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A Cross-Cultural Study on the Relationship Between Environmental Awareness and Social Media Use: Saudi Arabia vs United States

Mohammed Alsahafi
University of Missouri-St. Louis, maanht@umsystem.edu

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Mohammed Alsahafi

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Advisory Committee

Yan Tian, Ph.D.
Chairperson

Amber Reinhart, Ph.D.

Stephanie Van Stee, Ph.D.

Abstract

For many countries today, environmental sustainability is a subject of concern, and the world has witnessed the rise of environmental activism in recent years. Social media is increasingly being used by relevant stakeholders to raise environmental awareness. This study explores the relationship between social media use and environmental awareness from a cross-cultural perspective. Building upon previous research, this study compares social media use, environmental awareness, and their relationship between Saudi Arabian and American college students. Survey data was collected from a convenient sample of 266 Saudi Arabian and 290 American college students on their use of Facebook, Twitter, and Instagram as well as on their environmental awareness levels. Analysis of the survey data indicated that American college students spend more time on Facebook than Saudi Arabian college students, while Saudi Arabian students spend more time on Instagram and Twitter than their American counterparts. At the same time, American college students were found to have higher levels of environmental awareness than Saudi Arabian students. Furthermore, the results suggested that more social media use is not associated with higher environmental awareness levels in either country. Theoretical and practical implications of the findings are discussed.

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Introduction

Environmental issues, such as global warming, climate change, and the recent Amazon fire, are increasingly becoming a subject of concern for many countries and to the global community as a whole (Stylianou et al., 2019; UN, 2019; UN-DESA, 2013). Issues like these have amplified the societal pressure to create awareness on environmental issues. Individuals, as well as numerous organizations, have embraced the concept of earth stewardship in an effort to promote environmentally friendly and sustainable practices besides increasing disaster awareness (Narula et al., 2018).

Environmental awareness campaigns target the opinions, attitudes, and behaviors of individuals to provide knowledge and skills necessary to minimize adverse human impacts on the environment. In the past, print media, as well as broadcast media, have played a crucial role in creating environmental awareness. For example, Lokhandwala et al. (2010) note that the Green Ad campaign started by the Guardian Newspaper in the UK with the aim of building a more sustainable future through advertising, within three years from its launch in 2007, grew to include up to 110 partner sites and 75 green websites that were able to reach even more people. Also, television stations such as the National Geographic and CNBC Arabia are credited with "sowing seedings of environmental reporting" in the Gulf region that make businesses more conscious of how their actions affect the environment (Lokhandwala et al., 2010, p. 7). Moreover, in Romania, B1 Television in conjunction with their government, helped coordinate and promote proper disposal of electronic wastes, and in Nepal the Environmental Cycle Radio was a

significant voice in creation of community awareness of the human actions responsible for pollution and degradation of the Himalayas (Lokhandwala et al., 2010). Furthermore, the exponential growth in adoption of social media in the world, has facilitated the incorporation of social media as one of the tools for disseminating information by environmental activists (Tlebere et al., 2015).

In Saudi Arabia, both the government and non-governmental organizations are committed to building a holistic, inclusive, and sustainable society (Alshuwaikhat & Mohammed, 2017). One of the key ways of achieving that is through environmental sustainability. In fact, this is clearly explicated in the country's 2020 National Transformation Program (NTP) and vision 2030 (Alshuwaikhat & Mohammed, 2017). Multiple measures, including the use of media, have thus been taken into consideration to promote better environmental practices among Saudi Arabians. This study, therefore, intends to understand the relationship between the use of social media and environmental awareness, by comparing Saudi and U.S. college students. It is particularly important to consider college students' environmental awareness levels because their attitude and behavior will be expressed in their leadership as they replace the older generation in becoming global and national leaders in spearheading environmental stewardship and sustainability (Wray-Lake et al., 2010).

To understand the relationship between social media use and environmental awareness in this context, the agenda setting theory is used. Similarly, cross-cultural communication theories will provide cultural dimensions that will help explain differences that may exist in social media use and environmental awareness between Saudi Arabia and the United States.

Literature Review

Saudi Arabia on Environmental Conservation

Sustainability has become a principal interest in our society today. Among the core pillars of sustainability are individuals, people, groups, organizations, and communities. These are the entities that are capable of producing both material and immaterial cultural and dynamic expressions that tend to affect the well-being of the society. Civil societies, organizations and social movements are able to create patterns across the world that either play the role of obstruction or support of sustainable development (Al Surf & Mostafa, 2017).

Saudi Arabia is predominantly a semi-arid to hyper-arid land often with low rainfall and very high levels of evapotranspiration (Darfaoui & Al Assiri, 2017). Consequentially, the land is characterized by scarcity of water and minimal vegetation cover. Estimates reveal that only 2% of the country is naturally arable. Moreover, there is a worrisome trend of general warming in Saudi Arabia by approximately 0.40°C annually especially in the interior parts of the country (Cruz et al., 2017). Based on these trends, the General Circulation Model (GCM) estimates that the warming in Saudi Arabia by 2041 will be higher than the global average (Darfaoui & Al Assiri, 2017).

It is also worth noting that Saudi Arabia is a major oil and gas producer from which the country generates a significant amount of revenue. Ironically, the same energy sector is contributing the highest amount of CO_2 in the air of about 90% of the total CO_2 emission in the country (Darfaoui & Al Assiri, 2017). This is followed by the industrial

sector and the agricultural sector which contribute 8% and 2% respectively (Darfaoui & Al Assiri, 2017).

It is no surprise, therefore, that the UN Environment and Saudi Arabia's Ministry of Environment in 2019 signed an agreement to fortify environmental protection in the country (UN Environment, 2019). This arrangement was supposed to ensure that better data and information systems are in place to enhance the capacity of the country in monitoring and addressing the environmental challenges that they are facing. The environmental challenges include air pollution, water scarcity, climate change, and waste management.

Prior to the 2019 agreement between UN Environment and Saudi Arabia, the country had a well-outlined plan for achieving wholistic and balanced socio-economic development quality (Alshuwaikhat & Mohammed, 2017; UN Environment, 2019). This plan was delineated in the country's 2030 vision and 2020 National Transformation Plan (NTP). A significant component of the proposal was to have a clean environment. Clean environment, in this case, was defined by the air quality, land quality, and surface water quality (Alshuwaikhat & Mohammed, 2017). The three aforementioned factors play a momentous role in ensuring human well-being, proper crop and livestock production, as well as environmental health and, will subsequently improve the social and economic development of the country (Cruz et al., 2018).

Based on the vision, there is a general plan to increase the efficacy of waste management, to promote recycling and to reduce all forms of pollution, both domestic and industrial (Alshuwaikhat & Mohammed, 2017). Moreover, in Saudi Arabian cities, the Ministry of Municipal and Rural Affairs is resolute in keeping Saudi cities clean. As a

matter of fact, by 2020, the ministry intends to have improved cleanliness satisfaction from 40% to 70% and waste management and recycling from 15% to 40% (Alshuwaikhat & Mohammed, 2017). An examination carried out in 2016 on how achievable the 2020 NTP and 2030 vision revealed that the feasibility of the plans depended on "active involvement and empowerment of relevant stakeholders at all levels" (Alshuwaikhat & Mohammed, 2017, p. 1). Also, McCarthy and Burke (2017) note that everyone needs to be involved in the conservation and protection of the environment whether directly or indirectly. At the same time, engagement of people at the individual level is important because households alone contribute 19% of the global greenhouse gas emission (Fernandez et al., 2017).

For everyone to be involved in environmental protection and conservation, environmental awareness is key. Although the concept of environmental awareness brings a similarly intuitive meaning to most people, Ham et al. (2016) acknowledge that there is no set universal definition for the term. Different terminologies, such as environmental consciousness and environmental concern, have been used in multiple literatures to define the same concept. However, according to Ali (2015), environmental awareness can be defined as an understanding and consciousness of the natural environment, inclusive of its benefits to people and the threats it faces from human interaction. One of the ways to create environmental awareness is through the media. Below, the agenda setting theory is used to explain how the media can be used to influence masses on various issues.

Agenda Setting Theory

The agenda-setting theory describes the capability of media to influence the importance of topics on the public agenda (McCombs & Shaw, 1972). The theory explains that the media tells people what they should think about instead of what they think. The media does this through the frequency of the coverage of a certain item and the prominence placed on it. The audience will regard issues that are covered more frequently and more prominently as being more important.

The agenda-setting theory explains the relationship between how mass media puts emphasis on issues and how the public reacts to the issues. It takes into consideration the cognitive aspects of information delivery to the audience. Although the media does not tell people what to think, it tells them what to think about (Shaw, 1979). Through the concepts of framing and priming, the media will directly or indirectly influence how the audience feel or consider the agenda (Balmas & Sheafer, 2010). The media is thus considered responsible for shaping and influencing public opinion or agenda.

The first empirical test on agenda setting was carried out in North Carolina by McCombs and Shaw (McCombs & Shaw, 1972). They designed a study to examine the effect of election news coverage on public perception of the importance of certain political issues. The results of the study revealed a strong correlation between public perception and news. The public termed the most significant issues to be what was reported as most critical by the media. Although correlation had been established, causation had not been confirmed. A second test study was carried out later and causation was established. The public agenda was hence a virtual reflection of the media agenda, and the process was labeled ‘transfer of salience’ (Zhu & Blood, 1996). It was concluded

that the mass media sets an agenda of what the public should care about. Through the first level and the second level of agenda-setting, the media can both dictate “what to think about” and “how to think about” issues respectively (Balmas & Sheafer, 2010).

With the advent of technology, apart from television, newspapers and radio broadcast, social media is now also being considered a tool for agenda-setting in many areas including in environmental matters (De Choudhury et al., 2016; Feezell, 2017; Fernandez, et al., 2017; Zhang & Skoric, 2018). According to Shanahan (2011), people need television, newspapers, radio, the internet, and mobile phones for informative segments that would help them make household-level and global-level decisions regarding climate change. Multiple studies have consequently examined social media use in relation to environmental awareness. For example, in analyzing social media behavioral and environmental awareness patterns on Twitter based on Earth Hour 2016, Earth Hour 2015, and United Nations COP21, Fernandez et al. (2017) note that although these online environmental awareness campaigns had large public reaches, more tactful approaches are required in order to improve their public engagement and participation. This implied that the application of agenda setting theory on social media is not just about presenting information to the public and expecting that they would be influenced but also having a good grasp on the users’ needs and situations so as to have more targeted strategies. Also, Tlebere, et al. (2015) use examples of successful environmental awareness campaigns carried out on social media including the Hurricane Harvey fundraiser, black Friday donation, adopt the planet, the endangered emoji, and the 350.org campaign among other campaigns to demonstrate how the government, public organizations, and private organizations effectively use social media to facilitate

environmental democracy. They argue that social media allows its users to exercise three fundamental rights -the right to access information, access justice, and citizen participation- which are necessary in exercising environmental democracy. Environmental democracy in this context is defined as a set of standards that guide how environmental matters are handled including access to environmental information, creation and enforcement of environmental laws, and compensation or charges that accompany failure to comply to the standards. In investigating the patterns of attitudes, behavior, and beliefs over three decades in the United States, Wray-Lake et al. (2010) used a sample representative of adolescents in high school to offer unique insights into environmental awareness levels among young people. They use a series of questions to determine the conservational behavior, personal responsibility for the environment, belief of resource scarcity, perspective on governmental responsibility towards the environment, and attitude towards pollution among adolescents. A limitation of this study is the use of respondents' opinions to gauge their environmental awareness. The article explains that people's opinions usually change therefore errors might have been introduced. Correspondingly, Gwon and Jeong (2018) using data from multiple databases, identified the main attributes that make adolescents change their mind often. This, as Gwon and Jeong (2018) explained, included factors such as sensitivity to stimuli, immaturity, failure to make independent judgement, absorbency learning, imitation of others, ease of influence by external stimuli, susceptibility to public concerns, flexibility, malleability, openness, adaptability and plasticity. To avoid introducing errors in the study because of the often-changing stance of the sample representative as explained by Gwon and Jeong (2018) as well as Wray-Lake et al. (2010), this study will use college

students as a sample. College students are older hence they are expected to have a firmer stance and be less susceptible to public concerns as compared to high school students (Gwon & Jeong, 2018; Wray-Lake et al., (2010).

In an empirical research study examining how the use of media (both traditional and social media) affect environmental activism and consumerism and the implications of media on environmental group members and nonmembers in Hong Kong, results reveal a positive correlation between media and environmental activism (Zhang & Skoric, 2018). For social media, in particular, it was evident that most users' objective for having the application was for political and relational reasons. Influence of pro-environmental messages was thus much higher for social media users who were part of environmental groups than those who belonged to no environmental groups. A different study by Fernandez et al. (2017) also notes that during environmental campaigns on social media, it is often difficult to determine whether it is actually citizens who are unacquainted on environmental matters or if it is people who are part of the organizations carrying out campaigns that are being engaged. To overcome this limitation during data collection, in choosing respondents, regardless of the sampling method, the respondents are supposed to be from all walks of life and with different interests and experiences so that the chances of having the majority of the respondents being pro environmentalists is minimized. Any group of people who are likely environmentalists are not chosen to be respondents.

In a different study, Alhaddad (2018) explores the use of social media applications among Saudi Arabians. He states that WhatsApp, Facebook, Twitter, YouTube, Instagram, and Snapchat are the most popular social media applications. At the

same time, the same social media applications are very popular among Americans (Shensa et al., 2018). This study will use these popular social media applications to compare the environmental awareness levels of Saudi Arabians and Americans based on the frequency of use of the platforms. The frequency of social media use can be defined as how often an individual uses different social media platforms (Cha, 2010).

When creating environmental awareness using social media, the agenda at hand is to ensure that the target audience is equipped with knowledge that will help them make a positive impact on the environment through the adoption of specified approaches. The relevant stakeholders always want to relay the information in a manner that the audience's opinion will be influenced regardless of the audience's mindset or bias and to cause change in a wider social context. Given that social media is already being used to create awareness on environmental issues, an analysis of the impact made through social media will give insights into the extent to which it is effective in the Saudi society. Moreover, this research study, unlike previous studies, will offer a unique perspective into the environmental awareness levels in the Saudi Arabian society by making a comparison with the American society.

Cross-cultural Communication Theories

Cross-cultural theories explain matters related to cross-cultural research. Cross-cultural research has to do with comparing and contrasting people's communication across different cultures (Merkin, 2017). It also explains the consequences of the differences brought about by the stated differences in terms of social experience, behavior, family life, education and other areas (Merkin, 2017). This research study uses

Schwartz theory of basic values as well as Hofstede's theoretical framework to explain cultural differences.

Through comparative studies, the effects of factors associated with certain values or behavior can be understood better. Previous research has demonstrated that cultural differences between countries have an effect on the implementation as well as acceptance of information and communication technologies (Alarcon-del-Amo et al., 2015). A country's culture is often defined to mean a set of shared values that underpin social perceptions, attitudes, preferences and behavioral retorts (Alarcon-del-Amo et al., 2015; Merkin, 2017; Schwartz, 1992). Often, in cross-cultural research, Hofstede's cultural dimensions and Schwartz's theory of basic values form part of the theoretical framework (Alarcon-del-Amo et al., 2015; Jippes & Majoor, 2011; Schwartz, 2012).

Schwartz theory of basic values on cross-cultural studies.

According to Schwartz, "values are critical motivators of behavior and attitudes" (Schwartz, 2012, p. 17). This conclusion forms a basis for why cultural values are said to influence behavior of people in a specified locality. Dornhoff et al. (2019) also mention that values are related to human behavior in general and environmental awareness. They explain that "values are becoming increasingly significant worldwide in preserving biodiversity" (Dornhoff et al., 2019, p. 2).

Schwartz (2012) elucidates that values can be used in cross-cultural studies since they are common in different countries. The self-transcendence values (universalism and benevolence) in Schwartz's model are particularly applicable to this study. The goals of self-transcendence are enhancing and protecting the welfare of others and nature

(Schwartz, 2012). Therefore, societies that value self-transcendence over self-enhancement (achievement and power) are expected to be more environmentally aware and practice pro-environmental behavior since it will benefit other people and the natural environment. Moreover, previous studies have shown that self-enhancement is positively correlated with egoistic environmental concerns but negatively correlated with biospheric and altruistic concerns (Dornhoff et al., 2019). Given that Saudi Arabia has higher levels of self-transcendence in comparison to the United States (Hofstede Insights, 2019), it is thus expected that Saudi Arabians are more environmentally aware than Americans.

While such deductions were made on communication in a face-to-face context, the vast growth of information and communication technologies has broadened the application of cross-cultural communication theories. Alarcon-del-Amo et al. (2015) argue that with technology it is easier than before to collect and analyze effects of culture on behavior with more detail. Furthermore, many scholars agree that information technologies and applications encompass the definition of interactive space and thus behavior can be assessed (Alarcon-del-Amo et al., 2015).

Nalewajek et al. (2013) explain that certain features of social media, especially those that relate to lifestyle and fashion, fulfill hedonistic needs. Their empirical research carried out on Facebook and Pinterest reveal that social media usage, particularly among young people, promote hedonistic values and attitudes. Hedonism is one of the ten values in Schwartz's theory that is concerned with pleasure, sensuous gratification for oneself and enjoyment of life (Schwartz, 2012). Dornhoff et al. (2019) elucidate that hedonism, which forms part of self enhancement values, is positively related to egoistic environmental concerns. Additionally, Steg et al. (2014) note that hedonism significantly

and negatively relates to environmental concerns. It can thus be inferred from Steg et al. (2019) and Nalewajek et al. (2013) studies that social media use is negatively related to environmental concerns.

Social media sites offer users with a platform where they can create their profile and social links to other people among other features. Through posts, e-mail and instant messages, interaction among users on the platform is possible. Features such as place of residence, school year, place of work and a recommendation system on who to interact with make social media a communal platform. Apart from these, there are three other reasons why analysis of interaction on social media is particularly relevant. First, through conversations, on posts or private messages, individuals tend to influence each other on various matters including cultural ones (Feezell, 2017; Fernandez, et al., 2017). Secondly, the attitude, behavior and profiling of social media users can be done (Cruz et al., 2018; De Choudhury et al., 2016). Lastly, emotional connections, a sense of belonging, and loyalty can come out from an audience if posts are carefully curated (Ceron et al., 2016).

Hofstede's theoretical framework.

In the 1970's Hofstede carried out a survey among employees of IBM in 80 countries across the world. The aim of the research carried out by Hofstede was to understand how the employees in different countries perceived the organizational culture (Hofstede, 2011). The research was based on the supposition that each country has one culture, the results of the research are hence widely applicable. Hofstede defined culture as a set of programming of the mind that differentiates individuals in one group from another (Hofstede, 2001). He outlined six dimensions of culture that influence behavior and perceptions: individualism/ collectivism, power distance, uncertainty avoidance,

masculinity/ femininity, long-term versus short-term orientation and indulgence/ restraint. The significance of each dimension in each country varies.

According to Hofstede (2001), power distance defines the extent to which those who are less powerful in a country accept that power distribution is unequal. Individualism relates to the looseness of relationships between persons in a country such that people look only after themselves and their close family. Collectivism, on the other hand, relates to how persons from birth onwards form part of strong and cohesive groups in the society that offer them a sense of security as long as they continue being loyal to the groups. A low score on collectivism indicates individualism and a low score on individualism indicates collectivism. Like collectivism and individualism, masculinity and femininity, on a sliding scale, a low score on one indicates a high score of the other. Masculinity/ femininity pertains to a state where gender roles are distinct. For instance, a situation where men are supposed to be bold, focused on material success, and self-assured whereas women are supposed to be tender, modest, and are more concerned with the quality of life, masculinity is dominant. Contrary, when femininity is dominant, gender roles overlap. Uncertainty avoidance defines the degree to which people in a society are threatened by unknown eventualities. This is often reflected by the need for predictability often through written or unwritten rules. Long term orientation describes how each society maintains links with its past when handling the current and future challenges. Societies that score high on the long-term orientation, for example, have a preference for rooting their decisions in the past, viewing change as suspicious. Those that have a low score on long term orientation, take a more pragmatic approach to decision making. Lastly, the indulgence versus restraint dimension explains the degree to

which people put their desires and impulses in check. Indulgence means people in a society have a rather weak control over their urges while restraint means people have sturdy control over their urges.

When a comparison of the extent of each of the six dimensions is done between Saudi Arabia and the United States, as shown in Figure B1 in the appendix, there are disparities. The difference is significant in power distance, individualism and uncertainty avoidance with more than 30% variance. Saudi Arabia has a score of 95 on power distance, indicating that citizens of the country accept the hierarchical order that is in place without the need for a justification (Hofstede, 2001). On the other hand, the score for the same dimension in the United States is 40. The low score can likely be explained by the American premise of 'liberty and justice for all' (Connerly, 1996). A high power distance score is associated with low levels of environmental consciousness (Nagy & Konyha, 2018). As Nagy and Konyha (2018) explain, this is based on the fact that countries with outstanding performance on sustainability rankings such as the Scandinavian countries including Denmark, Sweden, Finland and Iceland have a low power distance index. It is, therefore, expected that the United States demonstrates a higher environmental awareness level than Saudi Arabia. On the other hand, Dadgar et al. (2017) explain that a high power distance society is associated with people who are more task oriented and less open about their feelings. Social media thus provides persons in such a society a platform where they can promote their way of thinking. As such, high power distance is associated with higher levels of social media usage. Based on the scores, it is expected that the level of social media use in Saudi Arabia is higher than in the United States. On the contrary, a different study explains that there exists a negative

relationship between high power distance and use of communication technology (Valaei et al., 2016). Based on the study by Valaei et al. (2016) and the estimated power scores (Hofstede Insights, 2019), then social media use is expected to be higher in the United States. Valaei et al. (2016) go further and explain that a low power distance encourages development which in this case would imply that development in the United States is higher. However, Valaei et al. (2016) also mention that there are numerous inconsistencies among scholars with regards to application of the concept of power distance in communication technology. Given that scholars have mixed viewpoints on how cultural dimensions affect environmental awareness, this is an area of greater exploration.

Saudi Arabia's score on individualism is low (25). This implies that the Saudi Arabian society is mostly defined by close knit relationships defined by loyalty (Hofstede, 2001). A 91 score on individualism in the United States depicts a society in which people are self-reliant and the relationships between individuals are not very strong. Individualism is negatively related to environmental consciousness (Nagy & Konyha, 2018). Based on the individualism scores, Saudi Arabia is expected to have higher levels of environmental awareness. High levels of individualism, on the other hand, is associated with low levels of social media use (Dadgar et al., 2017). Based on the individualism-collectivism score, United States is, thus, expected to have lower levels of social media use in comparison to Saudi Arabia.

On uncertainty avoidance, the United States has a score of 46. This means that Americans are both impacted by culture when making decisions and are also pragmatic since 46 is a fairly moderate score. New ideas, products, and technology are hence to a

fair degree accepted and adopted by Americans (Hermeking, 2005). On the other hand, Saudi Arabia scores 80 on uncertainty avoidance. This is a quite high score. It implies that most people in Saudi Arabia stick to certain beliefs and behavior and are not very receptive to eccentric ideas and behavior. A low score on uncertainty avoidance should consequently mean adoption and use of technology is more prevalent. United States is hence likely to have higher level of social media use. However, when it comes to environmental awareness, Nagy and Konyha (2018) note that the relationship between environmental awareness and uncertainty is insignificant. For masculinity, long term orientation, and indulgence, a difference in each score between the two countries exist but the variations are not as substantial as power distance, individualism, and uncertainty avoidance.

As explained by Hofstede (2011), these dimensions underpin social perceptions, attitudes, preferences, and behavioral responses. The difference in the scores thus implies that there might be a difference in attitudes, adoption and use of social media networks. Alarcon-del-Amo et al. (2015) also backs up the idea that cultural differences between countries cause a difference in information and communication technologies adoption and use including social media. Hermeking (2005) in his research on cross culture marketing, explains that the internet does not eliminate cultural differences that exist in countries. He argues that the internet like traditional media has different rates of adoption and use.

Often, cross-cultural research is done in psychology, medicine, sociology, and marketing (Hanel, et al., 2018). For example, Hermeking (2005), applies cross-cultural research to shed light on how international businesses can improve their profitability by

taking into consideration cultural differences in different countries such that they do not do homogenous marketing or make homogenous product where applicable. Santoso and Schrepp (2019), based on Hosftede's dimensions, conducted a comparative study between Germany and Indonesia software users to determine if cultural differences played a role in the subjective user experience. Their study revealed that users from different cultures placed importance on the user experience based on their culture and hence the findings encourage software developers to take into consideration cultural differences of their customer base when designing their products. Similarly, in a study to understand the influence of national culture on the espousal of integrated medical curricula, Jippes and Majoor (2011) investigated 1195 medical schools in 63 countries. The results of the study revealed that a high score on power distance and uncertainty avoidance was associated with adoption of the new curricula. Jippes and Majoor (2011) hence recommended that various countries shift their attention to the dimensions of national culture that may deter innovation and development.

In some cases, however, cross-cultural research has been conducted to assess environmental conservation of people in different countries. For example, Hannel et al. (2018) examine how cultural differences affect different factors in the United Kingdom, India and Brazil. Among the factors that they consider is what protection of the environment meant in different cultures. The results reveal that different nations can hold the same abstract meaning of values and importance; however, their behavior vary depending on their cultures. Hannel et al. (2018) explains that if for instance a Briton, an Indian and a Brazilian were to talk about protecting the environment, they will likely not be in agreement, not because they do not contribute towards environmental conservation,

but because they have different understandings. They elucidate that while protecting the environment for instance might mean reducing carbon emissions to a Briton, to an Indian or a Brazilian, it might mean not littering the towns. This inference is consistent with the laws of the countries and politics. The study shows that Britain, India and Brazil all value environmental conservation, however, when it comes to behaviors that demonstrate environmental protection, each has a varied concept.

In related research, Dornhoff et al., (2019) examine nature relatedness and environmental concerns among young people in Ecuador and in Germany. Dornhoff et al. (2019) note that nature relatedness and environmental concerns act as important psychological factors that reinforce pro-environmental behavior. Nature relatedness, as Dornhoff et al. (2019) explains, is the perceived cognitive and experiential connections to the natural world while environmental concerns has been defined as the extent to which one cares about what happens to the environment. They also explain that values, gender, nationality, and time spent on nature among other factors affected human-nature relationship. Results revealed that young people in Ecuador were more related to nature than those in Germany. Differences were also noted in environmental concerns. Germans scored higher on environmental concerns than Ecuadorians did. In general, these results form an empirical basis for the assumption of cultural differences in human-nature relationships between Saudi Arabia and the United States.

Most scholarly research have not focused on cross-cultural studies that examine the relationship between social media use and environmental awareness level. Although independent related research on environmental awareness level and social media use may exist in both countries (Alhaddad, 2018; Alshuwaikhat & Mohammed, 2017; Cruz et al.,

2018; Feezell, 2017; Gwon & Jeong, 2018; Wray-Lake et al., 2010), a comparative cross-cultural research will offer a new and unique insight. In cases where cross-cultural studies between United States and Saudi Arabia have been done, the topics under consideration have been totally different. For example, Robertson et al. (2013) conducted a cross-cultural study between Saudi Arabia and the United States but on corporate citizenship; similarly, At-Twaijri (1989) focuses on managerial values; and Kalliny et al. (2011) place their attention on marketing variations. In all these studies, differences were found between United States and Saudi Arabia. It is therefore plausible that there might be differences in social media use and environmental awareness levels between United States and Saudi Arabia. At the same time, these studies reveal that cross-cultural comparison between Saudi Arabia and United States on the relationship between social media and environmental awareness has largely been overlooked.

Social Media Statistics

According to Statcounter Global Statistics (2019), in Saudi Arabia between November 2018 and November 2019 the market share of popular social media platforms is as follows: 75.47% use Facebook, 13.19% use Twitter, 7.37% use YouTube, 2.25% use Instagram, 1.55% use Pinterest and 0.11% use Tumblr. In comparison to the United States, social media users within the same period were as follows: 49.46% use Facebook, 22.25% use Pinterest, 17.2% use Twitter, 8.17% use Instagram, 1.29% use YouTube and 0.56% use Tumblr (StatCounter Global Statistics, 2019). Although the proportion of each social media platform users vary for both countries, it is apparent that in both cases, Facebook, Twitter, and Instagram are among the top for social media sites.

According to the Communication and Information Technology Commission in Saudi Arabia, 20 to 24-year olds form the largest group of social media users in the country with 98.7% of individuals in this age bracket using social media (Mohammed, 2019). Correspondingly, among the 25 to 29 years age group, there is a 98.10% social media use and for those within 30 to 34 years age bracket have a 97.40% of social media use. Social media users in the country grew by 32% against the world's average growth of 13% (Mohammed, 2019). This is considered a progressive change towards attainment of Vision 2030 in terms of technology. In the United States, 90% of adults between 18 to 29 years old use social media; 82% of those within 30 to 49 years age category, 69% of those between 50 to 64 years, and 40% of those who are above 65 years (Clement, 2019).

Environmental Awareness among College Students

Institutions of learning have a role to play when it comes to shaping attitudes and behavior that affect the environment (Edsand & Broich, 2019). According to UNESCO (2019), environmental education, which can happen in learning institutions, can transform the society and help people develop knowledge, skills, attitude and behavior that promotes environmental conservation (UNESCO, 2019). This is possible because environmental education entails teachings on sustainable development, biodiversity, climate change, and cultural diversity. Further, science and socioscientific topics in learning institutions' curricula are meant to prepare students for modern social life, to equip them with knowledge and skills that will better themselves and society, and to be responsible citizens (Edsand & Broich, 2019). Additionally, Coertjens et al., (2010) while examining the role of schools stated that "schools in which science is taught in a more hands-on manner are associated with higher student environmental awareness whilst

environmental learning activities are associated with more pro-environmental attitudes amongst students" (p. 497).

In their study, Sivamoorthy et al. (2013) investigated environmental awareness and practices among college students in India. The study used questions related to pollution, energy conservation, wildlife conservation, human health, and animal husbandry to investigate the two factors. Sivamoorthy et al. (2013) particularly explain that their interest in analyzing environmental awareness and practices among college students is because their curricula entailed environmental education. Results of the study demonstrated that the environmental awareness level among college students was independent of a student's gender. Regardless of whether one was male or female, they were capable of being environmentally aware. However, with regards to adoption of pro-environmental practices, the results of the research revealed that female students' practices were more environmentally friendly. Sivamoorty et al. (2013) also argues that there is no direct correlation between environmental awareness and pro-environmental behavior. However, there is research with conflicting results. Edsand and Broich (2019), on a research done in the United States among high school students in Texas, revealed that a higher knowledge score was related with favorable attitudes towards the environment.

Similarly, when Ningrum and Herdiansyah (2018) examined environmental awareness, environmental behavior, and related factors among college students, they found out that environmental awareness and behavior among college students was fairly 'good.' The research reveals that most college students turn off computers when not in use, use energy saving bulbs, use alternatives for plastic bags such as paper and cloth

bags, re-use plastic and are part of environmental groups among other environmentally friendly practices. However, like Sivamoorthy et al. (2013), the results showed that a significant correlation exists between environmental behavior and gender as well as origin of the student. Also, Sahu et al. (2015) and Sharma (2014) in their investigations on environmental awareness among college students, found that gender differences, the towns (whether urban or rural) in which the students grew up, and the type of courses they took brought about variations in environmental awareness levels. Male students were generally more environmentally aware, but female students' attitude towards the environment was more favorable. Also, students who took science courses were found to score higher on environmental awareness in comparison to students who took art courses. Similarly, those in urban areas scored higher than those in rural areas. It is hence evident that most of the environmental research carried out among university students places a lot of emphasis on environmental awareness, environmental practices or behavior and gender or origin in relation to the latter. This research, however, only examined environmental awareness and its relation to the nationalities of the subjects under investigation. It is apparent that research on environmental awareness among college students rarely focuses on the nationalities of the students. However, since different nationalities are associated with different cultures (Hanel et al., 2018), not just different regions in a country, like urban areas and rural areas as shown in the study by Ningrum and Herdiansyah (2018) and Sharma (2014), then, it can be argued that the two types of research are related if not similar.

Research Questions

Power distance, individualism versus collectivism, and uncertainty avoidance are three among the six cultural dimensions from Hofstede's theory that not only vary significantly between United States and Saudi Arabia (Hofstede Insights, 2019) but are related to social media use (Dadgar et al., 2017). At the same time, power distance and individualism versus collectivism are related to environmental awareness (Nagy & Konyha, 2018). Approximated scores on the three aforementioned dimensions in Saudi Arabia and the United States reveal variations (Hofstede Insights, 2019). These variations suggest that the cultural values in the two countries are different. According to Schwartz's theory, values influence behavior and attitudes. Therefore, the difference in scores of the three cultural dimensions (power distance, individualism versus collectivism, and uncertainty avoidance) that affect environmental awareness and social media use suggest a difference in the environmental awareness levels and behavior related to social media use in Saudi Arabia and United States. Following the above stated arguments, the corresponding research questions are:

RQ1: Does the amount of social media use differ between American and Saudi Arabian college students?

RQ2: Does the level of environmental awareness differ between the American and Saudi Arabian college students?

This study will further examine the relationship between social media use and environmental awareness. Based on the agenda-setting theory, incidental exposure to pro-environmental content on social media sites is supposed to raise the environmental awareness level of individuals. The more often environmental activists on social media

post content, the more they give social media platform users “what to think about.” It is therefore expected that the more individuals use their social media applications, the more informed they are regarding environmental issues. This study hypothesizes that a relationship between social media use and environmental awareness level exists.

Based on Hofstede’s theory, a difference in social media use and environmental awareness level in United States and Saudi Arabia is expected. Since the investigation is based on the two variables whose differences have already been presumed, this study investigates whether there is a difference in the relationship between environmental awareness level and social media use in United States and Saudi Arabia. The corresponding research question is:

RQ3: Does the relationship between the amount of social media use and level of environmental awareness differ between American and Saudi Arabian college students?

Method

Sample

This study focused on Saudi Arabian and American college students. Convenience sampling was applied. Undergraduate students in Saudi Arabia and the U.S. were invited to participate in the study after approval by the IRB and the relevant university authorities. For a large population size as in the case of Saudi Arabia and the United States, a total sample size of at least 385 respondents, 193 for each country, was deemed appropriate for 95% confidence level, 5% margin of error, and a large population size.

For this study, there were 671 survey responses, 354 (52.6%) being from the American survey and 317 (47.2%) from the Arabic survey. To avoid multiple survey entries from the same individual respondents, cases of repetitive IP addresses were deleted. Congruently, 24 responses from the American survey and 11 responses from Saudi Arabian survey were deleted. Also, responses by 68 (10.7%) individuals who were neither Americans nor Saudi Arabians and 8 (1.3%) respondents who did not indicate their nationality were excluded from the data analysis for the research questions substantiation. Furthermore, three Saudi Arabian and one American respondent provided invalid answers to the social media use variables (i.e., reporting more than 1440 minutes or 24 hours of using one social media platform daily) and were removed from the sample. The final sample size thus became 556, with 266 (47.8%) of the respondents being Saudi Arabians and 290 (52.2%) being Americans. From the final sample, there were 299 (53.8%) male students, 254 (45.7%) female students, two (0.4%) students who stated to be of other gender, and one (0.2%) student who did not answer the gender question.

Given that both the American and the Saudi Arabian survey were set up in the same way, having the same questions, question sequencing, and data type, the samples from the two surveys were merged into one SPSS file for data analysis. A copy of the survey is attached in the appendix.

Procedure

This study applied a cross-section correlational survey design. Data were collected from the study participants through a one-time survey. The survey was conducted online through two universities using Qualtrics. Respondents remained

confidential, and the questionnaires were filled out by the students at their own preferred time and location between April 23, 2020 to May 10, 2020 when the survey was available online. All students who participated in the survey received extra credit from their instructors.

The questionnaire had three main sections. The first section collected information on demographic variables, including the nationality, age, and gender of the respondents. The second section dealt with environmental awareness and had two sets of questions, with one based on the Environmental Awareness Ability Measure (EAAM) Scale (Jha, 2019) and the other based on the Dunlap and Van Liere's New Ecological Paradigm (NEP)Scale (Dunlap et al., 2000). The first part of section II comprised of 14 multiple choice questions adopted from the EAAM scale, whereas the second part consisted of 23 agree/disagree questions adopted from the NEP scale. These two scales were used to measure environmental awareness to increase measurement reliability and validity. Reliability was tested through the internal consistency of each of the two scales, and convergent validity was tested through the extent to which the two scales relate. The third section dealt with collecting information on social media use variables.

Since self-reported data on social media use might not be reliable, an alternative method of counterchecking the amount of time spent on each social media platform was used to complement self-report measurement. The social media applications' statistics, as well as the mobile phone battery statistics on application usage, were used to provide more accurate data. Detailed information on how to retrieve data on social media use was provided in the instructions to allow respondents to aptly assess information on the degree to which they have used the various social media platforms.

Measurement

In this research study, three variables were of interest: the respondents' nationality, frequency of social media use, and environmental awareness. While nationality was measured with a single question in the questionnaire, both frequency of social media use and environmental awareness were measured in multiple ways. Social media use was measured through social media applications statistical estimates, self - reporting, and battery data estimate. Meanwhile, environmental awareness was measured using the EAAM scale and the NEP scale. This approach was meant to increase the reliability and convergent validity of the measurements.

Nationality was conceptualized as the right of belonging to a particular nation. It was measured through the question "what is your nationality," and the answers were coded as 1 = Saudi Arabian, and 2 = American.

Frequency of social media use was defined as the amount of time an individual spends on different social media platforms in a day. This study limited its research to the top three most used social media platforms that have been used in the recent past to create environmental awareness (Chetwynd, 2019). These platforms were Facebook, Instagram, and Twitter. Frequency of social media use was measured by groups of questions asking the average amount of time one spent on each of the three social media platforms on a daily basis. Respondents answered questions about 1) usage of social media apps based on information from their smartphone's battery usage, 2) usage statistics from the Facebook app and respondents' self-report usage on Instagram and Twitter[1], and 3)

[1] The app statistics was only available for Facebook but not for Instagram or Twitter when the survey was conducted. This feature was also present on Instagram, but just before the start of the survey the feature

respondents' personal estimates of the daily average time they spent on each social media platform through web browsers.

The frequency of social media use was measured by finding the total time spent on each of the top three social media sites for every respondent. On both iOS and Android phones, the time spent on each application was indicated in the settings tab. For iPhones, the on-screen time for each application was given as a total of the last ten days. To calculate the daily average, this value was divided by 10. On the other hand, for Android phones, only the present day's app usage was available and recorded. The daily average time spent by iPhone users on social media through the battery time or operating system estimate method was coded as BFiphone, BIiphone, and BTiphone for Facebook, Instagram and Twitter respectively. The equivalent variables coded for Android phone users were FhoursAn, IhoursAn, and ThoursAn. respectively. Correspondingly, the feature for checking the average time spent per day based on past seven days on Facebook was coded as FhoursAp. The time spent on Instagram and Twitter using this method was unavailable, however, so respondents provided personal estimates of the time they spend on the apps and the data were coded as IhoursAp and ThoursAp respectively. Lastly, since social media users can also access the platforms through browsers, the respondents were asked to estimate the amount of time they spent using their phone or computer browsers to access each social media platform. The data were coded as FhoursBr, IhoursBr, and ThoursBr for Facebook, Instagram, and Twitter

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became unavailable on Instagram, hence it was removed from the survey questionnaire. As of Sept 8, 2020, the feature is available again. Given the inconsistent nature of the measurement of the three app variables, they were not included in the data analysis and results section.

respectively. Since all the social media use variables were measured in both hours and minutes, all the input time was converted to minutes for analysis.

Environmental awareness was defined as the attitude regarding environmental consequences of human behavior (Ham et al., 2016), and it was measured by asking respondents a series of questions on environmental issues. A series of 37 questions surrounding recent environmental issues, such as the Amazon fire and climate change, as well as questions on ecological limits, balance of nature, human dominion, and ecological catastrophes were administered via the questionnaires. The 37 questions were comprised of 2 scales, one a 14-item scale and the other a 23-item scale as shown in appendix A. Both sets of questions revealed content related, behavioral, and theoretical variations among the respondents on environmental matters as per Van Liere and Dunlap's scale on measuring environmental attitudes (Ham et al., 2016).

The first set of questions were adopted from the Environmental Awareness Ability Measure (EAAM) scale by Jha (Jha, 2019). This set of questions consisted of 14 multiple-choice questions for which the responses were coded as 0 and 1, with 0 = incorrect answer and 1 = correct answer. An additive index was used to create the first environmental awareness variable (RETotal) with higher scores indicating a greater environmental awareness.

The second set of questions were adopted from the New Ecological Paradigm (NEP) Scale by Van Liere and Dunlap (Dunlap et al., 2000), and it was made up of 23 agree/disagree questions. The answers were coded in a manner similar to the way the answers to the multiple-choice questions were coded, with 0 = incorrect answer and 1=correct answer. An additive index was used to create the second environmental

awareness variable (REAsum) with higher scores indicating a greater environmental awareness.

Statistical Analysis

Different statistical techniques were used in data analysis. For RQ1, a one-way analysis of variance (ANOVA) with descriptive statistics was conducted to investigate if there were significant differences in social media use between college students in the U.S. and in Saudi Arabia. In this analysis, frequency of social media use, with three types of measurements (iPhone battery data, Android battery data, and self-report browser data) for each social media platform, was a ratio variable compared between two independent groups: American college students and Saudi Arabian college students. Similarly, for RQ2, a one-way ANOVA with descriptive statistics was conducted to compare the mean environmental awareness levels for the two nationalities. For RQ3 on determining if the relationship between social media use and environmental awareness differed between American and Saudi Arabian college students, a Pearson's correlation test for variables in each sample group was conducted independently. A correlation test was suitable since RQ3 was examining if an association between the two variables (social media use and environmental awareness level) was significant (Nayak & Hazra, 2011). The correlation tests revealed the strength and direction of the relationship in each case. Further, the correlation tests also disclosed if the relationships between use of each of the social media platforms and the two environmental awareness scales were statistically significant across the Saudi Arabia sample and the U.S. sample and how different they were.

Results

Social Media Use

RQ1 asked if the amount of social media use differed between American and Saudi Arabian college students. In response to RQ1, the ANOVA results indicated that there were significant differences between U.S. and Saudi Arabian college students in all but one social media use variables. With the battery data, American students with iPhones spent significantly more minutes daily on Facebook based on the last 10 days average ($M = 31.78$, $SD = 41.63$) than did Saudi Arabian students ($M = 5.17$, $SD = 12.99$), and the difference was significant ($F(1, 222) = 23.98$, $p < .01$). Similarly, for Android phone users, American students spent significantly more time daily on Facebook than Saudi Arabian students ($F(1, 47) = 4.40$, $p = .041$), with American students spending an average of 60.32 minutes ($SD = 85.46$) on Facebook and Saudi Arabian college students spending an average of 15.39 minutes ($SD = 39.35$) on Facebook daily. However, the difference in usage of Facebook, accessed through web browsers, between college students from the two countries, was not significant ($F(1, 173) = .49$, $p = .486$, with the mean daily usage being 38.10 minutes ($SD = 74.71$) for American students and mean daily usage being 30.09 minutes ($SD = 59.77$) for Saudi Arabian students.

On Instagram, the results revealed significant differences in the time spent on social media between Saudi Arabian and American college students. The battery estimate statistics as well as browser usage statistics revealed that Saudi Arabian college students spent significantly more time on Instagram than American college students. Based on iPhone's battery estimate, the Saudi Arabian college students spent more time on Instagram ($M= 48.94$, $SD = 73.51$) than American college students ($M= 31.82$, $SD = 40.92$), and this difference was significant ($F(1, 232) = 5.17$, $p = .024$). For Android

phone users, Saudi Arabian college students (M= 172.55, SD = 141.90) still spent more time on Instagram than American college students (M = 35.65, SD = 43.48), and the difference was significant ($F(1, 44) = 21.69$, $p < .01$). Moreover, time on Instagram via web browsers also revealed a significant difference ($F(1, 176) = 36.58$, $p < .01$), with Saudi Arabian college students spending more time on the social media platform (M= 157.03, SD = 168.62) than American college students (M = 38.10, SD = 93.65).

For time spent on Twitter, significant differences were noted too. The iPhone battery estimate statistics, Android phone battery estimates, and browser usage estimates by respondents all revealed that Saudi Arabian college students spent significantly more time on Twitter than American college students. For the iPhone's battery estimate method, Saudi Arabian college students spent an average of 44.68 minutes (SD = 60.36) on Twitter daily while the American college students spent 16.15 minutes (SD = 32.70), and the difference was significant ($F(1, 213) = 20.23$, $p <.01$). From Android's operating system, Saudi Arabians spent an average of 80.55 minutes (SD = 81.30) on Twitter daily whereas American students spent an average of 31.71 minutes (SD = 68.52), and the difference was significant ($F(1, 42) = 4.68$, $p = .036$). On accessing Twitter via browsers, Saudi Arabian college students recorded a daily average of 133.31 minutes (SD = 137.38) whereas American college students recorded a daily average of 23.04 minutes (SD = 59.22), and the difference was significant ($F(1, 175) = 55.39$, $p <.01$).

Table B1 in the appendix shows the summary of the descriptive statistics for social media use. It compares the mean time in minutes spent on each social media platform by Americans and Saudi Arabians as described above.

Environmental Awareness

RQ2 asked, "Does the level of environmental awareness differ between the American and Saudi Arabian college students?" In response to RQ2, the ANOVA results suggested that there were significant differences in the environmental awareness levels between American and Saudi Arabian college students, with American college students being more environmentally conscious than Saudi Arabian college students. Specifically, for the RETotal variable, which measured environmental awareness through a series of 14 multiple choice questions, the American sample scored higher in environmental awareness ($M = 9.32$, $SD = 3.24$) than the Arabian sample ($M = 5.55$, $SD = 3.50$). The difference was statistically significant ($F(1, 554) = 174.55$, $p < .01$). Meanwhile, for the REASum variable, which measured environmental awareness through a series of agree/disagree questions, the American sample also scored higher ($M = 17.67$, $SD = 5.28$) than the Arabian sample ($M = 12.40$, $SD = 8.12$). The difference was also statistically significant ($F(1,554) = 83.56$, $p < .01$). Table B2 in the appendix gives a summary of the environmental awareness results.

Remarkably, the RETotal had a good internal consistency for both the Saudi Arabian sample (Cronbach's alpha = .83) and for the American sample (Cronbach's alpha = .80). Similarly, REASUM scale was reliable for both the Saudi Arabian sample (Cronbach's Alpha = .96) for and the American sample (Cronbach's Alpha =.92). Also, there was a strong positive correlation between RETotal and REAsum both among Saudi Arabian college students ($r(264) = .776$, $p < .01$) and American college students ($r(288) = .770$, $p < .01$), indicating good convergent validity of the scales.

Relationship between Social Media Use and Environmental Awareness

RQ3 asked, "Does the relationship between the amount of social media use and level of environmental awareness differ between American and Saudi Arabian college students?" In response to RQ3, the correlation analysis results showed that whereas there were a few negative relationships between social media use variables and environmental awareness variables, most of the relationships were not significant. This was true for both American college students and Saudi Arabian college students. Environmental awareness was gauged using RETotal questions and REAsum questions whereas social media use was assessed based on the time individual students spent on Facebook, Instagram, and Twitter through various access mechanisms.

For the relationship between environmental awareness and Facebook use, there was no significant correlation between RETotal and Facebook accessed via browser ($r(53) = -.15$, $p = .29$), iPhone battery estimate ($r(59) = -.14$, $p = .272$), and android battery estimate ($r(16) = -.10$, $p = .698$) respectively among Saudi Arabian college students.. Among American college students, there was a significant negative correlation ($r(118) = -.18$, $p = .045$) between RETotal and Facebook access via browser. However, for Facebook used measured through iPhone battery estimate ($r(161) = .09$, $p = .269$) and Android battery estimate ($r(29) = -.05$, $p = .785$), there was no significant correlation between Facebook use and RETotal. Similarly, for Saudi Arabian college students, there was no significant correlation between REAsum and Facebook accessed via browser ($r(53) = -.26$, $p = .055$), iPhone estimate statistics ($r(59) = -.12$, $p = .347$), and Android estimate statistics ($r(16) = .02$, $p = .931$). For American college students, the correlation coefficients explaining the relationship between REAsum and Facebook use via browser

(r(118) = -.16, p = .085), iPhone estimate (r(161) = .030, p = .707), and Android estimate (r(29) = .34, p = .064) showed no significant relationships.

For the relationship between environmental awareness and Instagram use, a significant negative relationship was found between RETotal and Instagram use for both American (r(117) = -.23, p = .014) and Saudi Arabian (r(57) = -.34, p = .009) college students who used their browsers to access Instagram. There were no significant correlations found between RETotal and Instagram use based on iPhone battery statistics for either Saudi Arabian (r(59) = -.14, p = .272) or American (r(162) = .00, p = .955) college students. Similarly, RETotal and Instagram use based on Android system's estimate had no significant correlation for either Saudi Arabian (r(18) = -.41, p = .073) or American (r(24) = -.32, p = .102) college students. For REAsum correlations with Instagram use, a significant negative correlation was noted among Saudi Arabian college students who accessed Instagram using browsers (r(57) = -.30, p = .021). The correlation between REAsum and iPhone battery estimate (r(68) = .00, p = .975) and the correlation between REAsum and Android battery estimate (r(18) = -.30, p = .198) were insignificant among Saudi Arabian college students. Among American college students, the correlation between REAsum and Instagram use based on the three estimate statistics was not significant. The correlation coefficient for REAsum and Instagram access via browser was r(117) = -.12, p = .191, for Instagram use based on iPhone battery estimate was r(162) = -.08, p = .304, and for Instagram use based on Android's system estimate was r(24) = -.17, p = .400.

For correlations between Twitter use and RETotal as well REAsum, there was no significant relationship regardless of the access method for both American and Saudi

Arabian college students. Specifically, the correlations between RETotal and Twitter access via browser (r(59) = -.13, p = .339), Twitter use based on iPhone battery estimate (r(70) = .11, p = .354), and Twitter use based on Android's system estimate (r(18) = .43, p = .056) were not significant. among Saudi Arabian college students. Similarly, for American college students, the correlation between RETotal and , Twitter access via browser(r(114) = -.07, p = .448), Twitter use based on iPhone battery estimate (r(141) = .14, p = .094), and Twitter use based on Android's system estimate (r(22) = .05, p = .824) were not significant. The correlations between REAsum and Twitter access via browser (r(59) = -.13, p = .324), Twitter use based on iPhone battery estimate (r(70) = .03, p = .826), and Twitter use based on Android's system estimate (r(18) = .11, p = .653) were not significant among Saudi Arabian college students. The same applied to the correlations between REAsum and Twitter access via browser (r(114) = -.10, p = .288), Twitter use based on iPhone battery estimate (r(141) = -.01, p = .864), and Twitter use based on Android's system estimate (r(22) = .13, p = .545) among American college students. See Table B3 for a detailed result of the correlation analyses.

Discussion

Social Media Use

This study measured social media use in multiple ways. For each social media platform, four types of measurements were used: a) app use, b) browser use, c) iPhone battery estimate, and d) Android phone battery estimate. Whereas the browser use data for all three platforms and the app use data for Instagram and Twitter were estimated by participants, the battery estimate data and Facebook app data were measured through

smartphone and app's built-in features, which can potentially provide more objective and accurate measurements of social media use. According to Smith et al. (2018, p. 1), self-reported data is "less reliable and prone to social desirability bias." This study used technology-based data to complement self-report data to improve measurement validity of social media use. To increase internal validity of the research, the app data were excluded from the analysis because they were collected in different ways for the three social media platforms.

RQ1 asked if the amount of social media use differed between American and Saudi Arabian college students. Following this, significant differences were noted in social media use on all three social media platforms investigated in this study: Facebook, Instagram, and Twitter. On Facebook, apart from access via web browsers, which was measured with self-estimated data, the other Facebook use statistics, including iPhone battery estimates, and Android system estimates, depicted that American college students spent more time on Facebook than did Saudi Arabian students. The data on Instagram and Twitter use, however, showed usage patterns different from that of Facebook. Saudi Arabian college students spent significantly more time on both Instagram and Twitter than did American college students. Analyses of the self-reported data, which in this case was the browser statistics, and the technology-based data, which were the Android battery statistics and the iPhone battery statistics, supported the similar findings. Despite these differences being noted, the standard deviations were large, and in most cases even exceeding the mean time spent on social media, meaning that the use of social media platforms varies largely among social media users in each country.

Multiple scholars have tried to explain why differences exist in social media use when different groups of people are compared. For instance, according to Dadgar et al. (2017), a society with a high power-distance is associated with people who are more task-oriented and less open about their feelings. Social media thus provides persons in such a society a platform where they can promote their way of thinking. In comparison to the United States, Hofstede's Insights (2019) notes that Saudi Arabia has a higher power-distance. At the same time Dadgar et al. (2017) associate high levels of individualism, as in the case of the United States in comparison to Saudi Arabia, with low levels of social media use (Hofstede's Insights, 2019). This likely explains why Saudi Arabian college students spend more time on Instagram and Twitter in comparison to their American counterparts.

On the other hand, American college students spent more time on Facebook. This can be explained by Valaei et al.'s (2016) theory on the relationship between high power distance and social media use. According to them, there is a negative relationship between high power distance and use of communication technology development, including cell phone subscriptions and internet use. Given that the United States has a low power distance, it would be expected that they spend more time on social media. Also, with the uncertainty avoidance of Americans being lower than that of Saudi Arabians, generally, new ideas, products, and technology are adopted more easily by Americans (Hermeking, 2005; Hofstede's Insights, 2019).

In one instance, American college students used one social media platform more than Saudi Arabian college students and in the other two cases, the reverse was true. Just like the results were not consistent on what country's students use social media the most,

so are the cultural theories. For instance, on using one of Hofstede's dimensions, power distance, different scholars give divergent views on which country would use social media more. Some studies suggest that lower power distance societies use social media more while others suggest social media use is higher in societies with high power distance (Dadgar et al., 2017; Valaei et al.; 2016). Additionally, respondents in the two countries may have different motives and patterns for using each social media platform, and theories such as the uses and gratification theory might help explain the mixed findings.

At the same time, the unique differences in the social media platforms likely contributed to the differences in their adoption and use. Shane-Simpson et al. (2018) explains how college students choose their preferred social platform based on personal characteristics and preferences such as gender, age and privacy concerns. In their study, Twitter users were found to be generally young people with higher levels of self-disclosure and self-expression in public places as well as high relational mobility. On the other hand, Facebook users were found to be more likely to have lower levels of self-disclosure (or have more privacy concerns) but could easily derive benefits of relationships such as support from their friends since most use the platform for reciprocal communication to maintain relationships they have cultivated face-to-face. Shane-Simpson et al. (2018) also found out that Instagram attracted individuals who wanted more connectedness online since the use of images generated a higher sense of intimacy in comparison to text based platforms such as Twitter. However, unlike Facebook, the relationships on Instagram offered less social capital. From the results of this study, Saudi Arabian college students used Instagram and Twitter more whereas American college

students used Facebook more. A possible explanation is that in comparison to Saudi Arabian college students, American college students likely have more privacy concerns. This can also be explained by the Cambridge Analytica scandal that happened in 2018 in the United States increasing public awareness of privacy issues associated with social media use (Shane-Simpson et al., 2018) after which Facebook incorporated more privacy features on their platform design. Shane-Simpson et al (2018, p. 32) also explain that privacy concerns have resulted in "negotiation of privacy and social connection". This means people would do things such as keep their profiles private, reveal less personal information online, and connecting with people who they already know in person. They explain that such behavior is typically found on Facebook more than Twitter and Instagram.

Another possible explanation for the differences in the choice of the social media platform is explained by Hughes et al. (2012). They state that 10 to 20% of the variance in choices of social media platform can be explained by personality differences. Generally speaking, people with different personalities value different things and more so tend to be involved in activities that align with their values. In a study on how people spend their time daily, Rohrer and Lucas (2018) note that the interaction between an individual's personality and their situation is a large predictor of how they spend their time. This is in line with Schwartz' theory that "values are critical motivators of behavior" (Schwartz, 2012, p. 17). Shane-Simpson et al. (2018) explain that Facebook users are more likely to be individuals who value reciprocal connections than Instagram and Twitter users. This is because Facebook allows users to be 'friends' with others whereas on Instagram and Twitter, it is about 'following' others and possibly being

'followed back'. Following this argument, American college students are more likely to be individuals who value reciprocal connections than Saudi Arabian college students.

To further explain the differences in social media use activities between the American and Saudi Arabian students, a post-hoc analysis on the age variable was conducted. Results from one-way ANOVA indicted that the American college students ($M = 25.28$, $SD = 7.27$) were older than the Saudi Arabian college students ($M = 22.67$, $SD = 5.18$), and the difference was statistically significant ($F(1, 546) = 30.57$, $p < .01$). This age difference between the two samples could help explain the differences in choice of social media. Shane-Simpson et al. (2018) notes that older individuals tend to use Facebook more than Instagram and Twitter. This as they note is likely due the fact that Facebook (2004) was established earlier than Twitter (2006) and Instagram (2010), hence older persons adopted it earlier and in larger numbers than younger persons. Shane-Simpson et al. (2018) also explicate that younger persons tend to rely more on visual communication than older persons. In comparison to Facebook, Instagram is more visual. This would explain why more Saudi Arabian college students spent more time Instagram than Facebook in comparison to American college students.

Environmental Awareness

With self-transcendence values (universalism and benevolence) being more dominant in Saudi Arabia over self-enhancement (achievement and power), it was expected that Saudi Arabian college students would be more environmentally aware (Hofstede's Insights, 2019; Schwartz, 2012). However, this was not the case. There were significant differences in environmental awareness between Saudi Arabian college

students and American college students with American college students having a higher average in both scales measuring environmental awareness. According to Nagy and Konyha (2018), research has proved that countries with a low power distance such as Finland, Denmark, and Iceland have higher levels of environmental awareness. The United States having a low power distance in comparison to Saudi Arabia (Hofstede's Insights, 2019), then explicates the higher average scores for the American college students. Power distance might be a better predictor of environmental awareness than self-transcendence or enhancement values. This can be explained by the fact that in countries with high power distance, a lot of focus is likely placed on politics rather than advancement and problem solving. Also, because those in power are given much respect, there are fewer open forums for debating and questioning matters resulting in less responsiveness to social matters including environmental matters. Another possible reason that explains the higher level of environmental awareness in the US is that some of the largest environmental movements with many supporters have originated from the United States including the ClimateStrike movement in 2019 and Earth Day (Yeo, 2020). These movements in their activities do influence the surrounding people to be more environmentally conscious (Mishal et al., 2017).

Additionally, Hannel et al. (2018) explain how cultural differences in different countries affect how environmental awareness is perceived. They explain that people from different countries may have the same abstract meaning and values that are related to environmental protection but the behavior or actions that they attribute to environmental protection vary immensely. With a research study focused on what environmental awareness means to Britons, Indians, and Brazilians, Hannel et al. (2018)

demonstrated that when people of different nationalities talk about environmental awareness, their understanding will likely differ because of the variations in laws, politics and physical or natural environment. Similarly, since the environmental awareness in this research study was based on the same set of questions, differences in environmental awareness level may have been caused by differences in what actions each group perceives to be right. Moreover, later in his work, Dunlap (2008) notes that one of the limitations of the NEP scale is that its conceptualization of ecological views is not generally applicable outside the developed Western unions, that is, outside the United States and countries in western Europe. He found out that respondents outside this category had difficulty in understanding some items thus raising validity concerns. On the other hand, although the EAAM scale has not been used widely to assess environmental awareness between diverse groups, its validity is generally known to be high (Tiwari & Anwar, 2015).

The difference in age of the American and Saudi Arabian college students could also help explain the variation in environmental awareness levels. According to Edsand and Broich (2019), there is a positive correlation between age and environmental awareness. Older people tend to be more environmentally conscious because they are less mobile and more often than not have a responsibility of caring for younger ones. This care can be extended to the care for the environment in which these younger ones will live, and being less mobile would mean that they would want their immediate environment to be habitable since they wish not to move elsewhere. American college students being significantly older than Saudi Arabian college students could therefore help explain why American college students were more environmentally aware.

From a methodological perspective, it is worth noting that the two scales used in measuring environmental awareness are reliable. In setting up the survey, there were two sets of questions, RETotal and REAsum, and each set was adopted from a different scale. The first set of questions, RETotal was based on the Environmental Awareness Ability Measure (EAAM) scale by Jha (Jha, 2019) whereas REAsum was based on the New Ecological Paradigm (NEP) Scale by Van Liere and Dunlap (Dunlap et al., 2000). The Cronbach's alpha for the NEP scale and EAAM scale on both the American sample and the Saudi Arabian sample were all greater than .70 indicating good internal consistency of the scales (Mohsen & Reg, 2011). However, NEP scale on the Saudi Arabian sample was greater than .95 indicating probable redundancies in the questionnaire (Mohsen & Reg, 2011). Further, the correlation analysis indicated that there was a significant positive relationship between RETotal and REAsum for both the Saudi Arabian sample and American sample, indicating that the two scales measuring environmental awareness have convergent validity. Using one of the scales to measure environmental awareness might be sufficient in future research.

Relationship between social media use and environmental awareness

The results revealed a minimal to moderate (Cohen, 2013) but statistically significant negative correlation between social media use and environmental awareness in 4 out of 36 correlation analyses. Three of these 4 significant correlations were among Saudi Arabian college students while 1 was among American college students. For the most part, there was no significant relationship between social media use and environmental awareness. This means that in most cases, there is no definitive relationship demonstrated between social media use and environmental awareness. In

some cases, there might be a negative relationship between social media use and environmental awareness. The patterns are consistent for the U.S. sample and the Saudi Arabian sample. However, based on the agenda setting theory (Shaw, 1979), the fact that environmental activism has been conducted on Facebook, Twitter and Instagram (Chetwynd, 2019; Fernandez et al. 2017; Zhang & Skoric, 2018), it was expected that more use of social media is related to higher environmental awareness levels. Zhang and Skoric (2018) had shown a positive correlation between social media use and environmental activism on social media. The correlation was, however, much higher among social media users who were members of environmental groups. The significant difference was attributed to the idea that most people are on social media for relational and political reasons. At the same time, social media are known to promote hedonistic values and attributes (Nalewajek et al., 2013). These values focus on opulent gratification, pleasure, and enjoyment of life. These values are contradictory to the essence of environmental consciousness or awareness, hence the little to no correlation between social media use and environmental awareness could be explained.

However, keeping in mind that social media applications are communal communication platforms, there is no doubt that influencing and shaping public opinion is possible even on matters of the environment (McCombs & Shaw, 1972). Through conversations, posts, videos, and private messages masses can be influenced either by individuals or organizations. In fact, Zhang and Skoric (2018), in their research in Hong Kong, showed that social media users can be influenced to be more environmentally aware. The current study suggests that Saudi Arabian college students already use social media to a large extent. However, in comparison to their American counterparts, their

level of environmental awareness is lower. With both the government and non-governmental organizations working to ensure Saudi Arabia attains its environmental sustainability goals, the power of social media in agenda-setting can be largely tapped on only if environmental activism on social media is approached more effectively. Particularly the empowerment of students will mean the transformation of attitudes and behavior that in the long run will translate into better leaders and citizens.

Limitations

This study has several limitations. First, it used the same questions for two different societies, yet these are two societies that likely have different understandings of what environmental awareness means. Also given that the questionnaire was first prepared in English before translation into Arabic, in the translation process, the meaning of certain terms, statements or hashtags might be lost thus putting one-half of the respondents, Saudi Arabian college students, at a disadvantage. For example, when translating questions with names of incidents and organizations, additional words had to be added to the questions for clarification purposes making the questions lengthier. Besides, because of the differences in the syntax of the two languages, hashtags did not maintain their usual brief and specific nature.

Second, most of the variables were measured through self-report, and due to social desirability, respondents might have understated or overstated the amount of time they spent on social media. Even for the battery data, it is possible that the respondents made errors in locating the usage data or misreport the numbers they found. Third, this

study used a convenience student sample, so the results cannot be generalized to a larger population.

Directions for Future Research

Although social media is already being used to raise environmental awareness, the results of this study suggests there is little to no relationship between social media use and environmental awareness. This is contradictory to the agenda setting theory. Future research should hence focus on specific motives and patterns of social media use to explore effective ways of using social media to promote environmental awareness. Also, measuring social media use only in terms of amount of time spent on each platform might be overly simplistic, and future research should apply a more comprehensive approach of measuring social media use. Future research should also integrate cultural factors into research design and use representative samples to increase generalizability of research findings.

Conclusion

This study provides understandings on the differences of social media use and environmental awareness in two different nations: Saudi Arabia and the United States. While American college students spend more time on Facebook than Saudi Arabian college students, Saudi Arabian students spend more time on Instagram and Twitter than their U.S. counterparts. Meanwhile, American college students have higher levels of environmental awareness than Saudi Arabian students. More importantly, this study adds evidence to the scholarship on the relationship between social media use and environmental awareness.

Through the agenda-setting theory and its corresponding research studies, it is clear that agenda-setting through social media is possible (Fernandez et al., 2017; Hamid et al., 2017; Narula et al., 2018; Severo et al., 2019; Zhang & Skoric, 2018). However, this study suggests that the relationship between social media use and environmental awareness is insignificant in most cases and negative in some cases for both Saudi Arabia and the United States. It seems that overall social media use does not increase environmental awareness. This implies that the potential of social media in creating environmental awareness is not being fully exploited. Although environmental awareness messages are being relayed via social media, a lot still needs to be done in shaping and influencing public opinion on environmental matters. Based on the findings of this study, some of the factors that can be taken into consideration to make social media environmental activism impactful are careful selection of the right social media platform since varied populations use different social media platforms to different extents as well as taking cultural values into consideration when creating the environmental awareness messages since cultural values seem to impact conceptualization of environmental issues.

More specifically, this study has implications for Saudi Arabia given its keen interest in creating environmental awareness in the recent past through the National Transformation Program, Saudi Vision 2030, and the 2019 Saudi Arabia-UN Environment deal. Governmental and non-governmental organizations that use social media or are planning to use social media to improve environmental awareness among Saudi Arabians must take into consideration the fact that having an audience on social media does not necessarily translate into influence. Other factors too need to be taken into account in social media environmental activism. Also, duplicating the

environmental awareness approaches used by other countries might not yield good results unless cultural considerations are deliberated upon.

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Appendix A

Questionnaire

Dear Respondent,

You are invited to participate in a research study investigating the relationship between social media use and environmental awareness. This study is being conducted by Mohammed Alsahafi in Communication Department at University of Missouri- St. Louis. Taking about 20 minutes of your time to support this research by responding to the survey questions will be very helpful.

The study has been approved by the Institutional Review Board of the University of Missouri-St. Louis. While filling out the questionnaire, you may skip questions that you do not feel comfortable answering. Your answers will be kept confidential. Summarized statistics will be used to analyze the responses so no individual information will be revealed in any way. If you have any questions about your rights as a research participant, please feel free to contact the Chairperson of the Institutional Review Board at (314) 516-5897. If you have any questions about this study, please feel free to contact me at maanht@mail.umsl.edu.

Your input is highly appreciated!

Sincerely,
Mohammed Alsahafi

SECTION A

What is your nationality?

€ Saudi Arabian

€ American

€ Other

What is your age?

..... years

What is your gender?

.....

SECTION B

PART I

1. Our environment is

€ In good shape

€ **In bad shape but can be changed**

€ In bad shape and nothing can be done about it

2. What is the objective of Greenpeace?

€ To curb climate change

€ **To encourage green or environmentally friendly practices**

€ To foster peaceful coexistence of people and nature

3. Who have been the main target of Greenpeace?

€ Governments

€ **Major manufacturers**

€ Individuals

€ Schools

4. Which of these hashtags reference environmental issues?

€ #Metoo

€ **#Recycle**

€ #WeStrike

€ **#Savetheplanet**

€ #NeverAgain

€ #TimesUp

€ **#CleanTech**

€ #UmbrellaRevolution

5. In which month of the year is Earth Day celebrated?

€ March

€ **April**

€ May

€ June

6. The deepwater horizon spill caused all the mentioned effects except

€ Death of some sea bird species

€ Erosion of the sea shorelines

€ Increase in some fish species

€ **Little impact on the surrounding ecosystem**

7. Which of these is not a reason why environmentalists were concerned about the 2019 Amazon fire?

€ The fire caused massive air pollution

€ The fire caused vast deforestation

€ **Timber production in the amazon will be significantly reduced**

€ The fire was human ignited

8. The NASA satellite images used during the 2019 Amazon fires showed:

€ The cause of the fires

€ **The scale of the fire**

9. Which of these environmental issues has been most highly publicized within the past 5 years?

€ Air pollution

€ Deforestation

€ **Global warming**

€ Toxic Wastes

€ Ozone depletion

€ Water pollution

10. Who has the responsibility of ensuring the environment is conserved?

€ Governments

€ Individuals

€ Environmental Groups

€ Industries

€ **Everyone**

11. If human pollutant activities continue at the same rate and no conservative measures are taken into consideration, then the future will be

€ Better

€ The same

€ **Worse**

12. Which of these energy sources contributes the least environmental problems?

€ **Solar**

€ Coal

€ Petroleum

€ Nuclear

13. Does environmental pollution affect people's health?

€ **Yes**

€ No

€ Maybe

14. The greenhouse effect is caused by

€ **Increased amount of carbon dioxide in the atmosphere**

€ Increased rate of melting of polar ice caps

€ Destruction of the ozone layer

€ Increase in the amount of vegetation on the earth's surface

PART II

Respond to each of the questions below by marking or ticking against one of the mentioned responses, agree or disagree

No.	Statement	Response	
		Agree	Disagree
1	Humans are responsible for environmental pollution	√	
2	Lead free petrol is more environmentally friendly	√	
3	The media has a role to play in creating environmental awareness	√	
4	More exploitation of energy sources such as petrol and coal have no negative impact on the environment.		√
5	Tree planting is not necessary for controlling environmental temperature		√
6	The ozone layer is necessary for survival of mankind	√	
7	Regular service of your vehicle helps reduce pollution	√	
8	Separation of wastes is important in recycling	√	
9	Use of biofertilizers to maintain soil fertility is an ecofriendly approach of improving soil fertility.	√	
10	Nuclear testing has no impact on the environment		√
11	Environmentally friendly products are always cheap		√
12	Wind energy is pollution free	√	
13	Conserving forests is a way of protecting rare animal species	√	
14	The legal framework of a country is indifferent to environmental conservation		√
15	The environment affects our health	√	
16	Satellites and rockets contribute to pollution	√	
17	Using less papers in writing is good for the environment.	√	
18	Industrialization has contributed largely to pollution	√	
19	Carpooling is good for the environment	√	
20	Industries can play a larger role in conservation than individuals		√
21	Livivfdew2ng in harmony with nature reduces the risk of hazardous consequences from environmental processes	√	
22	We are approaching the population limit that the earth can comfortably accommodate	√	
23	There is no need to adapt to the environment since humans can remake it to suit their needs		√

SECTION C

1. Please note daily average time you spend on Facebook using the procedure below

Facebook
1. Open Facebook app 2. Tap ≡ or the F icon in the middle of the bottom the home page 3. scroll down to **settings and privacy** and select it 4. Tap on **Your Time on Facebook.** 5. Note the daily average
Time = ...hrs. ......mins

2. If you use Instagram app and Twitter app on your phone, how much time on average, based on your own estimate do you spend on each of these apps on a daily basis?

Instagram .....hrs. .....mins

Twitter .....hrs. .....mins

3. Which phone do you use?

€ iPhone

€ Android

€ Neither

4. Using the procedure below, note the time spent on social media applications based on iPhone's system estimation

iPhone
1. Open **settings** 2. Scroll down to **battery**

3. Tap the icon to the right to move to the '**Last 10 days'** tab 4. On the displayed list, scroll to find the **Facebook** app and tap its icon 5. Note the **Avg Screen On** time for the last 10 days for your Facebook app 6. Repeat procedure 4 and 5 for **Instagram** app and **Twitter** app
Time (last 10 days – daily average) Facebook .....hrs. .....mins Instagram .....hrs. .....mins Twitter .....hrs. .....mins

5. Using the procedure below, note the time spent on social media applications based on Android's OS estimation

Android
1. Open **settings** 2. Find and open the **Digital Wellbeing** option. 3. Note the **t**ime spent **(daily average)** on your **Facebook, Instagram** and **Twitter** applications
Time (daily average) Facebook .....hrs. .....mins Instagram .....hrs. .....mins Twitter .....hrs. .....mins

6. If you use your computer and/ or smart phone's browsers to access Facebook, Twitter or Instagram, please estimate the average amount of time you spend on each social media platform on a daily basis using your browsers.

Facebook .....hrs. .....mins

Instagram .....hrs. .....mins

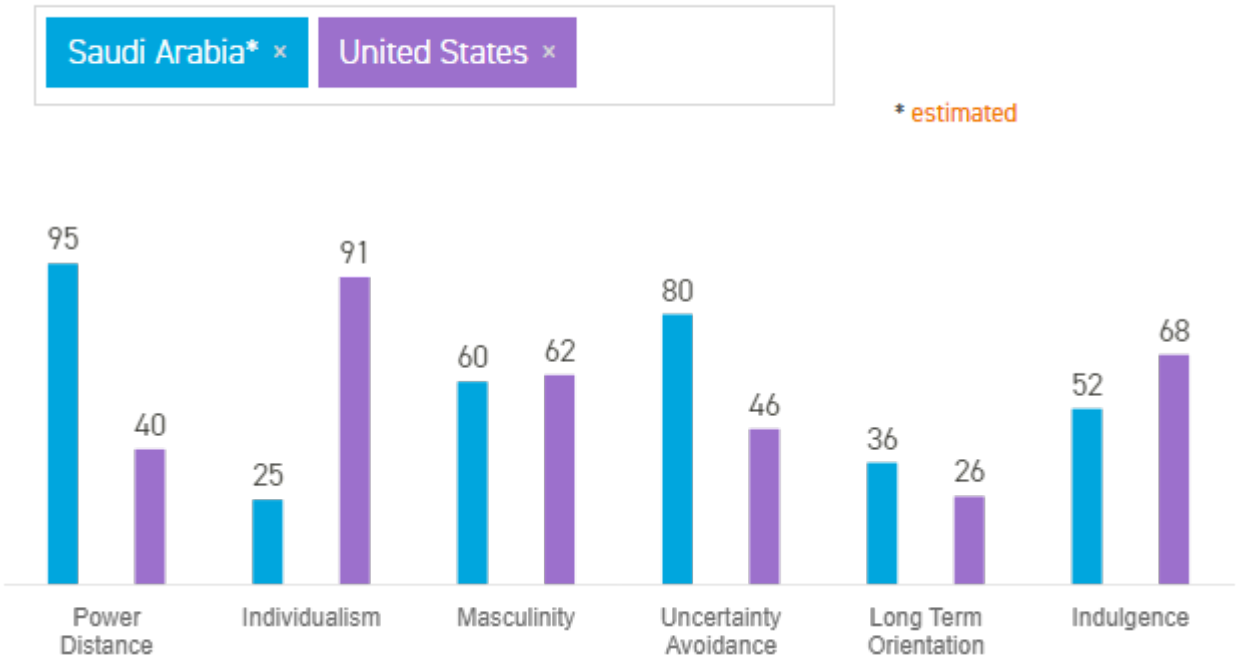
Twitter .....hrs. .....mins

Appendix B

Figures and Tables

Figure B1

Saudi Arabia versus USA on the Hofstede's six cultural dimensions



Note. Adapted from Hofstede Insights (2019). *Country comparison.* (https://www.hofstede-insights.com/country-comparison/saudi-arabia,the-usa/).

Tables

Table B1

Social Media Use Statistics

Social Media Platform	Accessed via	Saudi Arabian college students			American college students		
		N	M	SD	N	M	SD
Facebook	Browser	55	30.09	59.77	120	38.10	74.71
	iPhone estimate	61	5.17	12.99	163	31.78**	41.63
	Android estimate	18	15.39	39.35	31	60.32*	85.46
Instagram	Browser	59	157.03**	168.62	119	38.10	93.65
	iPhone estimate	70	48.94*	73.51	164	31.82	40.92
	Android estimate	20	172.55**	141.90	26	35.65	43.48
Twitter	Browser	61	133.31**	137.38	116	23.04	59.22
	iPhone estimate	72	44.68**	60.36	143	16.15	32.70
	Android estimate	20	80.55*	81.30	24	31.71	68.52

* p <.05, ** p <.01

Table B2

Environmental Awareness Statistics

Environmental Awareness variable	Saudi Arabian college students			American college students		
	N	M	SD	N	M	SD
RETotal	266	5.56	3.5	290	9.32**	3.24
REASum	266	12.46	8.12	290	17.67**	5.28

** p < .01

Table B3

Social Media Use and Environmental Awareness Correlation Coefficients

Social Media Platform		Environmental Awareness			
		RETotal		REAsum	
		Saudi Arabia	America	Saudi Arabia	America
Facebook	Browser	-.15	-.18*	-.26	-.16
	iPhone estimate	-.14	.09	-.12	.03
	Android estimate	-.10	-.05	.02	.34
Instagram	Browser	-.34**	-.23*	-.30*	-.12
	iPhone estimate	-.14	.00	.00	-.08
	Android estimate	-.41	-.33	-.30	-.17
Twitter	Browser	-.13	-.07	-.13	-.10
	iPhone estimate	.11	.14	.03	-.01
	Android estimate	.43	.05	.11	.13

* $p < 0.05$, ** $p < 0.01$