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International Journal of Mobile Communications

ISSN online: 1741-5217 - ISSN print: 1470-949X
https://www.inderscience.com/ijmc

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DOI: 10.1504/IJMC.2025.10062241

Article History:

Received:	30 November 2021
Last revised:	07 October 2023
Accepted:	07 October 2023
Published online:	02 December 2024

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To reveal or conceal? Sponsorship disclosure in health apps and its impacts on sponsor motive attributions, credibility and download intentions

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Abstract: Amid the growing corporate sponsorship for health and wellness apps, this study employed attribution theory and sponsorship literature to assess how users perceive and evaluate sponsors, their intentions, and the apps themselves. An online experiment examined the influence of sponsor identification within apps on users' attitudes toward the sponsor, app credibility, and app download intentions. It further explored whether download intentions were sequentially influenced by perceived sponsor motives (either altruistic or self-serving), sponsor attitude and app credibility. Results indicated that when sponsorship was disclosed at any level, users were more likely to perceive sponsors as having self-serving motives. However, perceptions of sponsors' altruistic motives varied based on the degree of disclosure. Apps and sponsors were positively evaluated when associated with altruistic motives of sponsors, whereas negative evaluations arose from perceptions of self-serving motives. Both theoretical and managerial implications for mobile marketing communications and health app development are discussed.

Keywords: sponsorship disclosure; motive attributions; altruistic motives; self-serving motives; health app; app evaluations; cause-related marketing; mobile marketing communication.

Reference to this paper should be made as follows: Joo, E. (2025) 'To reveal or conceal? Sponsorship disclosure in health apps and its impacts on sponsor motive attributions, credibility and download intentions', *Int. J. Mobile Communications*, Vol. 25, No. 1, pp.40–61.

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This paper is a revised and expanded version of a paper entitled 'Supporting mHealth apps as a newer cause-related marketing strategy? Assessing sponsor's real motives attributions mediating users' evaluations of the app and sponsor' presented at the Mobile Communication Division of the 70th International Communication Association (ICA) Conference, virtual conference, 20–27 May 2020.

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1 Introduction

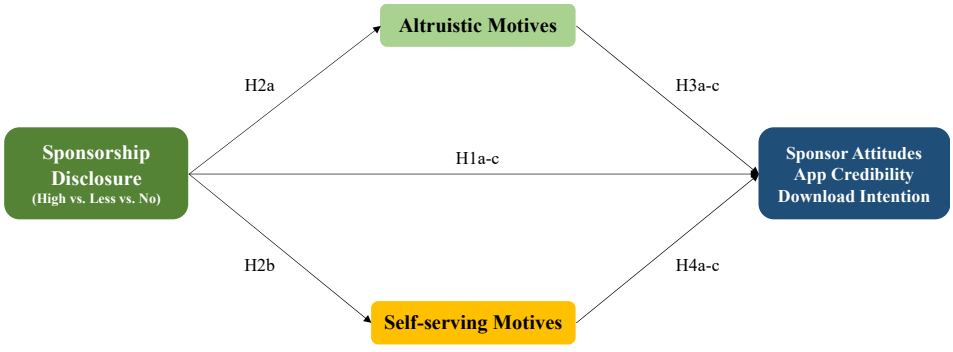
Innovation in wireless technologies and the rise of mobile platforms have revolutionised communication technology, offering corporations innovative avenues for business (Katsamakas and Pavlov, 2022; Venkatachalam and Ray, 2022). The evolution of technology has spurred companies to forge innovative partnerships, leading to heightened investments in niche tech areas like health apps and mobile games, often outside the traditional realms of outdoor sports and entertainment (Mittal and Kumar, 2022; Yang et al., 2022). The health and fitness sectors stand out for developing and backing of prosocial technologies, notably health-related apps that align with 'cause-related marketing' (Joo et al., 2021; Shankar et al., 2010). A recent report by IQVIA states that there are currently over 350,000 digital health apps available to users, and the top 110 of these apps represent nearly 50% of all health app downloads, amassing over 10 million downloads (IQVIA Institute for Human Data Science, 2021). These apps originate from a diverse range of providers, from for-profit companies to non-profit organisations, with many seemingly associated with commercial enterprises (Joo et al., 2021; West et al., 2012).

With traditional media investments increasingly leaning toward broader digital options, marketers are pivoting from traditional sponsorships like major sporting events to digital avenues that foster online, relationship-driven businesses (Spais and Johnston, 2014). Specifically, companies are harnessing health apps to craft robust mobile marketing strategies that capture users' daily activities, analyse behavioural data, and enhance both user engagement and relationships (Beldad and Hegner, 2022; Rose et al., 2017). For example, the sportswear giant Under Armour sponsored MyFitnessPal, a globally leading digital health and fitness platform, thereby bolstering its prominence within the online sports community. Such app marketing partnerships serve as a potent strategy, enabling companies to leverage the digital health and fitness community and connect with target customers at any time (Dignan, 2020).

In general, corporate sponsorship pursues dual purposes: enhancing brand images to increase profits and engaging in corporate social responsibility (CSR) initiatives to benefit society (Joo et al., 2021; Meenaghan et al., 2013). Positive perceptions of sponsoring brands are likely to arise when consumers believe these actions are genuinely altruistic (Rifon et al., 2004). However, the manner in which sponsorships are disclosed can engender public scepticism regarding the true motives behind a company's prosocial activities (Menon and Kahn, 2003; Tutaj and van Reijmersdal, 2012). This scepticism may also emerge in the context of mobile health apps. Negative evaluations of sponsors and their apps may occur if consumers suspect that a company is primarily offering an app for its advantage. Considering these complexities, it is vital to pinpoint the messaging features that efficiently convey the value of sponsorship activities to the brand or sponsor. With the surge in mobile health apps and their emergence as a vital channel for corporate marketing communications, it is now essential to engage in empirical discussions about the reciprocal impact that the disclosure of sponsorship has on both sponsors and apps within the realm of consumer health-focused mobile technologies (Aydin and Silahtaroglu, 2021; Joo et al., 2021).

Therefore, this study has three primary objectives. First, it explores the user response to the disclosure of sponsor information at different levels within health apps, specifically focusing on sponsor attitudes, app credibility, as well as app download intentions. Second, it investigates the mediating role of motivational attribution in shaping evaluations of both sponsors and apps. Third, it scrutinises potential sequential effects among key variables, which are outlined in the framework presented in Figure 1. Theoretically, this study aims to expand the understanding of attribution theory by examining the impacts of sponsor disclosure at various levels on consumer evaluations of both sponsors and health apps. Practically, the research findings are anticipated to facilitate the effective development of mobile marketing strategies for health app sponsorships, while also offering valuable insights into user's sections in the app store.

Figure 1 Proposed research model (see online version for colours)



2 Literature review

2.1 Discounting principle of attribution theory

In social psychology, 'attribution' refers to cognitive processes that individuals employ to formulate causal explanations for observed human behaviour and events, which consequently influence future thoughts and actions (Heider, 1958; Jones and Davis, 1965; Kelley, 1972). According to the attribution theory (Heider, 1958), individuals make causal inferences anchored in both internal personal factors – often referred to as intrinsic motives – including individual character and personality, as well as external situational factors – also known as extrinsic motives – including social pressure, societal norms, tasks, or luck. In the consumer context, previous experience and observations shape attribution regarding a communicator's motives. This dynamic prompts consumers to doubt or even dismiss recommendations from endorsers if they detect suspicious cues [see Folkes (1988) and Mizerski et al. (1979) for reviews]. Also, these suspicious cues serve as powerful triggers, activating memory and facilitating cognitive processes that assess a communicator's true intentions.

The discounting principle of attribution theory (Kelley, 1972) explains that people often underestimate or disregard one explanatory factor when faced with an alternative rationale. More precisely, intrinsic or initial motivations are often discounted when an external or environmental factor provides a compelling explanation for an event. This tendency stems from the human proclivity to simplify multifaceted attributional scenarios into a single, plausible explanation for observed events or behaviours. In contexts involving more intricate combinations of influencing factors, Kelley (1972) further posited that individuals employ rational and logical social perception to ascribe others' behaviour to a combination of environmental circumstances and inherent traits. Consequently, all factors that logically co-vary over time, across different situations, and between individuals are simultaneously considered when evaluating an observed outcome.

This principle serves as a key framework for understanding how individuals interpret their environment and has been extensively applied to examine the influence of consumer attributions regarding communicators' motives across diverse consumer settings. These settings include celebrity or influencer endorsements (Park and Cho, 2015; Shan et al., 2020; Sparkman, 1982; Silvera and Austad, 2004), evaluations of CSR initiatives (Kim and Ji, 2021; Lee and Cho, 2022), and reactions to online product reviews (Dou et al., 2012). These previous studies suggested that consumers frequently attribute extrinsic motivations, like financial gain, to endorsers who provide positive product reviews. In doing so, they tend to often overlook intrinsic motivations such as personal preference or satisfaction with the product. Typically, these intrinsic motivations are discounted unless there is a clear disclaimer stating that the endorser received no financial incentives.

2.2 Sponsorship disclosure in the health app interface

Corporate sponsorship is defined as the offering of support, either financial or in kind, to an activity or cause by a commercial organisation to achieve business objectives (Meenaghan, 1983). It encompasses a wide range of actions, which involve providing a cash or in-kind fee paid to an entity often related to sports, entertainment, or non-profit events/organisations in exchange for the rights to leverage the commercial opportunities linked with that entity (Ukman, 1995). Corporations frequently align with issues, events, and causes that can appeal to consumers more prominently than their competitors. These commercial partnerships can serve as a strategic means to amplify brand awareness and strengthen the company's image. They are also prevalent in major sports, entertainment events, and public health campaigns, often involving the prominent placement of brand names (e.g., 'Sponsored by Kraft Foods'). Occasionally, it goes beyond featuring the brand name, incorporating a short and catchy tagline (e.g., 'Kraft Foods: feeding the hungry one person at a time') to communicate the brand's message or mission more effectively (Rodgers and Thorson, 2000).

Previous research suggests that the increased visibility of corporate sponsorship information often correlates with more negative reactions regarding both the sponsor and the sponsored entities (Eisend et al., 2020; Goldfarb and Tucker, 2011; Rifon et al., 2004; Rodgers, 2007). Even basic brand information, such as names and logos, can influence consumer perceptions of corporate marketing efforts (Rifon et al., 2004), while the timing

of sponsorship disclosures, whether they appear before or during content, can elicit critical viewer reactions and negative brand attitudes (Boerman et al., 2014). With the advent of online sponsorship and recent technological advances, internet-sponsored content has become more diversified (Van Der Goot et al., 2021). Therefore, in-app support often adopts a nuanced approach that is subtle and sometimes barely noticeable, steering clear of disruptive push notifications or direct advertising. This tactful strategy effectively prevents user irritation by offering a seamless experience that engages consumers without causing annoyance or interruption to their online activities. Additionally, by fostering community engagement, it promotes sustained online interactions with consumers, establishing itself as an effective for long-term persuasion (Alnawas and Aburub, 2016; Lee et al., 2011; Weeks et al., 2008).

Within the realm of health and wellness, apps serve as tools for CSR, aiding in health management and reflecting a company's altruistic intentions toward fostering a healthier society. Marketers often disclose affiliations with health apps through the insertion of logos and advertisements within the app interfaces. However, such disclosures may act as a heuristic cue, prompting consumers to contemplate the motives behind these sponsorship activities, subsequently influencing their app download intentions (Gu et al., 2017; Martínez-Pérez et al., 2015). Prior studies have also shown that influential cues are derived not only from app features and design but also from the characteristics of both app developers and source providers (Kanthawala et al., 2019; Schueller et al., 2018). Thus, the manner in which sponsorship information is provided in the app interface can lead consumers to perceive attempts at manipulation by advertisers, potentially impacting the persuasiveness of the message, and altering their attitudes and intentions toward the sponsor/brand or app (Joo et al., 2021). Given this, this study proposes the following hypotheses:

H1 When apps display more visible sponsorship disclosure compared to less or none, individuals will:

- a rate sponsor attitudes less favourably
- b perceive the health app as less credible
- c exhibit lower intentions to download the health app.

2.3 Consumer assessment of sponsors' motives

Consumer attributions of sponsors' intentions are determined by past experiences, individual characteristics, and the nature of marketers' strategies and messages (Cornwell et al., 2005; Rifon et al., 2004). Individuals assess a company's actions based on their underlying causes, which then guide their reactions to those actions, such as CSR initiatives (Kelley and Michela, 1980). While consumers may lack detailed knowledge of the specific motives behind corporate sponsorship activities, they generally recognise that through lifelong consumer socialisation, sponsorship often pursues dual objectives of self-serving and goodwill, which influence their attitudes and intentions towards both sponsors and sponsored contents (Joo et al., 2021). In evaluating the causality of corporate sponsorship activities, as mentioned earlier, consumers attribute sponsors' motives to intrinsic or extrinsic factors. If sponsorship is perceived as driven by

intrinsic motives, consumers likely acknowledge altruism or social responsibility as the underlying forces. Conversely, if extrinsic motives are detected, consumers infer that sponsorships aim for financial gain, public image enhancement, or reputation improvement (Han et al., 2013; Lee and Cho, 2022; Park and Cho, 2015).

Previous research suggested that when no or less specific sponsorship messages are disclosed, consumers are more likely to attribute positive motives to and have a favourable evaluation of the sponsor (Hwang and Jeong, 2016; Pfeuffer and Huh, 2021). However, when explicit sponsorship messages are presented, consumers might become sceptical of the corporations' intentions behind their pro-social activities, engaging in a more complex attribution process (Kelley, 1972; Rifon et al., 2004). Since commercial corporations inherently aim for profit, consumers tend to believe that their sponsorship activities are driven more by extrinsic motives than by genuine intentions. Moreover, clear sponsorship disclosures within the app interface might cause people to perceive fewer altruistic motives from sponsors, viewing such activities as primarily self-promotional. Greater exposure to corporate sponsorship messages when selecting an app can heighten consumer awareness of sponsors' commercial intentions, like pushing for increased sales, thereby diminishing the perception of altruism and emphasising selfish motives. Thus, the following hypotheses are suggested:

H2 More visible sponsorship disclosure, compared to less or none, will result in:

- a stronger attributions of self-serving motives
- b weaker attribution of altruistic motives to health app sponsors.

Consumers may be interested in using free health apps sponsored by corporations, but their decisions regarding these apps are often influenced by their evaluation of the sponsors' motives. Previous research has found that consumers' attribution of motives to sponsors mediates the persuasiveness of the sponsored content as well as their evaluation of sponsors (Eisend et al., 2020). Within the context of health apps, consumers can also utilise cues from the app interface to discern the motives behind corporate sponsorship, which in turn can influence their perception of the app's quality and credibility (Kanthawala et al., 2019; Yang et al., 2022). While there may be individual differences in recognising the characteristics and motives of organisations providing or supporting apps, the majority of consumers tend to believe that for-profit organisations, like corporations, are driven by self-interested motives (Joo et al., 2021; Peng et al., 2016). Consumers' perceptions of corporate sponsorship motives can affect their evaluation and decision-making process regarding sponsors when selecting health apps. Therefore, it is hypothesised that the consumer attribution process regarding sponsors' motives plays a significant role in influencing the impact of sponsorship disclosure on the evaluation of both the app and the sponsor, leading to the establishment of the following hypotheses.

H3 Altruistic motive attribution will positively mediate the effects of sponsorship disclosure on:

- a attitudes towards the sponsor
- b health app credibility
- c intentions to download health apps.

H4 Self-serving motive attribution will negatively mediate the effects of sponsorship disclosure on:

- a attitudes towards the sponsor
- b health app credibility
- c intentions to download health apps.

Cognitive elaboration in attributing causes may enable consumers to discern altruistic motives, while also acknowledging self-serving ones (Kelley, 1972). As sponsorship activities progressively incorporate advertising components, their commercial intents become evident, heightening consumer awareness of corporate interests. Hence, explicit sponsorship messages with brand logos, slogans, or taglines may elevate perceptions of corporate profit motives (Rifon et al., 2004). In contrast, messages that lack detailed information about brand or sponsor type are likely to strengthen perceptions of genuine sponsorship motivations and diminish those related to profit (Pfeuffer and Huh, 2021). At the same time, empirical studies indicated that recognising altruistic motives does not preclude the acknowledgement of self-serving motives, and vice versa; this dynamic coexistence of perceptions often results in consumers attributing complex motivations to sponsors (Han et al., 2013; Lee and Cho, 2022; Rifon et al., 2004). This study, therefore, investigates the influence of sponsorship disclosure on sponsor attitudes through the attribution of altruistic and self-serving motivations, further examining its subsequent impact on app credibility and download intention during the app selection. This study thereby proposes the following research question:

RQ1 How do sponsorship disclosure levels influence cognitive (sponsor motives) and attitudinal (sponsor attitudes) responses, and how does it subsequently affect evaluations of the app?

3 Methods

3.1 Study design and participants

The scenario-based online experiment was conducted using a participant recruitment pool called the SONA system, which is operated by a large university in the Midwestern USA. This study was part of a larger research project examining the impact of users' psychological and behavioural assessments of health and fitness apps impact on commercial sponsorship. College students were selected as study participants, because they are typically more active in adopting new technologies and using health apps compared to other age groups (Aydin and Karamehmet, 2017). Data were collected using a one-factor, within-subjects experimental design featuring three levels, each representing a distinct app interface. The three levels consisted of conditions with highly visible sponsor disclosure, less visible sponsor disclosure, and no visible sponsor disclosure. To augment ecological validity and mimic the real-world experience of choosing one of the numerous apps available in the app store, three message repetitions were also included in the experiment (Smith et al., 1998). Each condition employed the same experimental manipulation, differing only in the design of the app interface across all experimental materials. Message repetition did not have a significant impact on any of mediator and dependent variables, with p-values ranging from 0.41 to 0.72.

The sample was composed of 254 participants, including 167 females (65.7%) and 83 males (32.7%), with three individuals opting not to disclose their gender. Their ages ranged from 18 to 28 with a mean of 21.63 (*SD* = 1.47). In terms of ethnicity, the majority were Caucasian (*n* = 172, 68.3%), followed by Asian American (*n* = 41, 16.3%), Black or African American (*n* = 21, 8.3%), and Hispanic or Latino (*n* = 11, 4.4%). The academic standing of the sample was primarily upperclassmen, with seniors (*n* = 90, 35.7%), juniors (*n* = 77. 30.6%), sophomores (*n* = 52, 20.6%), and freshmen (*n* = 26, 10.3%).

Table 1 Measurement items

		Cronbach's alpha	*Sources*
Altruistic motives	This sponsor is likely to have the best interests of the app at heart	0.959	Deitz et al. (2012), Rifon et al. (2004)
	The main reason this sponsor would be involved with the app is because the sponsor believes it deserves support		
	This sponsor sponsored the app because they care about their customers		
Self-serving motives	This sponsor sponsored the app to persuade me to buy their products	0.904	
	The main reason this sponsor supported the app because sponsorship creates a positive corporate image		
	This sponsor benefits by sponsoring consumer health and fitness app		
Attitude toward sponsor	Dislike – like	0.988	Speed and Thompson (2000)
	Unpleasant – pleasant		
	Unfavourable – favourable		
	Bad – good		
App credibility	Not qualified – qualified	0.979	Rodgers (2007)
	Not believable – believable		
	Not experienced – experienced		
	Not knowledgeable – knowledgeable		
	Untrustworthy – trustworthy		
	Biased – unbiased		
	Not reputable – reputable		
	Unethical – ethical		
	Not objective – objective		
	Not credible – credible		
App download intention	Given the chance, I intend to download and use the health app	0.983	Lee (2005)
	I expect my use of this health app to continue in the future		
	I have intention to download and use the health app\		

3.2 Stimuli development and procedures

Two pretests were performed to design and evaluate experiment stimuli. The first (n_1 = 32) was used to determine a relevant health topic for app interfaces among the top 10 most popular health app categories, including running, water drinking, counting calories, sleep, fitness, pregnancy tracker, weight loss, meditation, first aid and stress relief. The water drinking app was the most moderate score for both men and women (Cronbach's alpha for all topics ranged from 0.739 and 0.943) and was therefore selected to avoid the confounding effects of app topic selection.

Three versions of app interfaces with and without sponsorship information were created in the second pretest (n_2 = 40) on within-subjects conditions using water drinking as a selected topic. Pretest participants were asked to evaluate the degree to which the brand cue was visible on a semantic differential seven-point scale ranging from 'not visible' to 'very visible' [$F(2, 78) = 18.89, p < 0.001, \eta_p^2 = 0.33$) on each app. The highly visible sponsor disclosure condition featured the sponsor's logo prominently at the centre of the health app interface. In contrast, the less visible sponsor disclosure condition placed the sponsor's logo in a smaller size at the bottom-right corner of the interface. In the condition with no sponsor disclosure, the app interface did not display any brand logo. Three different versions of the water drinking apps were created for each within the condition (no significant effect on mediators and dependent variables) and were identical in manipulations of brand information visibility, except for the name and design features of each app. As this study used water drinking as the topic for stimuli development, the blue colour tone was consistently applied across all experimental materials (see Appendix).

In the main study, respondents read a brief description that asked them to imagine looking for a water-drinking app in their smartphone app stores and evaluate each app and their related sponsors. Participants were shown a total of nine versions of sponsored health apps in the experiment.

3.3 Measures

This study used modified measures developed in prior research (see Table 1). *Causal attributions of two sponsors' motives* were adopted from Deitz et al. (2012) and Rifon et al. (2004) and modified to fit the study context. A seven-point scale ranging from 'strongly disagree' to 'strongly agree' (Cronbach's α-s = 0.959 for Altruistic motives; 0.904 for self-serving motives) was used to rate altruistic and self-serving motive variables. Each variable included three statements. *Attitude toward the sponsor*, derived from Speed and Thompson (2000), was measured using four semantic differential seven-point items (Cronbach's α = 0.988). *App credibility* was measured using ten seven-point semantic differential scales (Cronbach's α = 0.979) adopted from Rodgers (2007). *App download intention* was measured using three seven-point Likert scales ranging from 'strongly disagree' to 'strongly agree' (Cronbach's α = 0.983) adopted from Lee (2005).

4 Results

4.1 Effects of sponsorship disclosure levels

Hypothesis 1 examined the sponsorship disclosure effects on each dependent variable, including attitudes toward app sponsors, app credibility, and intentions to download. A three-way repeated-measures ANOVA was performed to examine sponsorship disclosure effects on users' app and sponsor evaluations. Sponsorship disclosure had a significant main effect on attitudes toward the sponsor [$F(2, 506) = 47.62$, $p < 0.001$, $\eta_p^2 = 0.16$], app credibility [$F(2, 506) = 35.82$, $p < 0.001$, $\eta_p^2 = 0.12$], and intentions to download the app [$F(2, 506) = 30.46$, $p < 0.001$, $\eta_p^2 = 0.11$]. When apps showed more visible sponsorship messages compared to less or none, participants exhibited less favourable attitudes toward the sponsor ($M_{High} = 5.04$, $SD_{High} = 0.08$; $M_{Less} = 5.466$, $SD_{Less} = 0.07$; $M_{No} = 5.583$, $SD_{No} = 0.07$). Also, they rate lower credibility of ($M_{High} = 5.078$, $SD_{High} = 0.07$; $M_{Less} = 5.367$, $SD_{Less} = 0.07$; $M_{No} = 5.451$, $SD_{No} = 0.06$) and intention to download the apps ($M_{High} = 3.399$, $SD_{High} = 0.10$; $M_{Less} = 3.719$, $SD_{Less} = 0.10$; $M_{No} = 3.794$, $SD_{No} = 0.10$), when exposure to sponsorship messages was higher. Upon examining the pairwise comparisons to assess the relative effects of the three levels of sponsorship disclosure on all dependent variables (see Table 2), higher levels of sponsor disclosure were associated with more negative responses toward both the sponsor and the app, compared to conditions with less or no sponsor disclosure. It was also observed that less visible sponsor disclosure led to lower evaluations of sponsor attitudes and app credibility compared to conditions with no sponsor disclosure; however, this did not significantly impact the intention to download the app. Thus, H1a–H1c were all supported.

4.2 Effects of sponsor motive attributions

Hypothesis 2 posited that varying levels of disclosure in sponsorship messages (higher or lower or absent) would influence consumer attributions of app sponsors' altruistic motives and self-serving motives. A three-way repeated-measures ANOVA indicated that the level of sponsorship disclosure significantly impacted consumer attributions of app sponsors' altruistic [$F(2, 504) = 29.77$, $p < 0.001$, $\eta_p^2 = 0.11$] and self-serving [$F(2, 504) = 10.85$, $p < 0.001$, $\eta_p^2 = 0.04$) motives. When sponsorship messages were either less prominent or absent, participants attributed stronger altruistic motivations to the sponsors ($M_{High} = 4.781$, $SD_{High} = 0.08$; $M_{Less} = 5.118$, $SD_{Less} = 0.07$; $M_{No} = 5.199$, $SD_{No} = 0.07$). Conversely, higher exposure to sponsorship messages resulted in higher attributions of selfish motivations ($M_{High} = 5.253$, $SD_{High} = 0.07$; $M_{Less} = 5.216$, $SD_{Less} = 0.07$; $M_{No} = 5.034$, $SD_{No} = 0.07$). In pairwise comparisons assessing the impact of the three levels of sponsorship disclosure on motivational attributions (see Table 3), altruistic motivational attributions were influenced by the intensity of message disclosure, with no significant difference observed between low levels of disclosure and no disclosure. However, for selfish motivational attributions, no significant differences were noted between conditions with more or less exposure to sponsorship messages. Instead, it was found that the mere presence or absence of sponsorship disclosure influenced attributions of selfish motivations to the sponsor. Therefore, H2a–H2b were supported.

Table 2 Pairwise comparisons of sponsorship disclosure effects on users' evaluations

		Sponsor attitude			*App credibility*			*Download intentions*		
		Mean	*SD*		*Mean*	*SD*		*Mean*	*SD*	
High		5.04	0.08		5.08	0.07		3.399	0.10	
Less		5.47	0.07		5.37	0.07		3.719	0.10	
No		5.58	0.07		5.45	0.06		3.794	0.10	
		Mean difference	*SD*	*Sig.*	*Mean difference*	*SD*	*Sig.*	*Mean difference*	*SD*	*Sig.*
High	Less	–0.425***	0.06	0.000	–0.289***	0.04	0.000	–0.321***	0.05	0.000
	No	–0.543***	0.07	0.000	–0.373***	0.05	0.000	–0.395***	0.06	0.000
Less	High	0.425***	0.06	0.000	0.289***	0.04	0.000	0.321***	0.05	0.000
	No	–0.117*	0.05	0.017	–0.084*	0.04	0.044	–0.075	0.05	0.113
No	High	0.543***	0.07	0.000	0.373***	0.05	0.000	0.395***	0.06	0.000
	Less	0.117*	0.05	0.017	0.084*	0.04	0.044	0.075	0.05	0.113

Note: *$p \leq 0.05$, **$p \leq 0.01$ and ***$p \leq 0.001$.

Table 3 Pairwise comparisons of sponsorship disclosure effects on motive attributions in mHealth apps

		Altruistic motives			*Self-serving motives*		
		Mean	*SD*		*Mean*	*SD*	
High		4.781	0.08		5.253	0.07	
Less		5.118	0.07		5.216	0.07	
No		5.119	0.07		5.034	0.07	
		Mean difference	*SD*	*Sig.*	*Mean difference*	*SD*	*Sig.*
High	Less	–0.336***	0.06	0.000	0.038	0.05	0.467
	No	–0.418***	0.06	0.000	0.219***	0.06	0.001
Less	High	0.336***	0.06	0.000	–0.037	0.05	0.467
	No	–0.081	0.05	0.089	0.182***	0.06	0.001
No	High	0.418***	0.06	0.000	–0.219***	0.06	0.001
	Less	0.081	0.05	0.089	–0.182***	0.06	0.001

Note: *$p \leq 0.05$, **$p \leq 0.01$ and ***$p \leq 0.001$.

4.3 Mediation effects of sponsor motive attributions

Hypothesis 3 predicted that consumer attribution of sponsors' altruistic motives would mediate the relationship between the level of sponsorship disclosure and outcomes, including sponsor attitudes, app credibility, and intentions to download apps. To investigate the mediating roles of attributed altruistic motives of sponsors on the dependent variables, three distinct within-subjects mediation models were analysed using MEMORE macro for SPSS (Montoya and Hayes, 2017), with each model corresponding to a different dependent variable. Results indicated that consumers' attributions of sponsors' altruistic motives significantly predicted not only their evaluations of the app but also of the sponsors. Specifically, when comparing the more visible sponsorship messages than less or no visible sponsorship messages presented, there were significant partial mediation effects of sponsors' altruistic attributions on sponsor attitudes ($\beta_{High\text{-}No}$ = –0.2797, *SE* = 0.0550, 95% CI [–0.3902, –0.1742]; $\beta_{High\text{-}Less}$ = –0.2081, *SE* = 0.0429, 95% CI [–0.2973, –0.1296]), app credibility ($\beta_{High\text{-}No}$ = –0.1860, *SE* = 0.0397, 95% CI [–0.2679, –0.1126]; $\beta_{High\text{-}Less}$ = –0.1369, *SE* = 0.0301, 95% CI [–0.2004, –0.0824]), and app download intentions ($\beta_{High\text{-}No\ app}$ = –0.1728, *SE* = 0.0380, 95% CI [–0.2521, –0.1038]; $\beta_{High\text{-}Less}$ = –0.1288, *SE* = 0.0309, 95% CI [–0.1954, –0.0743]). However, when comparing less visible and non-visible sponsorship messages presented, no significant mediation effects were observed of sponsors' altruistic motive attributions on the relationship between sponsorship disclosure and dependent variables.

Table 4 Bootstrapped conditional indirect effects of motive attributions

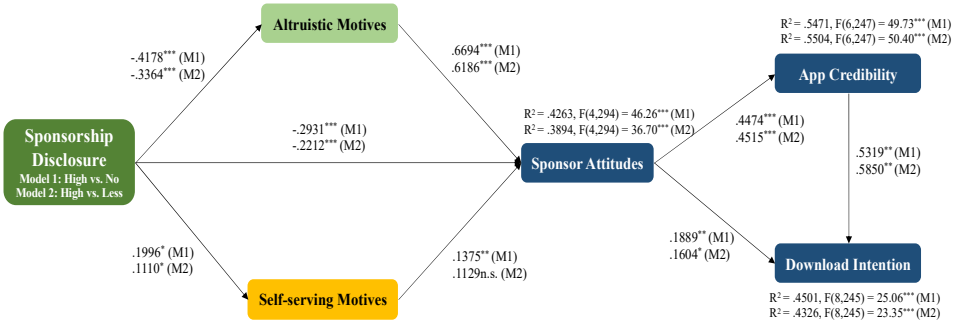
		Altruistic motives			*Self-serving motives*		
		B	*SE*	*95%CI*	*B*	*SE*	*95%CI*
High – no	Sponsor attitude	–0.2797	0.05	(–0.3902, –0.1742)	0.0301	0.02	(0.0008, 0.0604)
	App credibility	–0.1860	0.04	(–0.2679, –0.1126)	0.0362	0.02	(0.0441, 0.0763)
	Download intentions	–0.1728	0.04	(–0.2521, –0.1038)	0.0326	0.02	(0.0018, 0.0746)
High – less	Sponsor attitude	–0.2081	0.04	(–0.2973, –0.1296)	0.0125	0.01	(–0.0101, 0.0389)
	App credibility	–0.1369	0.03	(–0.2004, –0.0824)	0.0128	0.01	(–0.0048, 0.0362)
	Download intentions	–0.1288	0.03	(–0.1954, –0.0743)	0.1288	0.03	(–0.0040, 0.0332)
Less – no	Sponsor attitude	–0.0356	0.02	(–0.0890, 0.0046)	0.0406	0.02	(0.0124, 0.0766)
	App credibility	–0.0267	0.02	(–0.0695, 0.0034)	0.0239	0.01	(–0.0029, 0.0524)
	Download intentions	–0.0197	0.01	(–0.0472, 0.0021)	0.0298	0.02	(0.0023, 0.0698)

Hypothesis 4 posited that the relationship between the level of sponsorship disclosure and outcomes – such as attitudes toward sponsors, app credibility, and intentions to download apps – would be mediated by consumers' attribution of self-serving motives to sponsors. It was observed that attributions to sponsors' selfish motives had a significant partial mediating effect on the negative impact of sponsorship disclosure on sponsor attitudes. Notably, there were no significant differences in the strength of sponsor disclosure. However, the mere presence or absence of sponsor disclosure itself negatively impacted attitudes towards sponsors ($\beta_{High\text{-}No}$ = 0.0301, *SE* = 0.0152, 95% CI [0.0008, 0.0604]; $\beta_{Less\text{-}No}$ = 0.0406, *SE* = 0.0165, 95% CI [0.0124, 0.0766]), app credibility ($\beta_{High\text{-}No}$ = 0.0362, *SE* = 0.0188, 95% CI [0.0041, 0.0763]; $\beta_{Less\text{-}No}$ = 0.0239, *SE* = 0.0140, 95% CI [–0.0029, 0.0524]), and download intentions ($\beta_{High\text{-}No}$ = 0.0326, *SE* = 0.0189, 95% CI [0.0018, 0.0746]; $\beta_{Less\text{-}No}$ = 0.0298, *SE* = 0.0175, 95% CI [0.0023, 0.0698]), with this effect being mediated by attribution of self-serving motives. Consumers' attributions of sponsors' motives were found to be significant predictors of their evaluations of the app. Specifically, consumer attribution of sponsors' altruistic motives strengthened the negative relationships between sponsor visibility as well as app and sponsor evaluations, while self-serving motives also strengthened these relationships. H3a–H3c were thereby supported.

4.4 Serial mediation effects of sponsor motive, sponsor attitudes and app credibility

To test the proposed research question, we conducted serial mediation analyses in MEMORE macro with 10,000 bootstrap samples. Participants' download intention was entered as the dependent variable and their evaluations of sponsor motives, sponsor attitudes, and app credibility were entered as mediators (see Figure 2). Results showed significant mediation effects in the comparison models for higher and no visible sponsorship disclosure conditions (R^2 = 0.4501, $F(8, 245) = 25.06$, $p < 0.001$; total effect: β = –0.3955, *SE* = 0.0597, 95% CI [–0.5130, –0.2779], direct effect: β = –0.0826, *SE* = 0.0529, 95% CI [–0.1968, 0.0217]) and for higher and less visible sponsorship disclosure conditions (R^2 = 0.4326, $F(8, 245) = 23.35$, $p < 0.001$; total effect: β = –0.3163, *SE* = 0.0537, 95% CI [–0.4221, –0.2104], direct effect: β = –0.0649, *SE* = 0.0465, 95% CI [–0.1565, 0.0267]). No significant mediation effect was found in the model for less and no visible comparison conditions (R^2 = 0.3184, $F(8, 245) = 14.31$, $p < 0.001$; total effect: $\beta_{Less\text{-}No}$ = –0.0792, *SE* = 0.0470, 95% CI [–0.1718, 0.0134], direct effect: β = –0.0342, *SE* = 0.0414, 95% CI [–0.1157, –0.0473]). When sponsorship disclosure impacted app download intention, altruistic motivation attributes, sponsor attitude, and app credibility exhibited significant and positive indirect effects, acting as sequential mediators ($\beta_{High\text{-}No}$ = –0.0665, *SE* = 0.0167, 95% CI [–0.3585, –0.1500]; $\beta_{High\text{-}Less}$ = –0.0550, *SE* = 0.0168, 95% CI [–0.0926, –0.0269]). Also, there were partial indirect effects of sponsorship disclosure on app download intentions through the mediation of self-serving motive attributions, sponsor attitude and app credibility ($\beta_{High\text{-}No}$ = 0.0065, *SE* = 0.0041, 95% CI [0.0001, 0.0158]; $\beta_{High\text{-}Less}$ = 0.0033, *SE* = 0.0034, 95% CI [–0.0025, 0.0108]; $\beta_{Less\text{-}No\ app\ download\ intentions}$ = 0.0097, *SE* = 0.0048, 95% CI [0.0025, 0.0208]).

Figure 2 Results for serial mediation analyses (see online version for colours)



Note: *$p \leq 0.05$, **$p \leq 0.01$ and ***$p \leq 0.001$.

5 Discussion

5.1 Primary findings

This study explored the influence of disclosing sponsor information on apps, focusing on the attributes of sponsors' motives, attitudes towards sponsors, and evaluations of the apps. The research examined how consumers' perception of two distinct motives (i.e., altruistic, self-serving) affects their attitudes towards sponsors, trust in the apps, and intention to download. Specifically, it investigated the changes in consumers' attribution of motives to sponsors when sponsor identification is more emphasised on the app interface, and whether this attribution leads sequentially to the formation of negative attitudes towards sponsors, a decrease in app credibility, and a reduced intention to download. This study provides new insights by empirically validating the findings of previous research regarding sceptical reactions that arise from the exposure of app provider types, associated sponsors, and brand-related cues in mobile health contexts (Joo et al., 2021; Kanthawala et al., 2019). Furthermore, this study not only elucidates the dual impact that the level of sponsor disclosure exerts on both the app and the sponsor but also systematically explains consumer responses through psychological mechanisms, utilising the mediating role of attributions to the true motives of sponsors.

Firstly, this study revealed that the disclosure of sponsors on the app interfaces directly and negatively affects attitudes towards sponsors and app evaluations. In particular, the way corporate sponsors are disclosed significantly impact attitudes towards these sponsors, trust in the app, and download intentions. Participants demonstrated negative attitudes towards sponsors when sponsorship messages were more prominently displayed in the app. This led to lower credibility ratings for the app, ultimately reducing the intention to download the app. These findings extend the evidence on factors influencing consumer evaluations of health apps. Consumers process various cues presented in the app interface cognitively when selecting health apps. These cues may include information directly related to the app's functions or features, as well as characteristics of content providers associated with the app, including the presence of sponsors and advertisers.

Second, the evaluation of a sponsor's motives was found to vary depending on the level of disclosure provided by the sponsor. When sponsors were highly disclosed

compared to conditions where they were less visible, there was a significant decrease in the perception of altruistic motives. However, the perception of selfish motives did not change significantly. When conditions with fewer sponsorship messages were compared to those with no sponsorship messages at all, there was not a significant decrease in the perception of altruistic motives, but there was a notable increase in the perception of selfish motives. Furthermore, in conditions where sponsors were highly disclosed compared to those with no sponsorship messages, perceptions of altruistic motives decreased while perceptions of selfish motives increased. This suggests that as the level of sponsor disclosure intensifies, consumers are influenced to attribute fewer altruistic motives to sponsors. Conversely, the attribution of selfish motives to sponsors by consumers is more significantly influenced by the presence or absence of disclosure itself than by the level of disclosure. In summary, the mere exposure of sponsorship messages can enhance the attribution of selfish motives, but as the level of disclosure decreases, the attribution of altruistic motives can also occur.

Lastly, the results of this study confirmed that the level of sponsor disclosure influences both sponsor attitudes and app evaluations, with altruistic and selfish sponsorship motives playing a significant role as mediating variables in this process. The attribution of sponsorship motives not only shapes attitudes towards sponsors but also affects the trustworthiness of the app and the intention to download it. Specifically, when comparing situations where sponsor information is highly disclosed to those where it is not disclosed at all, both altruistic and selfish motives showed significant mediating effects. In situations where sponsor information is highly disclosed compared to those where sponsors are relatively less visible, only the attribution of altruistic motives had a significant impact on the app and sponsor evaluations. Moreover, when comparing low levels of sponsor disclosure to no disclosure at all, only selfish motives acted as significant mediators, exerting an indirect effect.

In summary, the attribution of altruistic and selfish motives was found to mediate app and sponsor evaluations in parallel, depending on the level of sponsor disclosure. When there was clear sponsor disclosure, both motives were attributed simultaneously. As the level of sponsor disclosure decreased, the attribution of altruistic motives had a greater influence on consumer responses. Conversely, the attribution of selfish motives had a greater impact on consumer responses depending on whether or not there was sponsor disclosure.

5.2 Theoretical implications

There are three major theoretical implications derived from this study. First, this study explored the nuanced effects of varying levels of sponsorship disclosure on consumer perceptions and behaviours within the context of health app interfaces, focusing on how consumers perceive sponsors' motives and how this perception influences their decision to download health apps. The research provides valuable insights, extending the theoretical understanding of the impact of sponsorship disclosure – specifically, the visibility and prominence of sponsorship messages – on consumer attitudes towards sponsors and app evaluations. Although attribution theory has been utilised in various studies related to marketing and sponsorship, there has been a lack of research examining the influence of sponsorship activities in personalised mobile environments, like apps, on the usage and adoption of mobile media. The findings of this study underscore the

significance of consumers' perceptual responses to sponsors, highlighting that these responses, which are influenced by the level of sponsorship information disclosure, play a pivotal role in shaping attitudes towards sponsors and in the selection of sponsored content.

Second, this study underscores the dynamic and multifaceted characteristics of consumer perceptions, providing empirical evidence against oversimplifying these perceptions as static or unchanging. It elucidates that these perceptions are intricately shaped not only by the degree of sponsor disclosure but also by the genuine motives consumers attribute to sponsors. This interplay significantly influences consumers' attitudes and behavioural intentions towards both sponsors and their associated apps. In scenarios where sponsorship disclosure levels are pivotal in app evaluations, the study identifies consumers' assessments of sponsors' motives and their resultant attitudes towards sponsors as key mediating variables. These variables exert subtle yet impactful indirect effects, highlighting the dual impact attributions have on both sponsors and the content they sponsor. Furthermore, the dynamic nature of how consumers attribute motives to sponsors should not be misunderstood or excessively simplified as a fixed consumer perception.

Finally, the findings of this research offer significant theoretical implications by extending and applying attribution theory to the context of mobile marketing communication. They provide invaluable insights into the cognitive processes consumers employ when evaluating sponsored content, enhancing the understanding of how consumers' attributions of sponsors' motives (i.e., altruistic, self-serving) serve as pivotal mediators in their responses to sponsors as well as apps. This study highlights the importance of altruistic motivation and self-service motivation in understanding consumer responses to different levels of sponsorship disclosure. Future research should explore the influence of various cognitive factors on consumers' attributions to sponsors' motives, including past experiences, knowledge of CSR initiatives, and individual differences in the perception and use of sponsored apps. Incorporating theoretical frameworks like the persuasion knowledge model or the elaboration likelihood model in future studies will help discern the differential impacts of these cognitive factors among individuals, fostering a more comprehensive understanding of the complex dynamics influencing consumers' responses to sponsored content in mobile marketing communications (Boerman et al., 2017; Campbell and Kirmani, 2000; Xie and Feng, 2023).

5.3 Managerial implications

The findings of this study carry potential implications for policy and practice in the realm of health app marketing and corporate sponsorship. By examining the impact of sponsorship disclosure on consumer perceptions and attitudes, this research can inform policies related to corporate sponsorship of health apps and guide app developers in enhancing their marketing strategies. The findings emphasise the importance of balanced sponsorship disclosure. Excessive sponsorship messages can lead to negative evaluations of sponsors, suggesting that marketers need to craft creative strategies for disclosing sponsorship without being overly intrusive. This involves subtly incorporating brand-level information, such as logos, slogans, or taglines that resemble traditional advertising, to minimise consumer attributions of corporate profit motives.

Furthermore, the study illuminates the dynamic and multifaceted nature of consumer perceptions, underscoring the need for a strategic understanding of these perceptions by marketers aiming to optimise the impact of sponsorship messages within health apps. Consumer evaluations of sponsors are significantly influenced by their attributions of sponsors' motives. While health app users do not entirely dismiss altruistic motives, the presence of logos tends to increase the attribution of self-promotional motives to sponsors. Therefore, marketers should be aware that any form of sponsor identification can lead to higher attributions of self-promotional motives. It is imperative to mitigate factors that might arouse consumer scepticism before revealing sponsor identification to maintain a positive brand image and consumer trust.

Lastly, for app developers and practitioners, the study's results offer crucial insights into the implications of featuring commercial sponsors. The association with commercial sponsors, especially for health apps offering personalised services based on individual health data, can induce user scepticism, impacting user decisions and perceptions negatively and potentially hindering app growth. To foster long-term app development and credibility in the competitive marketplace, practitioners should not only offer technically customised feedback through increased financial sponsorship but also work diligently to alleviate user concerns and scepticism regarding the use of sponsored apps. This approach, grounded in a nuanced understanding of sponsorship disclosure and consumer perception dynamics, will support the sustained growth and credibility of health apps in the competitive digital landscape.

5.4 Limitations and future research

This study offers valuable insights but must be considered with its limitations. Firstly, the study primarily investigates responses to sponsorship messages within the context of health apps, leaving the generalisability of the findings to other app categories or digital platforms uncertain due to the unique behaviours and attitudes of health app users. The behaviours and attitudes of health app users may differ from those of users of other apps, and these differences might influence their reactions to sponsorship messages.

Secondly, there was a gender imbalance among the participants, with a higher number of females. Since gender may influence cognitive responses and evaluations of sponsors and apps, future research should explore the impact of these characteristics further. It might also be beneficial to consider specific participant characteristics, such as diverse age groups, cultural backgrounds, and levels of technology acceptance, for a broader understanding of sponsored health app choices. By considering sponsor/brand-related variables like brand awareness, sponsor-app fit, and brand preference it is possible to develop latent variables that influence users' perceptions and reactions. Subsequent research should consider these factors for a more systematic and comprehensive understanding of user responses to sponsorship disclosure levels within mobile content.

Lastly, the sample size, composition, and data patterns of this study can influence the results. This research focused on how consumers attribute sponsors' motives when exposed to sponsor disclosure, and how this attribution affects their attitudes and intentions towards apps and sponsors. Despite this focus, data on actual download behaviours or app usage patterns by users were not included. Future research should delve deeper into understanding the relationship between users' attitudes and intentions and their actual behaviours by utilising other advanced statistical techniques. Even

considering these limitations, the findings of this study hold value as preliminary research, providing empirical evidence for more extensive and systematic follow-up studies.

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Appendix

Examples of apps with different levels of sponsorship disclosure (see online version for colours)