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Participation in Online Social Network Groups as a Driver of Sustainable Behaviour

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ABSTRACT

Objective: The study investigates the relationship between engagement in two large English-language online communities on Facebook and Reddit dedicated to sharing green-living tips and promoting sustainable behaviour among their members.

Research Design & Methods: The proposed conceptual framework assumes that the impact of social media engagement on sustainable behaviour change is mediated by intrinsic and extrinsic motives for sustainable behaviour, as well as moderated by homophily (reflecting perceived similarity between an individual and other group members). The model also accounts for time as a social group member and personal characteristics of respondents, including gender, age, income and education. The statistical methods involved structural equation modelling with SmartPLS.

Findings: The findings indicate that participation in online communities leads to favourable changes in attitudes and behavioural patterns. The strength of this association is positively moderated by homophily. Females and research participants who were younger and more affluent reported greater numbers of changes in their behaviour.

Implications/Recommendations: The outcomes of this study can help NGOs, businesses maintaining online brand communities and government policymakers understand how to successfully promote sustainable behaviour through measures aimed at relationship building.
Contribution: This research adds to the theory of marketing communication extending the knowledge about the role of social media in influencing consumer behaviour.

Article type: original article.

Keywords: sustainable behaviour, online communities, social media, homophily.

JEL Classification: D64, M10, N30.

1. Introduction

Sustainable development has emerged as a prominent mainstream notion in both science and the economy. Due to its high impact on the environment, the reduction of waste and emissions stands as an important principle of sustainability, which could be furthered not only by the government and business but also by individuals (Daly, 1990). As such, promoting behavioural changes among consumers toward more sustainable lifestyles is a viable contribution to sustainable development. It has been shown that the major obstacles to individuals adopting more sustainable behaviour are the perception of increased expense, a lack of interest, and ignorance (Kollmuss & Agyeman, 2002; Deloitte, 2022). In this context, Internet-enabled social media (SM) could serve as an effective means of enhancing knowledge and interest in sustainable living.

SM has become one of the most impactful communication channels, offering its users different forms of interacting within their communities, ranging from passive ways (like reading posts and approving other users' content) to more active kinds of engagement involving creating their own content and holding conversations with fellow community members (Onofrei, Filieri & Kennedy, 2022). Sustainably conscious consumers, who are highly engaged within their online social networks, can disseminate information on sustainability, raise awareness and protect nature in general (Groth, Buchauer & Schlögl, 2018). Furthermore, research shows that SM can influence consumers' perceptions, attitudes, and intentions (Narangajavana *et al*., 2017; Dwivedi *et al*., 2021). Interestingly, despite this considerable potential, organisations entrusted with promoting sustainability continue to underperform on SM (McAllister-Spooner, 2009; Carpenter *et al*., 2016).

In this research, we aim to investigate the links between SM engagement and sustainable behavioural change among members of two large international online communities on Facebook and Reddit. Our research seeks to discover how much behavioural patterns can change because of one's participation in a sustainability--focused SM group and to identify determinants that correspond to greater or

smaller changes, including homophily, intrinsic and extrinsic motives, time spent as a member of a social group, and personal characteristics. To the best of our knowledge, this is the first study to directly investigate this research problem based on original empirical data collected from SM users. Accordingly, we not only address a gap in the theoretical knowledge, but we also provide practical recommendations for businesses, NGOs, as well as governmental bodies, looking to improve the effectiveness of their marketing efforts by relying more on social media channels.

This paper is structured as follows. First, we develop research hypotheses by reviewing pertinent literature sources. Next, we provide a detailed description of the research methods employed, to be followed by a presentation of the research results. The last section discusses the findings, conclusions, limitations and directions for further research.

2. Literature Review

The concept of sustainable development, understood as the "progress that satisfies the needs of the present without endangering the ability of future generations to satisfy their needs" (Stahlmann, 2008, p. 59), gained prominence in the second half of the 20th century. At that time, actions were taken on the global stage to improve the quality of life of societies in a clean natural environment. Because of its high environmental impact, reducing waste and emissions is a key tenet of sustainability that may be advanced by individuals (Daly, 1990). As such, encouraging consumers to adopt more sustainable lifestyles can contribute to sustainable development.

Internet-based SM has emerged as a powerful channel of communication across the globe and its extensive use has altered the ways in which people interact online. Today's users of SM can directly interact with peers, build communities, and target people in their individual interest spaces (Carim & Warwick, 2013; Carpenter *et al*., 2016). Hence, information sharing and interaction is accomplished with exceedingly low cost and effort.

Engagement is a key concept in exploring consumer usage patterns of SM that characterises the scope and intensity of passive and active forms of involvement with online communities (Amaro, Duarte & Henriques, 2016). Higher levels of engagement entail relationship building with users through direct dialogue, while less engaged individuals can limit themselves to just reading posts and interacting with other users' content by clicking like buttons on Facebook and Instagram, or upvoting on Reddit. SM groups tend to be developed around certain topics (Carpenter *et al*., 2016), with sustainability focused communities frequently formed around environmental activism (Pickerill, 2001) with the purpose of limiting the negative environmental and societal impacts of their members (Kollmuss & Agyeman, 2002).

Past research has found that one of the main reasons for people not acting in a sustainable and responsible way is a lack of understanding of their negative environmental and social impacts (Kollmuss & Agyeman, 2002). Consequently, greater engagement in sustainability on SM could lead to raised awareness of sustainability issues, inducing positive behavioural changes (Stieglitz & Dang-Xuan, 2013). Furthermore, SM messages tend to be more effective at influencing knowledge, attitudes, and behaviour towards the environment than traditional media (Narangajavana *et al*., 2017; Dwivedi *et al*., 2021). As Groth, Buchauer and Schlögl (2018) observe, SM provides excellent opportunities for communication and interaction through online communities, and judicious use of such platforms can increase people's adoption of more sustainable behaviour.

To assess the effectiveness of online group participation in fostering sustainability, this study examines the impact of users' SM engagement on the development of their behavioural intentions towards more sustainable behaviour. Thus, we propose the following hypothesis:

H.1. Social media engagement is positively associated with sustainable behaviour change.

According to self-determination theory – SDI (Deci & Ryan, 1985, 1991), different types of motivation can be distinguished with respect to the level of self-determination underlying the behaviour. These motivational subtypes can be classified into three broad categories: intrinsic motivation, extrinsic motivation (Minton *et al*., 2012; Salonen *et al*., 2014; Piligrimienė *et al*., 2020) and amotivation (Pelletier *et al*., 1998).

SDI (Deci & Ryan, 1985) has been applied in many domains, including predicting intentions to engage in pro-environmental behaviour (e.g., Grønhøj & Thøgersen, 2017). Intrinsic motives refer to motivations that come from within the individual, such as personal values, beliefs, and attitudes. These types of motivations are often associated with a sense of personal responsibility and a desire to make a positive impact on the environment. Past research indicates that individuals with strong intrinsic motives are more likely to engage in sustainable behaviours such as recycling, energy conservation, and reducing consumption (Kollmuss & Agyeman, 2002).

Extrinsic motives, on the other hand, refer to motivations that come from external factors such as social norms, incentives, and rewards, often related to compliance with regulations, laws, or social expectations, all of which are connected with reward or punishment. The goal of a behaviour governed by extrinsic motives is to bring about positive consequences or to avoid negative ones (Deci, 1975). Studies have shown that individuals with strong extrinsic motives are more likely to engage in sustainable behaviour if they are rewarded or if there is a perceived social pressure to do so (Kollmuss & Agyeman, 2002).

Research also points out that combining intrinsic and extrinsic motives can have a stronger effect on sustainable behaviour than either kind alone (Thøgersen, 1999; Stern, 2000). It is therefore important to recognise that intrinsic and extrinsic motives are not mutually exclusive, both can coexist and interact in individuals and may influence sustainable behaviour differently depending on the context.

There is a growing body of research suggesting that SM engagement is positively associated with intrinsic and extrinsic motives for sustainable behaviour. Hasbullah, Sulaiman and Mas'od (2020) developed a conceptual model, which posits that sustainable consumption of luxury fashion can be driven by user-generated content in social media through both intrinsic and extrinsic motives. In their, as yet empirically untested model, intrinsic motivations are shaped by self-acceptance and community feeling, while extrinsic motivations are related to perceptions of fame and the credibility of the endorser. In a survey of 341 visitors to Vietnamese destinations, Chi (2021) discovered that SM can drive consumption intention in ecotourism through a mediation effect of intrinsic and extrinsic motivations. Xie and Madni (2023), based on a poll of 303 young Chinese consumers, observe that information sharing on social media is positively associated with green purchase intentions with subjective norms serving as an intermediary in this process. The subjective norms variable was operationalised as Likert scale statements about external influences, making this construct similar to extrinsic motivations. Research conducted by Yoo and Gretzel (2011) showed that consumers using SM before taking a specific action, often do so to enjoy the activity and they are driven mainly by intrinsic motives such as pleasure and enjoyment.

These studies provide evidence that SM engagement can positively influence intrinsic and extrinsic motives for sustainable behaviour through the provision of information, social norms, social identity and social comparison. At the same time, it is reasonable to expect positive links between both types of motives and sustainable consumption, which is one aspect of sustainable behaviour. Therefore, we hypothesise that:

H.2. Social media engagement is positively associated with intrinsic (H.2.1) and extrinsic (H.2.2) motives for sustainable behaviour.

H.3. Intrinsic (H.3.1) and extrinsic (H.3.2) motives for sustainable behaviour mediate the relationship between social media engagement and sustainable behaviour change.

A key idea in the conceptual framework of this study is homophily, which explains group composition in terms of the similarity of members' characteristics and the extent to which "pairs of individuals who interact are similar with respect to certain attributes such as beliefs, values, education, social status, etc." (Rogers & Bhowmik, 1970, p. 526). Similarly, SM homophily refers to the tendency for individuals to form connections with others who are like themselves on SM plat-

forms. Homophily has an impact on interpersonal relationships both off- and online, but it is assumed that on the Internet, homophily matters more. Internet users tend to have a more favourable impression of people whom they find similar to themselves and are more likely to make an effort to stay in touch with them, learn about their activities, and follow their posts (Ayeh, Au & Law, 2013; Shan, 2016; Filieri *et al*., 2018; Onofrei, Filieri & Kennedy, 2022).

Research suggests that homophily can be positively associated with SM engagement and can moderate the relationship between SM engagement and various outcomes, including motives for sustainable behaviour and sustainable behaviour change. This means that people who feel a greater affinity with other members of an online community tend to spend more effort and time in that community, more carefully reading social group posts, checking for updates and being more likely to create their own posts on the community forum (Mouw, 2006). Accordingly, we make the following hypothesis:

H.4. Social media homophily is positively associated with social media engagement (H.4.1), and is moderating the relationship of social media engagement with motives for sustainable behaviour (H.4.2) and with sustainable behaviour change (H.4.3).

Additional relevant considerations are personal characteristics of social group members as well as the length of time a person was a SM group member. The time variable could be thought of as a proxy for accumulated experience that a user has acquired with an online community. Increased experience could plausibly be assumed to coincide with a stronger feeling of affinity with other group members, increasing the group's cohesion and leading to more profound behavioural changes induced by the group (Zaglia, 2013). Also, the longer the membership experience in an online community, the stronger the community's cumulative effect on the individual. The literature also hints at the existence of diminishing marginal effects of membership duration on engagement in online communities (Vohra & Bhardwaj, 2019). Thus, it is reasonable to anticipate a positive correlation between the time variable and sustainable behaviour change.

The literature is unclear about the significance of relationships between personal characteristics and social network impact metrics. However, considering that most other studies on the effects of SM on human behaviour controlled for such variables, it is prudent to also include them in our model. But, due to the ambiguous nature of these associations, we will refrain from specifying their directionality. Based on the above reasoning, we may propose the two final hypotheses:

H.5. Time spent as a member of the social media group is positively associated with sustainable behaviour change.

H.6. Sustainable behaviour change is associated with personal characteristics, including gender, age, income, and education.

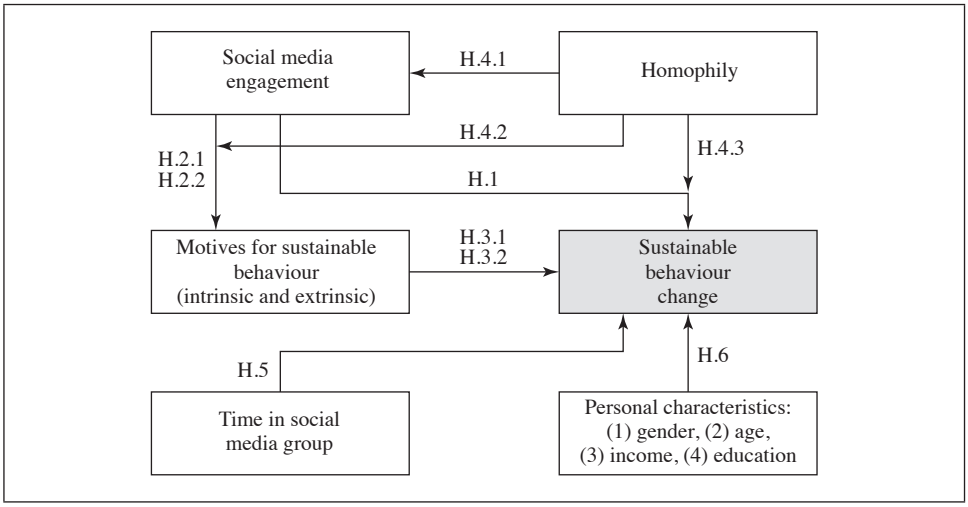

Fig. 1. Conceptual Framework of the Study and Its Research Hypotheses
Source: the authors.

To provide a concise overview of the scope of the current study, the research hypotheses are presented graphically in Figure 1.

3. Research Methods and Collected Sample

The digital questionnaire used in this research included four reflective constructs (homophily, intrinsic motives, extrinsic motives and income) and two formative ones (SM engagement and sustainable behaviour change). Unless indicated otherwise, the questionnaire employed Likert scales with six response options.

The scale for SM engagement was adopted from Amaro, Duarte and Henriques (2016), Onofrei, Filieri and Kennedy (2022), Baldus, Voorhees and Calantone (2015) and Paruthi and Kaur (2017). It included 11 items such as "I use this Facebook / Reddit group to read about the experience of others" and "I interact with others in this Facebook / Reddit group to share tips and experience". Homophily was measured similarly to Filieri *et al*. (2018), Money, Gilly and Graham (1998) and Onofrei, Filieri and Kennedy (2022) with five items (e.g., "The people in this Facebook / Reddit group have similar likes / dislikes as I do" and "The people in this Facebook / Reddit group have the same values as I do").

Metrics for intrinsic and extrinsic sustainable behaviour motives encompassed eight and seven items, respectively, sourced from Pelletier *et al*. (1998), Grønhøj and Thøgersen (2017), Clary *et al*. (1998) and Li *et al*. (2018) (e.g., "Taking care of the environment makes me feel better about myself" and "I like the recognition I get from others when I take care of the environment").

Sustainable behaviour change was measured with a list of 24 statements (Ajzen, 1991; Pelletier *et al*., 1998; Tanner & Wölfing Kast, 2003; Minton *et al*., 2012; Salonen *et al*., 2014; Piligrimienė *et al*., 2020) describing a broad range of sustainable activities (e.g., "I try to throw away as little food as possible" and "When available, I take public transport rather than driving my own car"); respondents were asked to indicate if their involvement in respective actions increased, decreased or stayed about the same since joining the SM group.

The data were collected with the CAWI method in December 2022 from two international, English-speaking online communities committed to promoting sustainability and sharing tips on eco-friendly lifestyles:

– r/sustainability – a Reddit group with 353 thousand members (n = 171),

– Sustainable Living – a Facebook group with 134 thousand members (n = 146).

Invitations to participate in the study were published as highlighted posts, so that every member visiting the groups' sites was able to easily see them and had a chance to click the provided link and fill out the questionnaire.

In total, 317 usable responses were gathered. The characteristics of the sample are presented in Table 1.

Table 1. Characteristics of the Study Sample

Gender	Age	University Diploma	Number of Sustainable Behaviour Changes
Males: 23.03% Females: 76.97%	18–24: 16.72% 25–34: 36.28% 35–44: 18.61% 45–54: 15.46% 55–64: 10.09% 65+: 2.84%	Yes: 40.06% No: 59.94%	0: 5.99% 1: 21.77% 2: 27.76% 3: 21.14% 4: 16.09% 5: 4.42% 6: 1.58% 7: 1.26%
Time Spent as a Member of This Social Group	Income Means for Likert Items Scaled from 1 (Strongly Disagree) to 6 (Strongly Agree)		
< 1 month: 4.42% 1–3 months: 8.83% 4–6 months: 18.30% 7–12 months: 24.61% 1–2 years: 23.97% 2–3 years: 16.09% > 3 years: 3.79%	1. I could easily handle an unexpected expense of $300: 3.6 2. I can enjoy my life because of the way I'm managing my money: 4.1 3. Because of my money situation, I feel like I will never have the things I want in life: 2.3 4. I have money left at the end of the month: 4.3		

Source: the authors.

Statistical analysis involved estimating a PLS structural equation model with the SmartPLS 4.0 software.

4. Research Results

To validate the quality of the structural equation model estimated for this study, we looked into standard reliability and validity metrics, as recommended by Hair *et al*. (2018). All relevant metrics came at acceptable levels, with each reflective construct explaining more than 50% of variance in its indicators, which suggests good reliability (Hair *et al*., 2007, p. 605), and correlating more strongly with their indicators than with other constructs in the model, which satisfies the Fornell--Larcker criterion for discriminant validity (Fornell & Larcker, 1981). Due to editorial limitations in this article, we are unable to provide specifics of this analysis, but interested readers may acquire them from the authors.

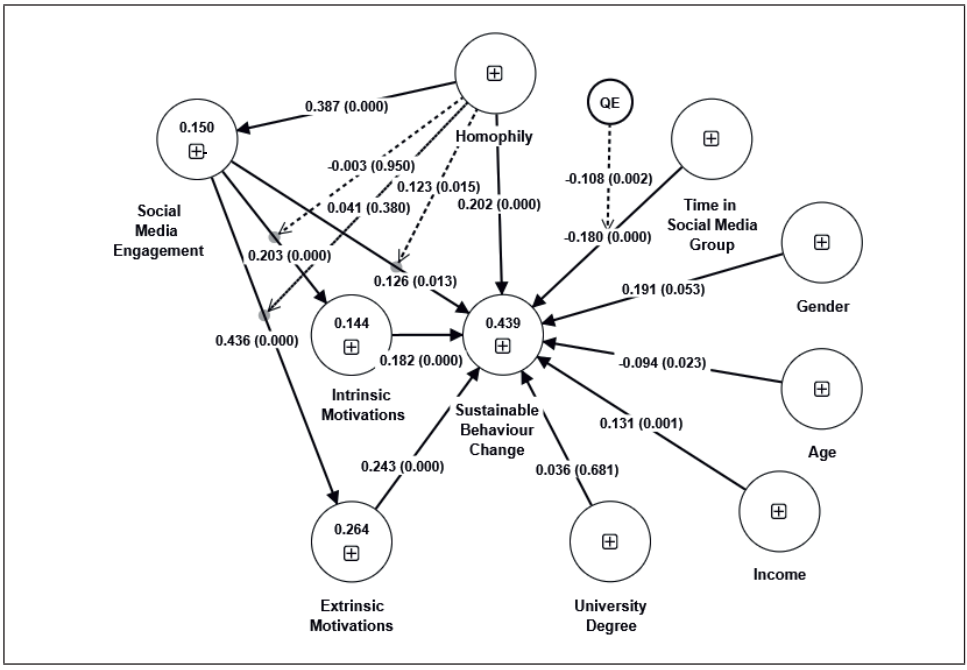

Fig. 2. Standardised Regression Weights and *p*-values for the Study's Structural Equation Model
Source: the authors.

After verifying the validity of the SEM solution's measurement model, the inner model illustrating connections between latent variables may be investigated. Figure 2 assists in that by providing standardised regression weights and *p*-values obtained with a bootstrap procedure based on 5,000 subsamples. The values inside the circles represent the amounts of variance in respective endogenous variables explained by the model.

Table 2 complements Figure 2 by presenting information about total effects between variables in the model, where they were different from their direct links, accounting for all relevant mediation effects.

Table 2. Direct and Total Effects between Pairs of Variables in the Model

Regression Paths	Direct Effects		Total Effects	
	standardised regression coefficients	*p* values	standardised regression coefficients	*p* values
SM engagement → sustainable behaviour change	0.126	0.013	0.269	0.000
Homophily → extrinsic motivations	0.138	0.009	0.307	0.000
Homophily → intrinsic motivations	0.252	0.000	0.330	0.000
Homophily → sustainable behaviour change	0.202	0.000	0.385	0.000

Source: the authors.

Figure 2 shows that the structural equation model explains 43.9% of the variance in sustainable behaviour change (SBC), with almost all hypothesised predictors (save the university degree variable) having significant contributions. Standardised regression coefficients for total effects listed in Table 2 indicate that the three strongest determinants of SBC are homophily (0.385), SM engagement – SME (0.269) and extrinsic motivations (0.243).

As was anticipated, SME does indeed show positive effects on SBC, both through direct links and due to the mediation of intrinsic and extrinsic motivations. Interestingly, the regression path involving extrinsic motivations is stronger than the one observed for intrinsic motivations, which may be because participation in online communities induces social pressures that tend to boost external, rather than internal behavioural drives. These insights give clear support to H.1 and H.2 of the research hypotheses.

Both groups of motives are positively associated with SBC, with extrinsic motives having a greater effect than intrinsic ones. Given that SME is positively associated with both types of motivation, two significant regression paths are formed, leading from SME to SBC. This is evidence for a partial mediation because SME also connects directly with SBC in a statistically significant way. Thus, hypotheses H.3.1 and H.3.2 can be accepted as true.

The role of homophily in the conceptual framework proved to be more important than anticipated. It was positively correlated with SME, implying that people who feel affinity with other community members are inclined to be more committed and involved. Furthermore, homophily was found to positively interact with the relationship between SME and SBC in line with this formula: SBC = (0.126 + 0.123 * homophily) * SME. Given that latent variables in the model are standardised

(the mean = 0, the standard deviation = 1), one standard deviation increase in homophily nearly doubles the average strength of the correlation between SME and SBE. Also, higher than average levels of homophily are apt to strengthen the link from SME to SBE, while homophily that is less than the mean weakens this association. In addition to its moderating function and indirect links with SBC, homophily has a direct positive impact on how much respondents change their behaviour to be more sustainable and environmentally friendly. All in all, homophily turned out to be the most important contributing factor to behavioural change. The above-described findings corroborate hypotheses H.4.1 and H.4.2. On the other hand, the lack of a significant moderation for the relationship between intrinsic and extrinsic motives and SBC disproves H.4.2.

The significant negative regression coefficient of the second order polynomial for time spent as a community member implies that the relationship between time and SBC is not linear but quadratic, of a form akin to the upside-down letter "U". As such, the greatest average values of SBC are expected from people with neither too short nor too long experience in the online community. This partially validates H.5, since the positive relationship was established from the lowest values of time to its intermediate levels, where it changes its direction to negative.

Most of the respondents' individual characteristics turned out to be significant predictors of SBC, which partially supports H.6. In particular, younger and more affluent people were inclined to report more adjustments in their behaviour toward sustainable and environmentally-friendly living. Females revealed more changes than males, but it should be noted that this effect was rather weak, significant only at the 10% level. Interestingly, educational attainment, distinguishing only between those who held or did not hold a university degree, did not show any relationship with SBC.

5. Discussion, Limitations and Directions for Further Research

In this research, we set out to investigate the link between participation in SM and behavioural changes in individuals involving the adoption of more sustainable practices and eco-friendly lifestyles. Based on data from 317 interviews with members of two large international communities on Reddit and Facebook, we found evidence suggesting a positive correlation between SM engagement (SME) and sustainable behaviour change (SBC). In addition to a direct link between SME and SBC, there was a mediation effect of extrinsic and intrinsic motives and a positive interaction with homophily, which describes how strongly respondents felt that their fellow members in the focal SM groups had similar likes, dislikes, and other pertinent attributes. Of the two types of motivations, extrinsic motives were the stronger mediator, as they displayed stronger correlations than intrinsic motives with both SME and SBC. This observation sheds some light on the possible under-

lying mechanism that induces behavioural change; it seems that SM participants are more driven by how their actions are perceived by other community members than by their own personal values and considerations. Furthermore, a significant positive relationship between extrinsic and intrinsic motivations implies a causal link whereby external factors may shape internal reasons to follow principles of sustainability in one's own life.

Of all the determinants of SBC considered, homophily was revealed as the most prominent one. This corroborates the literature sources noting that it plays a significant role in the formation and dynamics of SM groups, influencing both the composition of the group and the types of interactions that take place within it (Halberstam & Knight, 2016; Khanam, Srivastava & Mago, 2023). The current study appears to support the observation by Ertug *et al*. (2022) that homophilous group members are exposed to similar ideas and perspectives, which make them more entrenched in the views accepted by the group and less open to alternatives. Overall, our research suggests that homophily can affect behavioural changes in members of SM groups by influencing the level of engagement, participation, and communication among group members.

One interesting finding is a negative quadratic relationship between time spent as a group member and SBC, with the strongest behavioural changes reported by members with moderate experience in their online community. This could be taken as evidence for the existence of diminishing positive marginal effects on one's behaviour from participation in SM groups.

The apparent lack of effect of education on SBC does not necessarily mean that educational attainment is unimportant. In our study, this variable distinguished only between those with and without a university degree; if we have asked about years of completed formal education instead, perhaps an effect would be revealed in the bottom part of the scale. This should be treated as one of the limitations of this study. Other personal traits significantly contributed to the variance explained in SBC by the model. Accordingly, greater behavioural changes were associated with females rather than males, as well as younger and more affluent individuals.

Our findings provide recommendations for socially-minded businesses and NGOs dedicated to promoting sustainability as to how to enhance the effectiveness of their marketing activities targeted at Internet users. Specifically, we demonstrate that developing cohesive social communities can serve as a potent tool for fostering behavioural changes. However, the main condition of success seems to be the level of homophily that social group members feel about each other; low levels of homophily can result in a lack of behavioural effects or even in behavioural patterns contrary to those anticipated (through the revealed interaction of homophily with the link between SME and SBC).

The study has several noteworthy limitations. First, we lack statistical evidence to assert that our conclusions can be extrapolated beyond the two social media groups investigated. Although these groups were among the largest sustainability-oriented communities on the Internet, further research incorporating a sample from a broader population is essential to enhance the external validity of our results. Moreover, our conceptual model could benefit from the inclusion of additional constructs that might more effectively elucidate the observed statistical associations. Most critically, future research should investigate the direct correlational relationship between social media engagement and sustainable behaviour change. This suggests the existence of mechanisms that foster behavioural change, distinct from the regression pathways mediated by intrinsic and extrinsic motivations. It is conceivable that intermediary variables between SME and SBC exist, which could deepen our comprehension of the mechanisms causing individuals to shift towards more sustainable lifestyles. Additionally, considering SME's significant role in driving SBC, further academic inquiry is necessary to understand the factors that promote or impede involvement in SM, beyond homophily, which was the sole antecedent of SME examined in this study.

Authors' Contribution

The authors' individual contribution is as follows: Each contributed 50%.

Conflict of Interest

The authors declare no conflict of interest.

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