



Research article

Measuring the association between students' exposure to social media and their valuation of sustainability in entrepreneurship

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ABSTRACT

Currently, university students can read content from various social media sites; however, little is known about the relationship between students' social media exposure and their valuation of sustainability in entrepreneurship and of environmental and social care as drivers of new venture creation. This research seeks to reduce this knowledge gap, evaluating discrepancies among undergraduates according to the intensity of their social media use. An online survey was applied to compare students' perceptions based on their reading of Twitter, Facebook, Instagram, LinkedIn, and YouTube. A total of 143 valid responses of students in business and engineering careers in Chile were analysed using the Mann-Whitney test, showing a difference in the perceptions of undergraduates who read social media content once a day or more. The results show that a higher frequency of reading such content is related to higher perceived relevance of environmental sustainability, social welfare, and fair trade; likewise, it is linked with less perceived importance of sustainability as a driver of entrepreneurship. This evidence is relevant in recognizing the potential of social media sites to strengthen the higher education in sustainable entrepreneurship because these channels can be incorporated as a formal source of information for learning and its use is still limited. Future research should explore what specific types of content have the most significant impact on perceptions of sustainable entrepreneurship and promote particular methods for their application in this area.

1. Introduction

Entrepreneurship and business sustainability are two topics of great interest in higher education institutions. Entrepreneurship is appreciated as an activity that contributes to economic and social development and allows graduates to contribute to their environment through profitable work (Ribeiro-Soriano, 2017; Galvão et al., 2018). Business sustainability is understood as the ability to conduct business with the long-term objective of maintaining the well-being of the economy, the environment, and society (Hassini et al., 2012). Sustainability is appreciated by governments, international organizations, and universities as an increasingly important requirement for business activity since the findings of climate and social research on pollution, global warming, and labour conditions (e.g., Turok et al., 2017; Sapena et al., 2018) support the need to transform how companies perform in relation to the environment and society. Consistent with these trends, a significant number of higher education institutions in developing countries have incorporated entrepreneurship and sustainability into students' learning as high-priority issues.

The study of sustainable entrepreneurship has focused mainly on measuring the impact of sustainability on new business outcomes (e.g., Basdekidou, 2017; Provasnek et al., 2017) in addition to recognizing strategies and processes that facilitate incorporating sustainability into ventures (e.g., Vătămănescu et al., 2017), comprehending how to integrate sustainability into business model design (e.g., Hahn et al., 2018) and understanding the relationship among innovation, entrepreneurship, and sustainable development (e.g., Fellnhöfer, 2017; Kardos, 2012). For universities, research has focused on studying the relevance of entrepreneurship education to a sustainable future. Additionally, researchers have analysed the benefits of entrepreneurship courses for the promotion and creation of sustainable businesses (e.g., Halberstadt et al., 2019); studied methods of enhancing sustainable entrepreneurship competencies in students (e.g., Mindt and Rieckmann, 2017); and measured the impacts of sustainable entrepreneurship programmes in universities (e.g., Nwambam et al., 2018).

In addition to the competencies that students acquire in higher education processes, they are currently exposed to social media messages. These communication channels can affect people's perceptions of governments (Aladwani and Dwivedi, 2018), companies (Suryani et al.,

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2020), universities (Clark et al., 2017), and health conditions, such as the COVID-19 pandemic (Yu et al., 2020). Social media sites are selected based on personal preferences, in this sense, Twitter has a more political connotation, Facebook and Instagram facilitate communication with family and friends, Youtube contributes to learning through online video tutorials and LinkedIn is a platform oriented towards professional networking (DeGroot et al., 2015; Madge et al., 2009; Yang and Lee, 2020; Zide et al., 2014). Recent studies on sustainability and social media have focused on the effects of these digital channels on the promotion of activism (Gomez-Carrasco and Michelin, 2017), its influence on the consumption of sustainable products (Zhao et al., 2019), and its use as a source of information to measure urban behaviours that impact the environment (e.g., Hamstead et al., 2018).

Currently, social media permanently influences the lives of young people, and apart from its entertainment and information purposes, social media has penetrated many educational practices and processes (Zachos et al., 2018). In higher education, social media has captured researchers' attention due to its influence on students. Several aspects have been addressed, such as the effect of social media on students' academic performance (Talaue et al., 2018); the use of social media to obtain favourable student perceptions of first-semester students (DeAndrea et al., 2012); the instructional strategies using social media as a resource to achieve learning (Chen and Bryer, 2012); the development of cyberbullying among university students (Whittaker and Kowalski, 2015); the effect of social media on university staff productivity (Adzovie et al., 2017); and the link between frequency of social media use and students' engagement with their university (Junco, 2012).

Despite all these studies, there is still little knowledge of the relationship between social media use and perceptions in the field of sustainable entrepreneurship. In particular, students' perceptions of entrepreneurs' motivations and the relevance of sustainability to new businesses have not been extensively studied. Therefore, there is a recognizable knowledge gap regarding the role of social media in shaping opinions on entrepreneurial sustainability and the usefulness of social media in strengthening the value of sustainable entrepreneurship for students. This knowledge is particularly relevant in Latin American countries since universities in this region attribute high importance to strengthening entrepreneurial competences in students (Falla et al., 2020), and enterprises in this region evidence great weaknesses in sustainability (OIT, 2013). In view of this lack of knowledge, the following research questions arise: Do students with high use of social media show perceptual differences in sustainable entrepreneurship valuation? Is social media an important information resource to strengthen students' capacities for sustainable entrepreneurship? These issues are also relevant because research supports the idea that personal perceptions can explain behaviours associated with creating new sustainable ventures (e.g., Vuorio et al., 2018; Nhemachena and Murimbika, 2018).

This study aims to address this knowledge gap recognizing differences in the opinions of higher education students pursuing business and engineering careers, about the relevance they attribute to sustainability and their perceptions of the motivations of entrepreneurs. Specifically, it seeks to compare students' perceptions of their social media use, contrasting their judgements on the basis of their frequency of exposure to messages on Twitter, Facebook, Instagram, LinkedIn, and YouTube. This research proposes that exposure to social media sites can influence students' attitudes towards entrepreneurial sustainability. The responses to surveys of students from the Metropolitan Region, Valparaiso, and Biobio in Chile were analysed through the Wilcoxon-Mann-Whitney test to compare central tendencies. Business and engineering students were selected due to the importance of entrepreneurship education in these disciplines (May et al., 2016; Hazeldine and Miles, 2007). The selected social media sites were chosen since they are the most widely used in Chile (Cadem, 2019).

From a theoretical perspective, the findings extend the knowledge of personal variables related to entrepreneurs' valuation and perception of entrepreneurial sustainability. This research incorporates individual

behaviour in relation to social media as a new personal attribute. Therefore, the results complement the psychological background of studies explaining sustainable entrepreneurial behaviour, such as the relationship with altruism and creativity (Vuorio et al., 2018; Laužikas and Mokšėckienė, 2013), and previous findings associated with demographic variables, such as gender and family condition (Vinokurova, 2015; Uhlaner et al., 2010). Additionally, the findings allow a better understanding of the potential role of social media in shaping students' opinions on sustainability in entrepreneurship and identify which social media sites play a more determinant role.

From a practical perspective, higher education institutions can use the findings to improve their teaching of sustainable entrepreneurship by addressing social media use as a source of information for group homework, for face-to-face or online discussion forums, and for the analysis of relevant situations that affect sustainability worldwide. This perspective has high value, since teachers and higher education institutions currently have not yet fully exploited online social networks to support their activities (Zachos et al., 2018). In this sense, the pedagogical possibilities of social media have still been only partially applied (Manca, 2020), and many academics still do not use social media for teaching due mostly to lack of awareness, skill and confidence in using this emerging technology (Chugh et al., 2021).

2. Literature review

2.1. Sustainability and social media

Sustainable entrepreneurship is related to business development through the identification of opportunities based on social and environmental requirements. Cohen and Winn (2007, p. 58) defined sustainable entrepreneurship as "the examination of how opportunities will bring into existence future goods and services as discovered, created, and exploited, by whom, and with what economic, psychological, social, and environmental consequences". Patzelt and Shepherd (2011, p. 632) pointed out that sustainable entrepreneurship is "the discovery, creation, and exploitation of opportunities to create future goods and services that sustain the natural and/or communal environment and provide development gain for others". Similarly, Katsikis and Kyrgidou (2007, p. 2) stated that sustainable entrepreneurship is a "teleological process aimed at the achievement of sustainable development by discovering, evaluating and exploiting opportunities and creating values that produce economic prosperity, social cohesion and environmental protection". One concept related to sustainability is fair trade, understood as a trading partnership based on dialogue, transparency and respect that seeks greater equity in international trade (EFTA, 2001). Fair trade contributes to sustainable development by offering better trading conditions to marginalized producers and workers and securing their rights.

With the growing impetus in the field of sustainable entrepreneurship since the early 1990s, researchers have increasingly defended the sustainability orientation of entrepreneurs and managers as the main drivers of sustainable production and consumption, and previous studies have sought to analyse the capabilities and processes that lead to sustainable entrepreneurship. Parrish (2010) identified necessary organizational design conditions for addressing sustainability entrepreneurs' success in a competitive market. Jolink and Niesten (2015) proposed the "ecopreneurial business model", noting that what differentiates this business model is its ability to create greater value for environmentally concerned consumers and thus meet customer preferences and gain organizational support to achieve success. Roxas et al. (2017) recognized that a proactive strategic orientation towards environmental sustainability practices promotes small ventures' superior financial performance in developing countries. Simultaneously, social media is a topic of high interest as a teaching tool in higher education and as a means of promoting sustainability. Social media is defined as a set of technological innovations, both hardware and software, that facilitate the content creation, interaction and interoperability of users online (Berthon et al., 2012). This tool can

be differentiated into several types of online channels; for example, [Zarella \(2010\)](#) identified wikis (e.g., Wikipedia), blogs (e.g., Travelblog) and microblogs (e.g., Twitter), social networks (e.g., Facebook, Instagram), media sharing sites (e.g., YouTube), review sites (e.g., TripAdvisor), and voting sites (e.g., Digg). Likewise, publications have supported differences in the type of content and use of social media sites; in this sense, greater political and social connotations have been recognized for Twitter due to its status as a microblogging platform ([Abisheva et al., 2014](#); [DeGroot et al., 2015](#)). Facebook and Instagram are used more for relationships with friends and family ([Madge et al., 2009](#)), YouTube is used for self-learning through videos ([Yang and Lee, 2020](#)), and LinkedIn is used to develop professional networking ([Zide et al., 2014](#)).

Social media content has been related to the legitimization and diffusion of business sustainability; for example, [Taneja and Toombs \(2014\)](#) argued that these online channels allow small businesses to make their products visible products and validate their sustainable conditions, and [Gössling \(2017\)](#) found that social media can be used to promote sustainable tourism. In addition, some researchers have argued the positive effect of social media on the consumption of sustainable products; in this line, [Sogari et al. \(2017\)](#) evidenced the power of social media to increase sustainability awareness and influence wine consumer purchasing behaviour, supporting the idea that companies should improve their ability to share and communicate their environmental activities through social media. Likewise, [McKeown and Shearer \(2019\)](#) demonstrated that posts by famous institutional entrepreneurs on social media encourage discussion and consideration of sustainable fashion.

2.2. Education in social media

In the education framework, the evidence supports the potential broader and promising use of social media in higher education. Social media has been recognized to provide clear benefits for career development, research, and teaching, including improved communication with various interested parties, increased opportunities and contacts, and increased student learning and satisfaction ([Chugh et al., 2021](#)). Positive impacts of the use of social media have also been revealed regarding (a) learning processes (support, educational processes, improved communication and collaboration, academic performance) for both students and educators; (b) users' personality profile and learning style; (c) online learning platforms (learning management systems (LMSs)); and (d) higher education in general ([Zachos et al., 2018](#)). Furthermore, it has been found that the pedagogical possibilities of social media have still been only partially applied and that different social media exploit the possibilities to different degrees ([Manca, 2020](#)).

Regarding the use of social media sites in sustainability education, [Hamid et al. \(2017\)](#) explained their role in developing student and staff interest in environmental sustainability, arguing that higher education needs to take full advantage of the ubiquity of social media to expand how students and staff appreciate environmental care. Similarly, [Andersson and Öhman \(2017\)](#) stated that understanding the meaning of social media for young people could promote pluralistic and participatory classroom discussions about the environment and sustainability. Likewise, [Richardson et al. \(2016\)](#) argued that social media is an effective way to engage nurses and students in discussing complex topics. In contrast, [Abbas et al. \(2019\)](#) found that the use of social media in Pakistan had a more negative influence on students' behaviour than positive aspects regarding their learning about student sustainability.

In the field of perceptions of developing sustainable entrepreneurship, differences in students' sustainability valuation based on their frequent use of several social media sites have not been evaluated. Because conversation on social media tends to be argumentative, sophisticated, elaborate, and competitive and creates an educational situation in which world facts, values, and moral and political interests are confronted and argued ([Andersson and Öhman, 2017](#)), this study proposes that conversations on social media should also affect beliefs about entrepreneurial sustainability. Additionally, the frequency of exposition

on Facebook may influence the impact of the content of this social network on young people ([Vogel et al., 2014](#)); therefore, it is possible to propose that differences in entrepreneurial sustainability should be linked with students' frequency of exposure to online channels.

Hence, this research argues that the frequency of reading content on social media sites should imply discrepancies in students' way of seeing the world and thus their attribution of importance to sustainability in undertakings, mainly because political, social, business, and environmental information is published on social media, affecting students' opinions and beliefs. Additionally, due to variations in the characteristics of content and interaction among the selected social media sites, this research considers that these differences should vary in magnitude according to which online social channel is most frequently used. As previously stated, Twitter has more significant political and social connotations, Facebook and Instagram promote communication with friends and family, YouTube allows informal learning, and LinkedIn supports the development of professional networks. Consequently, the following research hypotheses are proposed:

- H1: Students' valuation of sustainability in entrepreneurship varies according to their social media exposure frequency.
- H2: The difference in sustainability valuation depends on which social media sites are used most frequently.

2.3. Drive for entrepreneurship

The study of drivers of entrepreneurship facilitates understanding people's motives for creating and developing businesses. Several studies have classified these motivations; one widely used perspective that is still valid today (e.g., [Zhang et al., 2020](#); [Al Matroushi et al., 2020](#)) is the division of reasons popularized by [Amit and Muller \(1995\)](#), which distinguishes drivers by opportunity, also called "pull" and, by necessity, "push". Opportunity entrepreneurship is related to independence, freedom, income and wealth, challenge-seeking, and recognition and status ([Kolvereid, 1996](#); [Feldman and Bolino, 2000](#); [Carter et al., 2003](#); [Wilson et al., 2004](#)); on the other hand, necessity entrepreneurship, such as the obligation to perform a subsistence labour activity, is associated with unemployment. In addition to this perspective, other studies have investigated deep psychological motives for entrepreneurship, recognizing the need for achievement and power as drivers ([McClelland, 1961, 1975](#)). The limitation of the above-mentioned views is that they focus on individual aspects without appreciating the valuation of the environment in terms of ecological and social welfare. Therefore, more recent research has examined this aspect. [Schlange \(2006\)](#) studied the motivations of sustainable entrepreneurs, recognizing that they are highly motivated to create businesses for the regional economic development and social system of which they are part and to balance business objectives with various issues of interest, including the ecological environment.

Research on the link between social media use and drivers of entrepreneurship is scarce, one of the few investigations was published by [Olanrewaju et al. \(2018\)](#), who explored how social media influences Nigerian entrepreneurs' motivation to start a business and found that most entrepreneurs were driven by opportunity rather than necessity due to the opportunities offered by social media. As it was argued, frequent exposure to family, social, political, and ecological content on social media sites such as Twitter, Facebook, Instagram, and LinkedIn should imply different perceptions of entrepreneurship and sustainability, and in this line, this research proposes that such discrepancies should also be expressed in the students' perceptions of the drivers of entrepreneurship. This approach is coherent with research on students' perceptions regarding social media's influence on the consumption of sustainable products ([Ahmad and Ariffin, 2018](#)) and the supported relationship between the frequency of Facebook use and student engagement ([Junco, 2012](#)). Additionally, as previously stated, these differences should be related to the nature of social media site content. Consequently, the following research hypotheses are proposed:

- H3: Social media use frequency is related to students' perceptual differences concerning entrepreneurs' motivations to create businesses.
- H4: The differences regarding entrepreneurs' motivations depend on which social media site is most frequently used.

3. Materials and methods

3.1. Measurement

A quantitative and cross-sectional study was conducted during the first and second semesters of 2020. The measurement instrument of this research was an online self-report survey answered by higher education students. The survey application was conducted through the Survey-Monkey platform. Students received an email with an invitation to participate in the research and the link to access the survey. The students' email addresses were provided by career directors and professors of the Faculty of Engineering and Business of Universidad de Las Américas in Chile. The survey response period was February 2020 to January 2021. The total number of students who received the survey was approximately 1,100; consequently, the response rate was close to 13%, which is reasonable for an online survey since the evaluator could not directly supervise students' responses, and the students were not paid for their participation.

This survey incorporated concepts related to drivers of opportunity entrepreneurship (Kolvereid, 1996; Feldman and Bolino, 2000; Carter et al., 2003; Wilson et al., 2004) and sustainable entrepreneurship (Schlange, 2006). The concepts of opportunity entrepreneurship were selected since sustainability has been associated with this type of driver (e.g., Urbano et al., 2019); in this regard, He et al. (2020) recognized that opportunity-based entrepreneurship has a positive relationship with environmental quality for sustainable development. The attributes associated with entrepreneur drivers were translated into Spanish and revised after the application of 25 surveys. These 25 test surveys were administered in face-to-face mode to engineering and business students in the Metropolitan Region of Santiago by a faculty member of the School of Engineering and Business during January 2020.

The statements linked to the valuation of environmental and social sustainability and fair trade were based on definitions of these concepts; additionally, adverse financial impacts were considered a major barrier

to sustainability (e.g., Álvarez Jaramillo et al., 2019; Kiefer et al., 2019). Before the final distribution of the survey, these affirmations were validated by professors with expertise in entrepreneurship and piloted in test surveys. Additionally, a Cronbach's alpha analysis was carried out to recognize the internal consistency of the factors associated with social and environmental sustainability and fair trade. The parameter obtained was 0.87, which reflects adequate consistency according to Nunnally (1978), who determined that a value above 0.7 is acceptable.

The frequency of reading content or exposure to images and videos on social media sites was evaluated on a scale of measurement with eight levels, from never to several times a day. Students and academics had previously been consulted about these magnitudes in the instrument testing stage; hence, it is considered that these adequately measure the frequency levels of exposure to social media content. The social media sites selected owing to high frequency of use in Chile were Facebook, Instagram, Twitter, LinkedIn, and YouTube (Cadem, 2019); these sites are also widely used by people of different generations in Chile (Anda, 2019). Table 1 presents the statements and measurement scales utilized.

3.2. Sample

A total of 158 responses to the online survey were collected using convenience sampling during the first and second academic semesters of 2020. The complete answers of 145 Chilean students were analysed, specifically, students who were studying commercial engineering, engineering in business administration, business administration technician, accountant auditor, and other careers such as industrial engineering and mining engineering. The sample was composed of 50% male students and 50% female students between 18 and 48 years old who were enrolled in the second to ninth semester of their university study plan in the daytime (23.94%), evening (7.04%) and executive (69.01%) modalities. The average age, close to 30 years old, was owing to the percentage of students in the executive programme, who study outside their workday after 6:00 p.m. on some days of the week. The research was approved by the Ethic Committee of Universidad de Las Américas in December 2019, the project code is CEC_FP_2019022. All surveys incorporated a request for informed consent defined by the ethic committee of the university, and only responses from students who completed this consent were analysed. Table 2 describes the demographic attributes and careers of the students in the sample.

Table 1. Factors and variables observed.

Factor	Observed variable	Scale
The relevance of sustainability, based on definitions of sustainability (Patzelt and Shepherd, 2011; Katsikis and Kyrgidou, 2007; Cohen and Winn, 2007) and fair trade (EFTA, 2001).	I believe that entrepreneurs should always take care of the environment, even if their profits decrease as a consequence.	Scale of 1–7, from completely disagree to completely agree.
	I believe that entrepreneurs should always take care of the community's welfare, even if their profits decrease as a consequence.	
	I believe that entrepreneurs should always reach fair agreements with their suppliers and workers, even if their profits decrease as a consequence.	
Entrepreneurial motivations (Kolvereid 1996; Feldman and Bolino 2000; Carter et al., 2003; Wilson et al., 2004) and sustainable entrepreneurship motivations (Schlange, 2006).	Rank the following characteristics: from the one that most relates to an entrepreneur (1) to the one that least relates to an entrepreneur (7).	Ambition, independence, money, respect/status, power, social welfare, environmental welfare.
Frequency of reading in online social media.	Read or review information on Twitter, Facebook, Instagram, YouTube, LinkedIn.	1 = Never, 2 = Every six months, 3 = Every two to four months, 4 = Once a month, 5 = Once a week, 6 = Two to three times a week, 7 = Once a day, 8 = Several times a day.

Table 2. Description of the sample.

	Percentage	Average age	Age S.Deviation	Business Technician	Commercial Engineering	Engineering in Administration	Accountant Auditor	Other careers
Women	50%	31	9.15	28.17%	26.76%	32.39%	9.86%	2.82%
Men	50%	33	10.71	19.72%	40.85%	21.13%	4.23%	8.45%

3.3. Statistical analysis

The central tendencies of perceptions of sustainability and entrepreneurs' motivations were compared using the Wilcoxon-Mann-Whitney test. Statistical analysis was performed with STATA software version 16. The observed variables were ordinal and did not have a normal distribution according to the Shapiro-Wilk test since the p-value obtained with this test was less than 0.05; consequently, the null hypothesis associated with normal distribution was rejected. The Wilcoxon-Mann-Whitney test is used to compare two independent samples when the data are interval scaled but the assumptions for the t-test (normality) are not satisfied; when ordinal (ranked) scales are used to compare two independent samples because the data are interval scaled but the assumptions for the t-test (normality) are not satisfied; or when ordinal (ranked) scales are used because the data are not normally distributed (Jakobsson, 2004; McCrum-Gardner, 2008). Several research studies in higher education have used this test to compare the central tendency of a variable of interest in two groups (e.g., Dabic et al., 2012; Correia et al., 2020). To compare perceptions between students with high and low-medium use of social media sites, the levels of frequency of exposure to messages on social media were defined in two categories: from never to 2 or 3 times per week (levels 1 to 5) reflecting low-medium frequency, and daily or more than one time per day representing high frequency (levels 7 and 8). This classification also allowed the central tendency to be compared with an adequate number of responses in each group.

4. Results

4.1. Frequency of social media use

First, an analysis of the students' use of social media sites was carried out, dividing them into high and low-medium frequencies. Figure 1 shows a greater frequency of reading messages on Instagram and Facebook, which is consistent with previous studies (Cadern, 2019) since these platforms are massively used in Chile and are accessible to different groups of the population. In addition, this finding is coherent with Herhold (2018), who found that most people in the United States use Facebook, YouTube, and Instagram at least once per week. Regarding Twitter, the percentage of students reading messages one or more times a day was lower. This difference can be explained by Twitter's condition as a microblogging platform associated with exposure to messages with stronger social, economic, political connotations or linked to personal interests such as sports or music. Concerning LinkedIn, the lower frequency can be attributed to the professional connotations of this platform; mostly students who were also workers occasionally read content of interest to their jobs.

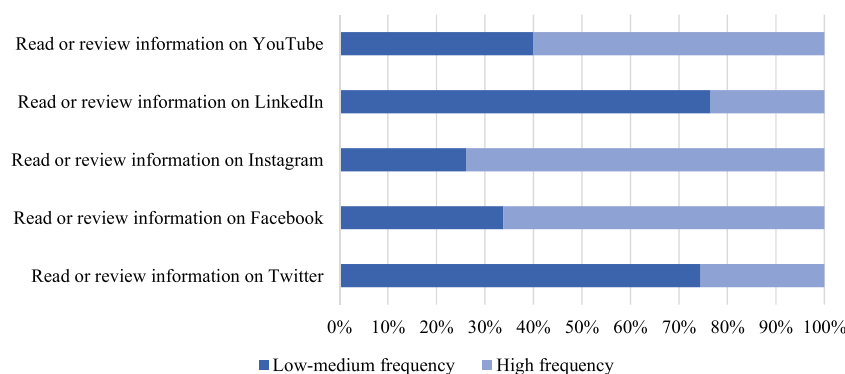


Figure 1. Frequency of social media exposure.

4.2. Results of means and Mann-U test

Table 3 presents the results of perceptions of the valuation of sustainability in entrepreneurship and drivers linked to entrepreneurs grouped by use frequency of Twitter, Facebook, and Instagram. Users who read messages on Twitter with higher frequency, that is, one or more times a day, showed a greater propensity to advocate for environmental care (H-L = 0.34, $p = 0.09$), community welfare (H-L = 0.30, $p = 0.07$), and fair trade (H-L = 0.76, $p = 0.00$), even if the entrepreneurs' profits decreased as a result. Regarding the perception of entrepreneurial drivers, students with high Twitter frequency ranked independence (H-L = -0.56, $p = 0.08$) and social welfare (H-L = -0.51, $p = 0.09$) lower. Regarding Facebook and Instagram users, students did not demonstrate differences of opinion about environmental protection, community welfare, and fair trade; frequent Facebook users indicated that independence is less important to entrepreneurs (H-L = -0.78, $p = 0.01$), and frequent Instagram users indicated that ambition is more relevant to entrepreneurs (H-L = 0.97, $p = 0.02$).

Regarding YouTube and LinkedIn, Table 4 shows that students with a high frequency of exposure to YouTube content had a higher valuation of environmental care (H-L = 0.40, $p = 0.08$) and fair trade with suppliers and customers (H-L = 0.60, $p = 0.02$), even though these aspects implied lower profits for entrepreneurs. Students with a high frequency of LinkedIn use showed greater agreement with fair trade with suppliers and customers (H-L = 0.52, $p = 0.03$). Frequent YouTube users were also more likely to appreciate ambition as a characteristic of entrepreneurs (H-L = 1.09, $p = 0.00$) and less likely to consider community welfare relevant (H-L = -0.56, $p = 0.04$).

Table 5 presents the order of entrepreneurial drivers recognized by students with high and low-medium frequency of exposure to each social media platform on the basis of arithmetic mean. As a trend, high exposure is related to greater appreciation of ambition and less recognition of environmental care and community welfare. Consequently, the results support the suggestion that students with higher reading frequency have a more negative opinion of environmental care and community welfare. These concepts are associated with sustainability in business.

The evidence supports perceptual differences. Students with a high level of social media exposure, particularly to Twitter and YouTube, showed greater statistically significant evidence on the basis of the Mann-U test. Consequently, the findings validate Hypothesis 1, associated with differences in the valuation of sustainability by frequency of social media use, and Hypothesis 2, which proposes that discrepancies in results depend on what social media site is most frequently used. The opinion on the characteristics of entrepreneurs varies, with the driver "ambition" highly ranked by students with greater frequency of use of Instagram and YouTube, "independence" ranked lower by students with a higher frequency of reading Twitter and Facebook, and "social well-being" ranked lower by students with greater frequency of exposure to Twitter and

Table 3. Comparison of central tendency on Twitter, Facebook, and Instagram.

		Twitter				Facebook				Instagram			
		H	LM	H-LM	Mann-U	H	LM	H-LM	Mann-U	H	LM	H-LM	Mann-U
Perceptions of sustainability	I believe that entrepreneurs should always take care of the environment, even if their profits decrease as a consequence.	6.03	5.69	0.34	0.09*	5.76	5.80	-0.04	0.78	5.79	5.71	0.08	0.77
	I believe that entrepreneurs should always take care of the community's welfare, even if their profits decrease as a consequence.	5.89	5.59	0.30	0.07*	5.64	5.73	-0.10	0.58	5.76	5.42	0.34	0.11
	I believe that entrepreneurs should always reach fair agreements with their suppliers and workers, even if their profits decrease as a consequence.	6.08	5.32	0.76	0.00***	5.60	5.35	0.26	0.39	5.62	5.24	0.38	0.11
Drivers of entrepreneurship	Ambition.	4.46	3.89	0.57	0.19	4.21	3.69	0.51	0.16	4.29	3.32	0.97	0.02**
	Independence.	2.19	2.75	-0.56	0.08*	2.34	3.12	-0.78	0.01**	2.56	2.74	-0.18	0.74
	Money.	3.46	3.45	0.01	0.98	3.59	3.18	0.41	0.24	3.49	3.37	0.12	0.86
	Respect/status.	4.46	4.16	0.30	0.37	4.21	4.29	-0.08	0.71	4.16	4.45	-0.29	0.34
	Power.	5.41	4.94	0.46	0.24	5.08	5.02	0.06	0.91	5.17	4.76	0.41	0.30
	Community welfare.	3.59	4.10	-0.51	0.09*	3.90	4.12	-0.23	0.42	3.84	4.34	-0.50	0.14
	Environmental welfare.	4.43	4.70	-0.27	0.36	4.67	4.57	0.10	0.88	4.50	5.03	-0.53	0.15

Note: "H" represents high frequency and "LM" low-medium frequency, while "H-LM" is the difference between frequencies. *Represents significant differences with 90% confidence, **significant differences with 95% confidence, ***significant differences with 99% confidence.

Bold numbers are associated with significant differences.

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Table 4. Comparison of central tendency on YouTube and LinkedIn.

		YouTube				LinkedIn			
		H	LM	H-LM	Mann-U	H	LM	H-LM	Mann-U
Perceptions of sustainability	I believe that entrepreneurs should always take care of the environment, even if their profits decrease as a consequence.	5.93	5.53	0.40	0.08*	5.76	5.77	-0.01	0.78
	I believe that entrepreneurs should always take care of the community's welfare, even if their profits decrease as a consequence.	5.77	5.52	0.25	0.18	5.76	5.64	0.13	0.20
	I believe that entrepreneurs should always reach fair agreements with their suppliers and workers, even if their profits decrease as a consequence.	5.76	5.16	0.60	0.02**	5.91	5.40	0.52	0.03**
Drivers of entrepreneurship	Ambition.	4.47	3.38	1.09	0.00***	4.53	3.88	0.65	0.14
	Independence.	2.44	2.86	-0.43	0.15	2.82	2.54	0.28	0.84
	Money.	3.49	3.40	0.10	0.78	3.76	3.36	0.40	0.29
	Respect/status.	4.20	4.29	-0.10	0.86	3.82	4.36	-0.54	0.13
	Power.	5.16	4.91	0.25	0.53	4.97	5.09	-0.12	0.94
	Community welfare.	3.75	4.31	-0.56	0.04**	3.71	4.05	-0.35	0.24
	Environmental welfare.	4.49	4.84	-0.35	0.24	4.38	4.71	-0.33	0.33

Note: "H" represents high frequency and "LM" low-medium frequency, while "H-LM" is the difference between frequencies. * Represents significant differences with 90% confidence, **significant differences with 95% confidence, ***significant differences with 99% confidence.

Bold numbers are associated with significant differences.

Table 5. Order of entrepreneurs' attributes.

	1	2	3	4	5	6	7
Twitter	H Power (5.41)	Ambition (4.46) ↗	Respect/status (4.46)	Envir. welfare (4.43) ↘	Commun. welfare (3.59) ↘	Money (3.46)	Independence (2.19)
	LM Power (4.94)	Envir. welfare (4.70)	Respect/status (4.16)	Commun. welfare (4.10)	Ambition (3.89)	Money (3.45)	Independence (2.75)
Facebook	H Power (5.08)	Envir. welfare (4.67)	Ambition (4.21) ↗	Respect/status (4.21) ↘	Commun. welfare (3.90) ↘	Money (3.59)	Independence (2.34)
	LM Power (5.02)	Envir. welfare (4.57)	Respect/status (4.29)	Commun. welfare (4.12)	Ambition (3.69)	Money (3.18)	Independence (3.12)
Instagram	H Power (5.7)	Envir. welfare (4.50) ↘	Ambition (4.29) ↗	Respect/status (4.16) ↘	Commun. welfare (3.84) ↘	Money (3.49) ↘	Independence (2.56)
	LM Environmental welfare (5.03)	Power (4.76)	Respect/status (4.45)	Commun. welfare (4.34)	Money (3.37)	Ambition (3.32)	Independence (2.74)
YouTube	H Power (5.16)	Envir. welfare (4.49)	Ambition (4.47) ↗	Respect/status (4.20)	Commun. welfare (3.75) ↘	Money (3.49) ↘	Independence (2.44)
	LM Power (4.91)	Envir. welfare (4.84)	Commun. welfare (4.31)	Respect/status (4.29)	Money (3.40)	Ambition (3.38)	Independence (2.86)
LinkedIn	H Power (4.97)	Ambition (4.53) ↗	Envir. welfare (4.38) ↘	Respect/status (3.82) ↘	Money (3.76) ↗	Commun. welfare (3.71) ↘	Independence (2.82)
	LM Power (5.09)	Envir. welfare (4.71)	Respect/status (4.36)	Commun. welfare (4.05)	Ambition (3.88)	Money (3.36)	Independence (2.54)

Note: "H" represents high frequency and "LM" low-medium frequency. Bold numbers are associated with significant differences.

YouTube. These findings validate Hypothesis 3, which argues that differences exist in appreciation of drivers of entrepreneurship based on frequency of social media use, and Hypothesis 4, which is associated with differences depending on which social media site is most frequently used.

5. Discussion

The research shows that students with higher social media use tend to attribute a higher value to sustainability in entrepreneurship and that they perceive differences in the motivations that lead people to entrepreneurship. The following research questions are proposed in the study: Do students with high use of social media show perceptual differences in their valuation of sustainable entrepreneurship? Is social media an important information resource that strengthens students' capacity to undertake sustainability? The evidence obtained supports the conclusion that indeed, there are discrepancies in valuation. Likewise, the results validate the hypotheses proposed by revealing perceptual differences in students with a higher frequency of reading on several social media sites. The results also support that social media is a relevant source of information for teaching sustainable entrepreneurship, particularly in terms of the formation of attitudes and perceptions that promote the creation of businesses committed to protecting the environment and the community.

These findings are consistent with previous research supporting the positive effect of social media on the development of favourable opinions of sustainability. For example, Alamri et al. (2020) found that the concept of sustainability was used in a mainly positive way in conversations on social media. By analysing a sample of tweets, they showed that 84.64% of the messages associated with sustainability were positive or neutral, while only 15.36% were negative. In addition, they concluded that sustainability is, in fact, a trending topic in social media with thousands of microcommunities that maintain conversations about it. Likewise, Calcagni et al. (2019) argued that social media platforms could be understood as new scenarios for the co-construction of values where relational principles derived from socio-ecological interactions are negotiated and defined. Additionally, Sogari et al. (2017) demonstrated the relevance of social media in increasing sustainability awareness, supporting such approaches.

From a theoretical perspective, the results of this research demonstrate the linking of a personal behavioural variable, the frequency of exposure to social media content, with the valuation of environmental sustainability, community welfare, and fair trade. In addition, the evidence supports discrepancies in the perceived relevance of ecological and social welfare as drivers of entrepreneurship. The recognition of this behavioural attribute extends the understanding of individual conditions that imply favourable attitudes towards sustainability in entrepreneurship. The findings are coherent with online collaborative learning theory, which holds that the use of the internet facilitates the generation and organization of ideas and intellectual convergence (Harasim, 2012), because the results suggest that a higher frequency of social media use is a behaviour that favours positive opinions towards sustainability and affect opinions of the motives that lead to entrepreneurship. This result complements evidence about differences in valuation of sustainability by demographic and psychological variables, such as gender and education (De Silva and Pownall, 2014), individual personality traits (Luchs and Mooradian, 2012), and the level of personal materialism (Mandliya et al., 2020).

Regarding the practical implications, several authors have pointed out that the use of social media as a teaching tool in higher education is still limited (e.g., Manca and Ranieri, 2016); consequently, this research suggests that social media has significant potential for development as an information medium to support learning in sustainable entrepreneurship subjects. First, universities should incorporate social media in entrepreneurship courses as a source of information, suggest validated social media user accounts that publish relevant information and can be used for the preparation of research papers, and promote social media use in the development of entrepreneurship projects and in discussions of

ethical aspects of entrepreneurship. Frequent exposure to reliable information on social media should strengthen critical thinking and analytical skills (Sinprakob and Songkram, 2015) and enable students to recognize the importance of sustainability in entrepreneurship for the current and next generations. In addition, negatively appreciating the drivers of new ventures, which is linked with higher social media usage, is an opportunity to develop students' projects to foster sustainable development. According to Ploum et al. (2019), students' moral competencies regarding entrepreneurship play an important role in identifying new ideas for sustainable development.

The results also reveal perceptual differences across social media sites according to the kind of content and usage of each online channel. The most significant perceptual differences between Twitter and YouTube were consistent with the results of Neier and Zayer (2015), who found that Twitter facilitates the expression of an individual's personality and ideas and the capacity to expose others' ideas and opinions; likewise, they found that YouTube has the most potential to enhance learning in the classroom and facilitate sharing content with peers because it enables discussion and aids in the discovery of new content. In this line, Twitter is highlighted from an educational perspective for facilitating students' autonomous and self-directed education (Noguera Fructuoso, 2015); supporting the rapid search, exchange and synthesis of important content (Miguel et al., 2013); and allowing interaction with prominent people in specific fields of study (Dunlap and Lowenthal, 2009; Guzmán-Duque et al., 2012). Additionally, YouTube supports finding multimedia content on different topics, such as tutorials on producing goods and courses for learning digital marketing or languages; currently, this video-sharing platform is recognized as a medium for informal learning and a source of information to support knowledge (Lange, 2019).

6. Conclusions

This research provides new evidence on the relationship between social media use and students' perceptions of sustainability in entrepreneurship. The results show that business and engineering students in Chile who frequently read social media attribute greater importance to environmental sustainability, social sustainability, and fair trade, even when entrepreneurs' profits decrease as a result. Perceptual differences of personal drivers related to entrepreneurial drivers are also demonstrated; mainly, students who daily read content on social media associate less independence and community welfare and greater ambition with entrepreneurship. The findings highlight the Twitter platform; students who read content one or more times a day on this site assigned greater importance to environmental sustainability, community welfare, and fair trade. Future research may extend the understanding of the impacts of social media use on sustainable entrepreneurship subjects in specific domains, such as product development or employee and pollutant management. Future studies may also recognize what particular types of content have the greatest impact on perceptions of entrepreneurial sustainability, and develop specific teaching methodologies to apply social media to entrepreneurial sustainability issues in face-to-face and online classes.

7. Limitations

The sample contained business and engineering students in Chile who were mostly workers attending executive programmes; this sampling condition limits the generalizability of the results to other contexts. The number of students surveyed did not allow the analysis to be divided by gender, career, or age range. Future research can evaluate larger groups of students in different study areas and countries, which will allow comparative analyses by area of knowledge, gender, age, and other demographic control variables. It is also necessary to consider the emotions and thoughts generated in students when they are exposed to economic, political, or social content; to do so, qualitative methodologies that

enable in-depth explanation of the effect of such content on students' sustainability valuation should be incorporated.

Declarations

Author contribution statement

Gustavo Barrera Verdugo: Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Antonio Villarroel Villarroel: Contributed reagents, materials, analysis tools or data.

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Data will be made available on request.

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The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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