behavioural factors on human attention is essential to avoid a 'race to the bottom' as media companies and technology developers cater for their consumer's preferences without necessarily considering the risks or benefits in the longer-term. The evidence from this study implies that frequent consumption of short-form or long-form online media makes no discernible difference to attention in everyday life situations when not online. The contribution of this study lies in raising awareness of the importance of assumptions related to attention and the need for further observation. The work has some limitations. Nevertheless, it could be a springboard for more comprehensive and broad research.

Current research and theories regarding attention are most useful in clinical diagnosis but do less to track decline over time, and do not adequately deal with aspects of modern online life such as multi-tasking and 'fear of missing out' when so much information and entertainment is only a click away. The present study did not have enough representative participants across the various Age range categories and subsequently it was not possible to make any broad inferences about the moderating

effect of age. Based on the results, the research question which considered whether type and frequency of content consumed was related to lower levels of attention in Everyday Life situations could be reconsidered to address the observation that attention is contextual. Perhaps a greater question would tackle declining or sustained levels of attention during continuous or frequent consumption of one type of online media, especially when other distractions or types of online media or temptingly close-at-hand. Self-report online survey studies are useful for challenging assumptions, however attention is such a fluid, important and difficult to define state that comprehensive future studies will likely demand inclusion of laboratory tests as well as qualitative exploration.

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# Appendix

- A. Ethics Form
- B. Participation information sheet
- C. Consent Form
- D. Debrief form
- E. Example ELAS Questions
- F. Example ELAS Scoring Form
- G. Example ELAS Results
- H. SPSS Output

# Appendix A: Ethics Form

# DEPARTMENT OF TECHNOLOGY AND PSYCHOLOGY ETHICAL APPROVAL FORM A

Title of project
The Effects of Online Media Consumption and Age on Attention:
An Online Survey in Ireland

Name of researcher
Ian Mcilwain

Email contact N00182584@student.iadt.ie

Name of supervisor Sinead Meade

Name	e of supervisor Sinead Meade				_
			Yes	No	N/A
1	Will you describe the main research so that they are informed about what	procedures to participants in advance, to expect?	Х		
2	Will you tell participants that their p		Х		
3	Will you obtain written consent for p 'ticked' consent form)?	participation (through a signed or	х		
4	If the research is observational, will to being observed?			Х	
5	Will you tell participants that they m time and for any reason?	ay withdraw from the research at any	Х		
6	With questionnaires, will you give po questions they do not want to answer		Х		
7	Will you tell participants that their data and that, if published, it will not be iden		Х		
8	Will you debrief participants at the e them a brief explanation of the study	Х			
9	If your study involves people betwee that <u>passive</u> consent is obtained from consent obtained from both the child			Х	
10	If your study involves people under consent is obtained from parents/gua their nominee (such as a teacher) will collection period?	rdians <u>and</u> that a parent/guardian or			Х
11*	Does your study involve an external	agency (e.g. for recruitment)?		Х	
12	Is there any realistic risk of any parti or psychological distress or discomfo	cipants experiencing either physical		Х	
13	Does your project involve work with	animals?		X	
14	Do you plan to give individual feedb scores on any task or scale?	ack to participants regarding their		Х	
15	Does your study examine any sensiti religion, sexuality, alcohol, crime, dr	ve topics (such as, but not limited to, rugs, mental health, physical health)		Х	
16	Is your study designed to change the negative way (such as inducing aggre			Х	
17	Will your project involve deliberatel	v misleading participants in any way?		Х	
18	Do participants fall into any of the following special groups?	People with learning or communication difficulties		Х	
		Patients (either inpatient or outpatient)		Х	
		People in custody		x	

N00182584

Appendix B: Participation information sheet

Study Title: Short or Long-form online media consumption and attention in Everyday

Life

Invitation

You are being invited to consider taking part in the research study: Short or Long-form

online media consumption and attention in Everyday Life. This project is being

undertaken by Ian Mcilwain who is a student of Cyberpsychology at Institute of Art,

Design + Technology, Dún Laoghaire, Co. Dublin, Ireland

Purpose of the Research

To investigate the relationship between the type of online media that we consume

regularly and the effect on our attention in Everyday Life situations.

**Participant Information** 

Before you decide whether or not you wish to take part, it is important for you to

understand why this research is being done and what it will involve. Please take time to

read this information carefully and discuss it with friends and relatives if you wish. Ask

us if there is anything that is unclear or if you would like more information.

Do I have to take part?

You are free to decide whether you wish to take part or not. If you do decide to take

part you will be asked to notify your consent. You are free to withdraw from this study

at any time and without giving reasons.

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## If I take part, what do I have to do?

You will be asked to complete a two-part survey questionnaire which is comprised of roughly 60 questions and will take no more than 15 minutes.

#### How will information about me be used?

Data will be stored securely on a password protected computer and student server storage. The data will not be used at individual level. The data will be retained by the researcher for at least one year. If the research is to be published, most scientific journals require original data including survey results to be kept for 5 years.

#### Who will have access to information about me?

Survey Monkey according to their GDPR rules, terms and conditions, the researcher and supervisor at Dun Laoghaire Institute of Art, Design & Technology.

## What will happen to the results of the study?

The results will be used as part of a thesis submission for MSc Cyberpsychology in Dun Laoghaire Institute of Art, Design & Technology.

#### Who has reviewed the study?

This study has been approved by the Department of Technology and Psychology Ethics Committee (DTPEC).

#### What if there is a problem?

If you have a concern about any aspect of this study, you may wish to speak to the researcher(s) who will do their best to answer your questions. You should contact Ian Mcilwain email N00182584@student.iadt.ie or their supervisor Sinead.meade@iadt.ie.

#### Contact for further information

Researcher Ian McIlwain N00182584@student.iadt.ie

# Thank you

Thanks for taking time to read the information sheet.

<Date>

Appendix C : Participant Consent Form

## **CONSENT FORM**

	Title of Project:	Short or Long-form onli	ne media consumption and
		attention in Everyday Li	fe
	Name of Researcher	<b>/s:</b> lan Mcilwain	
Please tick	box		
	I confirm that I have read		rmation sheet for the above
	I understand that my parat any time. I agree to take part in th		d that I am free to withdraw
	I understand that data consisted before it is submitt	ollected about me during ed for publication.	this study will be
Name of p	participant	Date	Signature

N00182584

Appendix D : Participant Debrief Form

Debrief

Thank you very much for taking part in this research study.

The study in which you just participated was designed to investigate the relationship between the type of online media that we consume regularly and the effect on our attention in Everyday Life situations.

If you have questions about this study or you wish to have your data removed from the study on <date> please contact me at the following e-mail address:

N00182584@student.iadt.ie

Alternatively, you may contact my supervisor, Sinead Meade at IADT, at sinead.meade@iadt.ie

We thank you sincerely for contributing and assure you that your data is confidential and anonymous, and if published the data will not be in any way identifiable as yours.

Thank you,

lan

#### Appendix E: ELAS Situational Questions

After each of the 9 Everyday Life situations is described ((i) Reading (ii) Watching a movie (iii) Indoor activity (iv) Attending a lecture (v) Having a conversation (vi) Working on an assignment (vii) Cooking (viii) Cleaning up at home (ix) Driving), the participant is asked to answer the following questions:

- Q1. How long can you carry this out without having a break (so without a break or mind wandering)? Please mark the correct number of minutes. Possible answers <Minute scale 0 to 120 in increments of 5>
- Q2. How well can you focus on this? Possible answers <Focus scale 0 to 100 in increments of 10, with guide provided as follows: 0=no focus on the task, 50=50% of your focus on the task, 100=100% of your focus on the task>
- Q3. How well can you focus on this if there is distraction around you (e.g., children playing)? Possible answers <Focus scale 0 to 100 in increments of 10, with guide provided as follows: 0=no focus on the task, 50=50% of your focus on the task, 100=100% of your focus on the task>
- Q4. How well can you concentrate on this if you have to do something else at the same time (e.g., texting a friend)? Possible answers < Concentration scale 0 to 100 in increments of 10, with guide provided as follows: 0=no concentration on the task, 50=50% of your concentration on the task, 100=100% of your concentration on the task>
- Q5. How motivated are you to perform the task well (so to take in all the details)? Possible answers <Motivation scale 0 to 100 in increments of 10, with guide provided as follows: 0=no motivation to perform well, 50=50% motivated to perform the task, 100=100% motivated to perform the task>

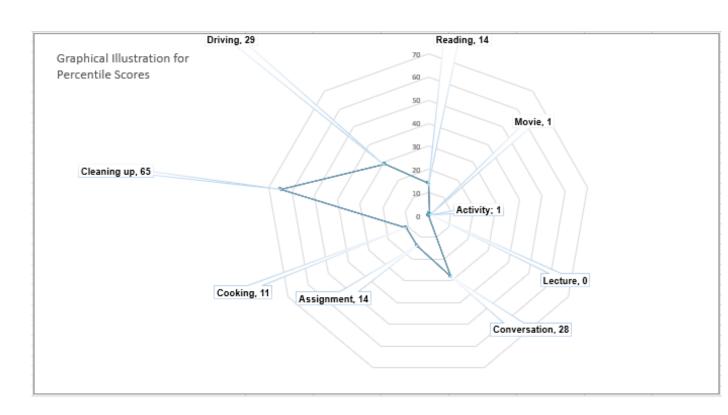
Appendix F: Example of ELAS Scoring Form for each participant

	Patient characteristics		ELAS observed scores
	(FILL IN)	ELAS item#	(FILL IN)
Age (in years)	36	A1	30
Gender (female = 1; male = 2)	2	A2	70
Education <sup>1</sup> (Low = 1; Med = 2; High = 3)	3	A3	10
		A4	70
		B1	45
<sup>1</sup> International Standard Classification of Education (ISCED; UNESC	O, 1997):	B2	70
Low: Primary education		B3	30
Medium: Lower and upper secondary, postsecondary		B4	10
High: Tertiary education		B5	20
		C1	35
		C2	60
		C3	30
		C4	10
		C5	10
		D1 D2	0
		D3	0
		D4	0
		D5	0
		E1	45
		E2	70
		E3	30
		E4	70
		E5	50
		F1	75
		F2	70
		F3	10
		F4	20
		F5	70
		G1	70
		G2	20
		G3	70
		G4	80
		H1	95
		H2	100
		Н3	40
		H4	80
		H5	80
		l1	80
		12	80
		13 14	40 80
		15	100
		ıɔ	100

Appendix G: Example of ELAS Scoring Form Results

	Α	В	С	D	E	F	G	Н	ı
ELAS scale scores	Reading	Movie	Activity	Lecture	Conversation	Assignment	Cooking	Cleaning up	Driving
Observed score	43.75	33.5	27.833	0	51.5	46.5	60	75.83333	73.333
Predicted score	66.072	73.35	70.603	58.186	63.006	67.168	78.824	67.972	82.446
Z score	-1.076	-2.35	-2.417	-3.3680	-0.575	-1.095	-1.232	0.393	-0.5654
T score	39	26	26	16	44	39	38	54	-0.3034
Percentile	14	1	1	0	28	14	11	65	29

Number of Low Attention Situations (NLAS)



# Appendix H: SPSS Output

# Univariate Analysis of Variance Univariate Analysis of Variance - Between-Subjects Factors

Between-Subjects Factors

		N
Age Group	0	2
	1	12
	2	30
	3	13
	4	4
Short or Long Preference	1	34
	2	27

## **Descriptive Statistics**

Dependent Variable: NLAS #

Age Group	Short or Long Preference	Mean	Std. Deviation	N
0	1	3.00		1
Ĭ	2	1.00		1
	Total	2.00	1.414	2
1	1	1.89	1.414	9
, ·	2			
		1.67	1.528	3
	Total	1.83	1.115	12
2	1	2.07	1.335	15
	2	2.27	2.052	15
	Total	2.17	1.704	30
3	1	2.13	2.167	8
	2	2.80	2.775	5
	Total	2.38	2.329	13
4	1	1.00		1
	2	2.33	2.082	3
	Total	2.00	1.826	4
Total	1	2.03	1.446	34
	2	2.26	2.030	27
	Total	2.13	1.717	61

Levene's Test of Equality of Error Variancesa,b

		Levene Statistic	df1	df2	Sig.
NLAS #	Based on Mean	1.854	6	51	.107
	Based on Median	1.444	6	51	.216
	Based on Median and with adjusted df	1.444	6	42.241	.221
	Based on trimmed mean	1.746	6	51	.129

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

- a. Dependent variable: NLAS #
- b. Design: Intercept + AgeGroup + ShortorLong + AgeGroup \* ShortorLong

Tests of Between-Subjects Effects

Dependent Variable: NLAS #

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	7.187 <sup>a</sup>	9	.799	.240	.987	.041
Intercept	95.822	1	95.822	28.786	.000	.361
AgeGroup	3.193	4	.798	.240	.914	.018
ShortorLong	4.554E- 5	1	4.554E- 5	.000	.997	.000
AgeGroup * ShortorLong	4.474	4	1.118	.336	.852	.026
Error	169.764	51	3.329			
Total	454.000	61				
Corrected Total	176.951	60				

a. R Squared = .041 (Adjusted R Squared = -.129)

**Multiple Comparisons** 

Dependent Variable: NLAS # Tukey HSD

(I)	(J)	Mean			95% Cor Inte	
Age Group	Age Group	Difference (I-J)	Std. Error	Sig.	Lower Bound	Upper Bound
0	1	.17	1.393	1.000	-3.77	4.11
	2	17	1.332	1.000	-3.93	3.60
	3	38	1.386	.999	-4.30	3.53
	4	.00	1.580	1.000	-4.47	4.47
1	0	17	1.393	1.000	-4.11	3.77
	2	33	.623	.983	-2.10	1.43
	3	55	.730	.942	-2.62	1.51
	4	17	1.053	1.000	-3.15	2.81
2	0	.17	1.332	1.000	-3.60	3.93
	1	.33	.623	.983	-1.43	2.10
	3	22	.606	.996	-1.93	1.50
	4	.17	.971	1.000	-2.58	2.91
3	0	.38	1.386	.999	-3.53	4.30
	1	.55	.730	.942	-1.51	2.62
	2	.22	.606	.996	-1.50	1.93
	4	.38	1.043	.996	-2.57	3.33
4	0	.00	1.580	1.000	-4.47	4.47
	1	.17	1.053	1.000	-2.81	3.15
	2	17	.971	1.000	-2.91	2.58
	3	38	1.043	.996	-3.33	2.57

Based on observed means.
The error term is Mean Square(Error) = 3.329.

NLAS#

Tukey HSDa,b,c

Age		Subset
Group	N	1
1	12	1.83
0	2	2.00
4	4	2.00
2	30	2.17
3	13	2.38
Sig.		.988

Means for groups in homogeneous subsets are displayed.

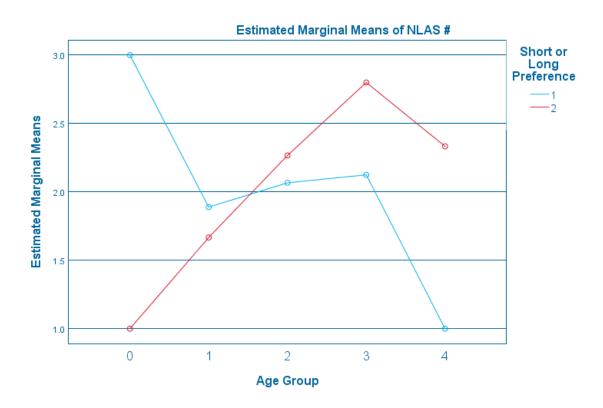
Based on observed means.

The error term is Mean Square(Error) = 3.329.

a. Uses Harmonic Mean Sample Size = 5.299.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

c. Alpha = .05.



# T-Test

T-Test - Group Statistics - March 29, 2020

#### **Group Statistics**

Short or Long Preference	N	Mean	Std. Deviation	Std. Error Mean
NLAS# 1	34	2.03	1.446	.248
2	27	2.26	2.030	.391

T-Test - Independent Samples Test - March 29, 2020

#### Independent Samples Test

			for Equality of nces				t-test for Equality	of Means		
							Mean	Std. Error	95% Confidence Differ	
		F	Sig.	t	df	Sig. (2-tailed)	Difference	Difference	Lower	Upper
NLAS#	# Equal variances assumed Equal variances not assumed	5.501	.022	516 497	59 45.357	.608 .622	230 230	.445 .463	-1.121 -1.162	.661 .702

# Regression

Regression - Model Summary - March 29, 2020

## **Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.272ª	.074	090	1.793

a. Predictors: (Constant), Physical reading, Instagram, Twitter, Pinterest, Whitepapers, blogs or knowledge repository (Eg. Wikipedia), TV media outlet (Eg. CNN, RTE, BBC), Newspaper publisher (Eg. economist.com, nytimes.com), News content aggregator (Reddit, Flipboard), Facebook

**ANOVA**<sup>a</sup>

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	13.049	9	1.450	.451	.900 <sup>b</sup>
Residual	163.901	51	3.214		
Total	176.951	60			

a. Dependent Variable: NLAS #

Coefficients<sup>a</sup>

	Unstandardized Coefficients		Standardized Coefficients		
Model	В	Std. Error	Beta	t	Sig.
1 (Constant)	2.323	.758		3.064	.003
Twitter	.023	.086	.039	.269	.789
Instagram	097	.094	180	-1.028	.309
Facebook	.005	.101	.009	.053	.958
Pinterest	214	.171	178	-1.253	.216
Newspaper publisher (Eg. economist.com, nytimes.com)	.025	.093	.042	.273	.786
TV media outlet (Eg. CNN, RTE, BBC)	.047	.095	.071	.488	.627
News content aggregator (Reddit, Flipboard)	044	.123	054	361	.720
Whitepapers, blogs or knowledge repository (Eg. Wikipedia)	.054	.128	.065	.423	.674
Physical reading	160	.549	042	291	.772

a. Dependent Variable: NLAS#

b. Predictors: (Constant), Physical reading, Instagram, Twitter, Pinterest, Whitepapers, blogs or knowledge repository (Eg. Wikipedia), TV media outlet (Eg. CNN, RTE, BBC), Newspaper publisher (Eg. economist.com, nytimes.com), News content aggregator (Reddit, Flipboard), Facebook