EFFECTS OF SOCIAL ENDORSEMENT CUES ON THE SPREAD AND ADOPTION OF HEALTH MISINFORMATION: SOCIAL NORMS AND CREDIBILITY ASSESSMENT PROCESSES AS EXPLANATORY MECHANISMS

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ABSTRACT

EFFECTS OF SOCIAL ENDORSEMENT CUES ON THE SPREAD AND ADOPTION OF HEALTH MISINFORMATION: SOCIAL NORMS AND CREDIBILITY ASSESSMENT PROCESSES AS EXPLANATORY MECHANISM

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Given that the spread and adoption of health misinformation have become a major public health issue, this study aimed to illuminate the psychological processes through which social media users judge the credibility of health misinformation on social media and adopt misinformed health behaviors, focusing on the role of social endorsement cues, specifically number of "likes".

Based on the MAIN (Modality, Agency, Interactivity, and Navigability) model (Sundar, 2008) and the Focus Theory of Normative Conduct (Cialdini et al., 1991), the present study conducted two experimental studies with a 2 (Social endorsement cues by distant ties: a low number of likes vs. a high number of likes) x 2 (Social endorsement cues by close ties in one's network: presence of likes by close ties vs. absence of the likes by close ties) factorial design with two different health topics. The results indicated that social endorsement cues (i.e., number of likes) from the two different referent groups created perception of social norms – both descriptive and injunctive norms around the misinformed health behavior. The likes from one's close ties on the social network were more influential in creating perceived social norms, compared to the ones from distant ties. Further, the perceived social norms, in particular, the injunctive norm of close ties and the descriptive norm of distant ties, increased the perceived credibility of health misinformation. The social endorsement cues from close ties, in particular, increased the two different behavioral intentions related to the spread of health misinformation

(i.e., intention to share) and adoption of health misinformation (i.e., intention to engage in the misleading health behavior). Theoretical implications and practical applications of the findings were discussed.

I dedicate this dissertation to my loving family, my mom WonKyung Park, my dad Jeechang Rheu, my sister Minhye Rheu, and my husband Jihoon Han.

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CHAPTER 1: INTRODUCTION

Social media has become an integral part of our daily lives, as shown that about 70% of US adults now using one or more social media platforms on a daily basis (Pew Research Center, 2021). Importantly, social media platforms have become an essential space for people to seek health information over the past decades, as shown in a recent study that reported 72% of social media users (people who have one or more social media accounts) have used social media to find relevant health information (Health Information National Trends Survey [HINTS], 2019).

Health information on social media comes from diverse sources. The Internet allows literally anyone who has access to it to generate and share health information. This allowed non-experts sources of health information, including layperson Internet users, social media influencers, or food companies to generate a vast amount of health information online on a daily basis. A critical issue is that oftentimes these information providers spread knowledge that is inaccurate and potentially harmful to many individuals, i.e., health misinformation.

Health misinformation can be defined as false and inaccurate information related to one's physical and mental health that lacks scientific evidence, proper verification from trusted sources, and/or a consensus made by scientific communities (Chou et al., 2018; Krishna & Thompson, 2021; Swire-Thompson & Lazer, 2020). Health misinformation often contains behavioral components, promoting various health behaviors, such as following a regimen to prevent a certain disease or taking nutritional supplements to manage one's health or improve one's appearance.

The biggest issue pertaining to health misinformation on social media is that false information can spread far more quickly and widely than accurate information (Sommariva et al., 2018; Vosoughi et al., 2018). As social media allows users to share information easily with a

single click, it has become so much easier for misinformation to spread quickly through densely connected networks on social media platforms. Even though health misinformation may be shared only among particular network members at first, once it is shared with a person located at the center of many overlapped networks (i.e., high betweenness centrality), the misinformation spread to a great number of people who are connected through different networks, exposing the wide public to the falsehood (Seymour et al., 2015).

Another dire problem related to health misinformation is that it often results in harmful physical or mental health consequences, endangering many individuals who adopt misinformation in their health decisions. For example, the anti-vaccination movement and the resultant measles outbreak in 2019 across many countries including the United States is a stark example that shows how health misinformation can be a global health threat (Benecke & DeYoung, 2019). The current ongoing example is misinformation during the COVID-19 pandemic, which has caused a lot of confusion and misunderstanding among the public about its transmission, prevention, treatments, and vaccination (Nsoesie & Oladeji, 2020). In worst cases, people have lost their lives because they followed health misinformation without verifying it (Neporent, 2014). As seen in these examples, the spread and adoption of health misinformation have become grave issues that lead to serious health consequences not only at an individual level but also at a societal level.

Health information has direct bearings on individuals' physical and mental health and should be consumed and adopted with caution. However, in the era of social media, fact-checking or verification of health information is often neglected or simply not feasible due to the overwhelming amount and rapid spread of health misinformation. Consequently, over the past

decades, health misinformation has become an ever more serious and consequential issue in our society (Nan et al., in press).

Given health misinformation on social media has become one of the most serious threats to public health, it is necessary to understand what aspects of social media facilitate the spread and adoption of health misinformation. There are a number of different characteristics of social media that facilitate the spread and adoption of health misinformation (Resende et al., 2019; Vosoughi et al., 2018; Vraga & Bode, 2017). This dissertation particularly focuses on the unique features of social media that may facilitate the spread and mindless acceptance of health misinformation: social endorsement cues.

Social endorsement cues (e.g., number of likes and shares) are information about other people's liking, approval, and agreement with a social media post or the person who posts the content (Hayes et al., 2016). The most typical form of social endorsement cue is "like" on Facebook or similar features such as "favorite" on Twitter, "heart" on Instagram, or "thumbs-up" on Reddit. Such type of social endorsement cue has become a quintessential component of many different types of social media platforms.

Importantly, current social media platforms provide social endorsement cues generated by two different groups of social ties: close ties and distant ties. Social endorsement cues by distant ties are quantified indications of how many other social media users in general liked, viewed, or shared certain social media content. Further, users can see whether their close social media connections (e.g., close ties in the physical world that are connected on a social media platform) interacted to a certain social media post. The exposure to social endorsement cues by distant and close connections allows people to quickly gain the idea of how popular or relevant the content of a social media post is to other people.

This dissertation argues that this particular feature of social media is one of the important contributing factors that makes social media a space conducive to the spread and adoption of health misinformation. Specifically, the study focuses on the role of social endorsement cues in forming the perception of social norms around health misinformation, which subsequently influences credibility judgment of such information, and, in turn, influences the intention to share or adopt the health misinformation.

Social norms are generally defined as implicit understandings of particular behavior that is shared among people (Abrams et al., 1990; Elster, 1989). There are two distinct types of social norms – descriptive norms and injunctive norms (Cialdini, 1990). Descriptive norms refer to what is mostly done in a society, in other words, the prevalence of certain behavior. Injunctive norms refer to perceived social approval of certain behavior. People rely on perceived descriptive and injunctive social norms when making behavioral decisions in a given situation.

Considering that social endorsement cues represent an aggregate reaction of others to a certain piece of information on social media (i.e., social media post), as well as approval of the information by close ties, such cues may inform individuals of how other people evaluate and accept the health misinformation. For instance, a high number of social endorsement cues (e.g., a high number of likes) to a social media post that introduces a recipe to improve one's immunity may give an impression to the users that the health behavior described in the social media post (i.e., cooking the recipe) is widely practiced or approved by other people. On the contrary, a low number of social endorsement cues may create an impression that the behavior is not popular or approved by other people. Therefore, it is reasonable to posit that such cues, by forming a perception of social norms around the information, provide one with a basis for judgment about

whether they should trust and adopt the health behavior introduced in a social media post, without having to critically think through the content or reading comments.

That is, perceived social norms around certain health-related information can influence the perceived credibility of the information because whether or not certain information is widely utilized (i.e., descriptive norms) and approved (i.e., injunctive norms) by other people is an important factor that people use to decide the credibility of the information (Schwarz et al., 2016). Increased credibility can then lead to an increased likelihood of sharing the health misinformation with others or applying it to one's health practices, as demonstrated in previous research that credibility is an important factor in one's decision to share and adopt online information (Ha & Ahn, 2011; Chung et al., 2015; Yaqub et al., 2020).

Given that these cues can be generated by either generic others (i.e., any users on a social media platform) or by one's close friends in their network, the present study argues that each of these cues will influence people's perception of social norms – both descriptive and injunctive norms – of proximal others (i.e., close ties on a social media platform) as well as distant others (i.e., general other users of the platform). Previous research on social endorsement cues and social norms primarily focused on the effect of social endorsement cues generated by non-specific, generic others on a given social media platform. However, considering social norms of proximal and distant ties can have a differing influence on individuals' behavior (e.g., Park & Smith, 2007; Yun & Silk, 2011), perceived social norms of close and distant ties may have varying influences on perceived credibility of health misinformation as well as one's decision to take the information in their own health decision making. Exploring normative influences of close and distant social media connections will add valuable knowledge to the existing research,

as visible endorsements of social media content by close connections is a key feature available on many social media platforms.

In summary, this dissertation aims to explore the psychological processes through which social endorsement cues result in behavioral intention to share and adopt health misinformation. This study proposes that social endorsement cues form perceptions of both descriptive and injunctive norms of close and distant ties around health misinformation, which subsequently increase the perceived credibility of the misinformation. Then the increased credibility leads to a higher intention to share the misinformation with others as well as the intention to engage in the misinformed health behavior. The present study aims to illuminate whether social endorsement cues from close and distant ties have varying influences on credibility judgment and the subsequent behavioral outcomes.

Although previous research explored the effect of social endorsement cues and their relation to social norms (e.g., Chung, 2019; Kim, 2018), the topic has been relatively understudied in health domains as pointed out in a recent study (Calabrese & Zhang, 2019), and further, it has rarely been studied in the context of health misinformation (Li et al., 2019). Given that social media has become the mecca of health misinformation, it is of critical importance to examine how one of the most distinct and essential features of social media – social endorsement cues – influence the proliferation of health misinformation and illuminate what psychological processes are involved in the spread and adoption of health misinformation. This dissertation adds to the existing knowledge regarding how and why health misinformation has become such an urgent issue in the era of social media.

CHAPTER 2: HEALTH MISINFORMATION AND SOCIAL MEDIA

2.1 Spread and adoption of health misinformation

The Internet has become a go-to source for health information for many people around the world. According to Health Information National Trends Survey in 2019, over 72% of Americans reported that they go online to look for information about health and medical topics. Further, 64% of the respondents reported that they trust the Internet as a health information source to "some" extent or "a lot" (HINTS, 2019).

However, concerningly, a large amount of health information online is inaccurate or misleading (Southwell & Thorson, 2015; Swire-Thompson & Lazer, 2020). Previous research of health misinformation on various social media platforms has found that a large portion of health information on social media platforms is either misleading, inaccurate, or unverifiable. For example, in a study about medical misinformation pertaining to the COVID-19 pandemic on Twitter, among sampled tweets, about 25% included misinformation and 18% included unverifiable information (Kouzy et al., 2020). Another study that examined the quality of psoriasis-related content on YouTube found that 21% of the analyzed videos was misleading, containing incorrect or unsubstantiated information about psoriasis (Qi et al., 2016). A recent systematic review of the prevalence of health misinformation on social media revealed that misinformation rates of social media posts about various health topics ranged from 30% to 43% on average (Suarez-Lledo & Alvarez-Galvez, 2021).

The prevalence of health misinformation is partially because the Internet has allowed virtually anyone with access to online spaces can create and share information about health even if they do not have expertise in various health topics. While this is empowering for the public to exchange emotional support and useful health knowledge with each other, it also opened the

door to the unprecedented risk of the two most critical issues around health misinformation – spread and adoption of health misinformation. Along with the influx of health (mis)information online, more and more people rely on non-experts when looking for information about their health concerns or interests (Mahoney et al, 2015; Bakke., 2019).

One of the reasons why health misinformation is so prevalent is that the spread of information on social media is much faster than in offline settings. Social media platforms afford individuals an access to vastly broader networks and information, and online content can be easily shared by a large number of people through these networks with a single click (Majchrzak et al., 2013). Likewise, health misinformation as well can spread much quickly through densely connected social networks due to the technological affordances of social media platforms. For example, even though health misinformation is shared only among particular network members initially, once it is shared with a person located at the center of many overlapped networks (i.e., high betweenness centrality), it creates new opportunities for the health misinformation to spread to entirely new networks of people, exposing the wider public to the false information (Seymour et al., 2015). Adding more to the problem, it was found that falsehoods spread far more quickly and widely than accurate information on social media (Sommariva et al., 2018; Vosoughi et al., 2018).

Another crucial issue in health misinformation is that health misinformation can have significant negative health consequences when adopted carelessly. A stark example is the measles outbreaks in 2019 in many counties including the United States, as a result of the so-called anti-vaccine movement. Although it had been almost eradicated globally thanks to the development of the vaccine and wide vaccination at an early age across the globe, measles has made a comeback because some people decided not to vaccinate their children following the

widespread misinformation about side effects of vaccination (Benecke & DeYoung, 2019). This shows that even when a few individuals make health decisions based on misinformation, the repercussion of that decision can influence the entire society, sacrificing even those strictly following health guidance made by reliable health and medical sources. In worst cases, people lost their lives because they followed the misinformation without verifying it. For example, in Nigeria, two young men lost their lives because they drank a fatal amount of saltwater to avoid catching the Ebola virus, which was later found out as a social media hoax (Neporent, 2014).

As demonstrated in these examples, the spread and mindless adoption of health misinformation on social media have become grave issues that have real consequences not only at an individual level but also at a societal level. Further, once it is widely shared among the public, it is extremely difficult to roll it back and correct it (Keselman et al., 2008; Lewandowsky et al., 2012). Therefore, it is crucial to illuminate particular characteristics of social media that facilitate the motivation to spread and/or adopt such information and examine the psychological mechanism that underlie it to prevent them preemptively.

2.2 Types and characteristics of health misinformation

Health misinformation is defined as a health claim that lacks scientific evidence or consensus among the scientific community or is based on unscientific or inaccurate evidence (Chou et al., 2018; Krishna & Thompson, 2021; Swire-Thompson & Lazer, 2019). Misinformation itself is not a novel phenomenon. It has existed throughout the long human history. Early records of misinformation trace back to the fourteenth and sixteenth centuries (O'Connor &Weatherall, 2019). Along with the advancement of science, what was considered true or false has been constantly changing, as new scientific discoveries have come to light and

technologies and scientific research methods evolve. Much of the health misinformation that once had been widely accepted has been refuted by novel scientific findings. For example, in the early 20th century, millions of bottles of opiate and alcohol-laced medicine were sold as a soothing and calming remedy for infants (Protto et al., 2021), which is unthinkable by today's standard.

However, with the overwhelming amount of health (mis)information created and shared online on a daily basis, it is becoming increasingly more difficult to verify what is true and what is false. There are several distinctive characteristics of health misinformation commonly found online. Current research suggests that health misinformation is different from typical scientific information in some aspects (Bellows & Moore, 2013; Ecker et al., 2014; Nan et al., in press; Teoh, 2019; Xu & Guo, 2018), which I summarized into four different themes: appeals to emotions, ambiguous sources and evidence, reliance on testimonials, and promotion of socially acceptable images.

First, health misinformation attempts to arouse strong emotional reactions. For example, an analysis of anti and pro-vaccine messages revealed that common sentiments of anti-vaccine messages include fear, anger, or sadness (Xu & Guo, 2018). In a similar vein, it tends to promise an immediate fix or result for complicated health problems, using exaggerated and extravagant words (e.g., break-through, miracle, secret, etc.). Second, regarding source and evidence, health misinformation tends to draw simplistic conclusions using evidence or research that lacks comprehensive scientific support or explanations, but seemingly convincing (for instance, by selectively using or misleading facts and/or research results). Sources of health misinformation are often dubious, such as self-proclaimed health professionals or advisors. Third, it is often based on anecdotes and testimonials of people who have been, for example, using a health

product or practicing a regimen, in contrast to scientific messages that are usually backed up by facts and statistics (Bellows & Moore, 2013; Teoh, 2019). Lastly, health misinformation promotes socially accepted images and associates the information with a healthy lifestyle, especially when attempting to sell a product (de Regt et al., 2020)

These distinctive characteristics of health misinformation makes it very difficult for people to disentangle trustworthy and valid health information from false information. This is especially true for health misinformation that is unverified and misleading, rather than for health misinformation that is scientifically proven wrong. However, existing research on health misinformation has primarily focused on misinformation that is unequivocally false, the most representative example being the association between vaccination for contagious diseases and autism (Nan et al., in press). For instance, a systematic review of health-related misinformation on social media found that among the 50 studies included in the review, 37 studies were about vaccination and/or contagious virus (e.g., Ebola and Zika virus), while there has been a relative lack of studies for other topics, such as misinformation about diet and nutrition, cancer prevention or treatments, smoking products, or water safety.

Undoubtedly, unequivocally false arguments, such as anti-vaccination movement, can be a serious threat to public health, although they are not accepted or shared by the general public. However, in reality, subtle and unverifiable health information takes up the majority of health misinformation compared to ostensibly false arguments and its influence on public health is not negligible. Many types of misinformation we come across daily on social media include advertisements for miraculous cures, life-changing dietary supplements, or quick and substantial weight loss schemes. Because these types of health misinformation are very common and widespread, but hard to verify (Ecker et al., 2014), they can influence the daily health decisions

of a great number of people and can have long-term consequences on individuals' health and quality of life. Further, carelessly adopting these types of information sometimes result in serious negative health outcomes, such as eating disorders, risk of cancer, and mortality (Al Khaja et al., 2018). This suggests that there needs to be more research about more subtle and common types of misinformation. Therefore, this dissertation will explore the understudied but common topics of health misinformation to bridge the gap in the previous research.

2.3 Health misinformation and social media

As the prevalence of health misinformation has become a growing concern to public health, social media has drawn attention from scholarly communities as the primary catalyst of the phenomenon (Kouzy et al., 2020; Suarez-Lledo & Alvarez-Galvez, 2021; Qi et al, 2016). There are a number of reasons why social media is blamed for aggravating the so-called "health misinformation epidemic." (World Health Organization, 2021). This dissertation focuses on patterns of information consumption on social media and technological elements of social media that make the online space particularly conducive to the spread and adoption of health misinformation.

With regard to information consumption patterns on social media, people rarely pay close attention to or carefully scrutinize the information they come across on social media platforms, primarily due to the information overload (Pentina & Tarafdar, 2014; Sundar, 2008). Social media feed is densely packed with all kinds of information, and a lot of information people consume on social media is incidentally encountered, rather than intended or planned (Boczkowski et al., 2019; Tian & Robinson, 2009). Due to these contextual characteristics of information consumption on social media, social media users tend to show selective and

fragmented reading patterns and report that it is difficult for them to differentiate between opinions and facts and decide which pieces of information is more important and valuable than others (Boczkowski et al., 2019; Lee et al., 2017). Further, on social media, people are exposed to health information shared by individuals in their personal networks who are more trusted than other sources. Therefore, it is more likely for people to accept the information that comes from trusted sources without critically verifying it (Centola, 2013). This pattern of information consumption applies to when encountering health misinformation as well. When consuming health-related (mis)information, people may rely on peripheral cues and make hasty judgments about whether the information is credible and valuable enough to share or follow, rather than carefully checking the validity and reliability of the information (Sundar, 2008).

This dissertation argues that social endorsement cues (e.g., number of likes, shares or views) are one of the facilitators that lead people to carelessly judge or adopt health misinformation. In other words, social endorsement cues are peripheral cue that people commonly rely on to evaluate health misinformation. Social endorsement cues, defined as quantified visual cues that represent who and how many other people on a social media platform previously reacted (e.g., like, share, view, or comment) to a certain social media post, are representative features of social media platforms. This dissertation proposes that these particular features of social media contribute to strengthen the tendency to process information superficially, and will further discuss the rationale in the following chapter.

In summary, given the magnitude of the threat that health misinformation poses to public health and the role of social media in amplifying such threat, it is imperative to understand what aspects of social media is particularly relevant to the spread and adoption of health misinformation and the psychological processes that underly the phenomenon. Therefore, this

dissertation focuses on social endorsement cues as one of the critical factors to explain why and how many social media users fall into the trap of health misinformation. Further, it aims to explore the psychological mechanisms through which social endorsement cues influence the intention to share and adopts health misinformation, based on previous research on social norms and the credibility assessment of online information.

CHAPTER 3: THEORETICAL BACKGROUNDS

3.1 Social endorsement cues on social media

According to a recent survey by Pew Research, over 70% of U.S. adults use any kind of social media site, which has been a consistent trend over the past five years (Pew Research, 2021). This suggests that social media sites have become essential media platforms people rely on for different purposes, including seeking information, entertainment and social networking on a daily basis.

Almost all social media platforms such as Facebook, Instagram, or Twitter commonly include a feature that allows users to instantly react to a social media post. On social media, it is unclear for users whether their messages are seen, delivered, or attended to by their audience since interactional cues such as eye gaze, nodding, and other nonverbal expressions are not available in the mediated environment (Ellison & Vitak, 2015). To compensate for the lack of communicative feedback, users signal their approval, agreement, or support by liking, commenting, or sharing (Gerlitz & Helmond, 2013).

These features have become typical ways for social media users to provide instant feedback to a specific piece of information or content. One of the most used and prominent features is "like" function. Facebook has "likes" and other emotional "reactions" buttons, Twitter has the "favorite" button, Instagram has the "heart" icon, and Reddit has the "upvote" icon. The "like" button was first introduced on the video-sharing platform Vimeo in 2005, and the feature was adopted by Facebook in 2009. Since 2009, the feature has become a quintessential component of many different types of social media platforms. The "like" button or the sorts of "like" button allow people to give one-click, content-free feedback that indicates their

agreement, approval, or support for the content and/or the person who posts the content (Carr & Heyes, 2015).

Such features are called a variety of names, such as social media metrics (e.g., Lee & Su, 2019), virality metrics (e.g., Lee-Won et al., 2016), or paralinguistic digital affordances (e.g., Hayes et al., 2016). In this dissertation, I will use the term social endorsement cues to refer to the indication of agreement, support, and approval of social media content by users.

Social endorsement cues are afforded by two fundamental elements of social media: the stream and the network (Bayer et al., 2020). Social media stream refers to the aggregated flow of content (i.e., social media feed), which displays social media posts of other users. A social media feed includes social media posts generated by other users, including one's direct social media connections as well as other content creators who are not directly connected to them (e.g., suggested content and ads). Social media stream allows users to consume and engage with a constant feed of user-generated content provided by their network (Bayer et al., 2020). Users gain awareness and understanding of other people's life events, interests, or opinions, and important issues in their networks through what they encounter through a stream of social media feed (Lu & Hampton 2017).

Another important element of social media is the network. The network element of social media refers to "a social media element representing social connections, such as a collection of contacts created via mutual 'friending' or one-way 'following'." (Bayer et al., 2020, p. 474). On social media, people are connected with not only with friends and family members whom they have close connections offline (i.e., preexisting social networks), but also relatively distant ties such as co-workers and even those that have no prior relations outside of the platform (Ellison & Boyd, 2013; Carr & Heyes, 2015). On social media platforms, these networks of social

connections (e.g., friends or followers) are visible to users by default through features such as a list of followers or friends (Boyd & Ellison, 2007).

Social endorsement cues are made available by these two fundamental components of social media – the stream and the network – because they allow users to observe reactions (e.g., like, tag, or share) of other people (including both close and distant ties) to social media posts on their social media feed (Bayer et al., 2020). Critically, the feedback from distant ties (i.e., other users in general) is represented in a quantitative manner and used as a numerical indicator of social endorsement by other members of a social media platform to certain social media content. For example, a higher number of "likes" implies that many people agree with or approve of the content (Chung, 2019; Kim, 2018a). Moreover, if a social media post is liked or shared by close "friends" or "followers" who are directly connected through one's social media networks, one can see which persons liked the content. This specific feature helps users form an idea of how the members of their own networks think about certain content.

In summary, displayed alongside social media content, social endorsement cues suggest how other people (both close and distant ties) think or feel about certain social media posts. By providing users with this simple, quantified information, social endorsement cues make social media platforms a space particularly conducive to form an understanding of social norms around a certain belief, information, or behavior (Stavrositu & Kim, 2014; Chung, 2019). As previously discussed, this dissertation explores the effect of social endorsement cues on the perception of social norms, credibility judgment, and their behavioral outcomes (sharing and adopting of health misinformation) in the context of health misinformation.

In the next section, I will review the previous research on the effects of social endorsement cues on credibility judgment of online information and behavioral intentions to

share or to follow the information in one's health practices, within the theoretical frameworks of credibility assessment of online information (Metzger et al., 2003), the MAIN (Modality, Agency, Interactivity, and Navigability) model (Sundar, 2008), and theories of social norms (Abrams et al., 1990; Cialdini e al., 1990). After that, I will introduce previous studies that looked at social endorsement cues in the framework of social norms and discuss how this present study expands the previous research in the context of health misinformation.

3.2 Credibility judgment in online space

Credibility has been the central topic in persuasion research for a long time. Previous research on credibility in offline settings has tended to put a lot of emphasis on source credibility primarily because of the tradition of persuasion and information processing research that focused on source credibility as a key factor of attitude formation and behavior change (e.g., Hovland et al., 1953; Petty & Cacioppo, 1986). In an environment where valuable information is possessed by a few authorities (e.g., experts, organizations, or government institutions) and not widely shared among the public, the source credibility has been a critical parameter for people to determine whether the information is credible or not. However, with the introduction of the Internet and the following deluge of information in online space, credibility assessment of online information has taken a big turn (Metzger et al., 2003; 2010; Metzger & Flanagin, 2015). Metzger and her colleagues provided insightful review of previous research on different types of credibility, namely, source credibility, message credibility, and media credibility, and discussed how the process of credibility judgment has changed in online settings as compared to offline settings (Metzger et al., 2003).

Source credibility has been defined in terms of various dimensions (e.g., Hovland et al., 1953; McCroskey & Young, 1981; Tseng & Fogg, 1999). The two most prominent dimensions of source credibility are the ability (i.e., expertise) and intention (i.e., trustworthiness) of the source to provide honest and reliable information to the receivers. The prevailing consensus among the findings of source credibility research is that, regardless of message quality, information that comes from a highly credible source creates stronger persuasive effects than one from the source with low credibility (Tormala & Petty, 2004).

Media credibility is the perception of the medium where the information is presented. Media credibility is dependent on technological and structural features of the media and independent of source or receiver characteristics (Metzger et al., 2003).

Lastly, message credibility is a type of credibility that has been given relatively less attention than other types of credibility (Appelman & Sundar 2016). Metzger and her colleagues proposed that message content, delivery, structure, and language intensity are four primary determinants of message credibility (2003). According to their review, credible messages contain well-organized, clear, accurate, comprehensive, current, reliable, and valid information or arguments. Later research on message credibility by Appelman and Sundar (2016) developed a measure of message credibility, specifically in the context of news, and found perceived accuracy, authenticity, and believability are the three primary indicators of message credibility.

In a more recent work, Metzger and Flanagin (2015) paid special attention to *experiential credibility,* which refers to the credibility that comes from first-hand experiences and hands-on knowledge of a large number of individuals despite their not having official authority or expertise. The concept of *experiential credibility* has become more relevant with the recent changes in the media landscape. Notably, information available online has become increasingly

social in nature. Online environments facilitate and maintain collective inputs from a large number of individuals, creating collective intelligence, which helps people assess and evaluate information available online. Thanks to this technological affordance, more and more people rely on resources enabled by social computing technologies such as online reviews, recommendations, and credentialing systems, one of them being social endorsement cues on social media.

It makes the traditional notion of credibility assessment as originating from a single source of information often inapplicable and outdated (Callister, 2000; Metzger et al., 2010). This is because identifying the source of information has become more difficult due to the abundance and diversity of information sources. For instance, oftentimes, people are not aware of who originally created online information, and original information can be easily edited and modified multiple times by anyone. Further, a lot of times information comes from anonymous sources, which makes the concept of source credibility more ambiguous and complicated to identify (Metzger et al., 2010).

On the contrary, aggregated user-generated inputs in the form of online reviews, star ratings, or social endorsement cues are based on many individuals' firsthand experiences or hands-on knowledge on a certain information topic. In spite of relative lack of special knowledge or authority, such inputs can be seen as having a great deal of experiential credibility, and thus be relied upon as trustworthy resources to evaluate online information (Flanagin & Metzger, 2013, Metzger & Flanagin, 2015; Pure et al., 2013). Metzger and Flanagin (2015) explained the reasons why aggregate user-generated information can be perceived as trustworthy based on signaling theory (Donath, 2007) and warranting principle (Walther & Parks, 2002). Specifically, signaling theory (Donath, 2007) argues that signals about information sources that are difficult to

fake, supported by social convention, or costly to access or to imitate are considered more reliable when assessing credibility of information. Because it is difficult to manipulate aggregate information generated by a large number of individuals (e.g., a large number of "likes" to a positive restaurant review), it can signal high credibility. Similarly, warranting principle argues that people heavily rely on information that cannot be easily manipulated or controlled by any particular single entity, and therefore, collective opinion by others can serve as a warrant that is valid and reliable (Walther & Parks, 2002).

Based on these recent discussions on credibility assessment of online information, this dissertation focuses on social endorsement cues as one of the technological features on social media that people rely on when evaluating the credibility of health (mis)information. In the following section, I will discuss the MAIN model, which is the theoretical framework that focuses on the role of technological features or design elements afforded by digital media technologies in assessing the credibility of online information, rather than traditional factors directly related to message or source credibility. Therefore, the MAIN model is a useful framework to explain the role that social endorsement cues play in the process of credibility assessment health misinformation, and the resultant behavioral outcomes of interest.

3.3 MAIN model

Social endorsement cues and their influence on credibility judgment have been extensively studied within the framework of the MAIN model (Modality, Agency, Interactivity, and Navigability model) by Sundar (2008). The MAIN model is a conceptual framework that explains how users assess the credibility of online information. The central argument of the MAIN model is that credibility judgment processes of information are fundamentally changed in

the digital environment. Specifically, Sundar (2008), in his MAIN model, argued that because of a huge amount of information and multilayered sources of the information in online environments, people tend to assess the credibility of online information primarily based on the heuristics triggered by technological features and affordances available by different types of digital media (e.g., social media, online shopping platforms, and news websites) rather than other credibility assessment factors traditionally considered important, such as source and argument quality.

Indeed, consistent with the argument made by the MAIN model, early studies focusing on credibility judgment on the web reported results that are consistent with the argument. For example, in a website credibility survey, the most frequently mentioned factors that the respondents considered when assessing the credibility of the website were visual design-related elements and structure of information, rather than content or source-related factors (Fogg et al., 2003). This result shows that "people typically process web information in superficial ways, that using peripheral cues is the rule of web use, not the exception" (p. 15). A review reported similar findings that users evaluated the credibility of online information mainly based on surface characteristics of websites (i.e., non-message related elements), such as the appearance, presentation, and organization of information and interface design elements (Wathen & Burkell, 2002). Both of these studies indicate the importance of the design and structure of information and the medium that conveys the information in the context of credibility judgement. Further, another study about information processing patterns during credibility judgment found that most people "rarely" or "occasionally" verify the information they found online and unlikely to put efforts to thoroughly assess the information unless they are highly motivated to do so (Metzger, 2007).

In line with these previous findings, the MAIN model is primarily concerned with the technological aspects of digital media that can influence credibility judgment and other behavioral outcomes including sharing and adopting online information. Specifically, the MAIN model proposes four primary affordances of digital media technologies that influence credibility judgment, namely modality, agency, interactivity, and navigability. These affordances influence one's credibility judgment of online information by activating various cognitive heuristics (i.e., mental shortcuts) that people use to determine the perceived credibility of online content, system, or interface.

Social endorsement cues are closely related to agency affordance or agency cues (i.e., "who and what is identified or perceived by the receiver as the source", Sundar, 2008; p. 83). In online spaces, "other users" as a source of information have a powerful influence on credibility judgment of online information as well as other relevant behavioral decision-making processes. This ambiguous concept of "other users" or "other people" as a source of information is enabled by the technological ability to collect user data and display information about what most people are doing, buying, watching, or listening on a particular online platform (Metzger et al., 2010; Sundar, 2008). For example, online shopping sites like Amazon displays the number of reviews, ratings, and comments by other buyers of a product. Music streaming applications like Spotify shows how many other users have added a music album to their playlists. Likewise, social media platforms provide social endorsement cues in the form of the number of likes, shares, views, or comments.

This summative and quantified information of the behavior of "other users" is found to influence the perception of the credibility of online information and subsequently guide individuals' behavioral decisions. Further, they are sometimes even preferred than expert or

authoritative sources (Sundar & Nass, 2001; Sundar et al., 2007; 2009). As explained in the above, in online environments, the source of information is often unclear because information can be easily reproduced, edited, and shared multiple times in the chain of communication. Further, sometimes people or organizations that create and disseminate online content can choose to be anonymous. Therefore, in online environments where the source of information is often ambiguous due to these previously discussed reasons, it is possible that people rely more on the aggregate sum of other people's reactions.

Within the framework of the MAIN model, the effect of various types of social endorsement cues (e.g., star-ratings, virality metrics, and comments or reviews) on credibility judgment and other behavioral outcomes has been studied in terms of bandwagon heuristics (i.e., "if others think that this is a good story, then I should think so too"; Sundar, 2008, p.83).

The bandwagon effect refers to people's tendency to follow a popular opinion or attitude by a large number of other people (Simon, 1954; Marsh, 1985). The idea was first proposed to explain how the result of opinion polls influenced people's voting decisions. Simon (1954) argued that people's voting behavior is "a function of their expectations of the election outcome (Simon, p. 245)." That means, people's behavior is influenced by their prediction or assumption of the majority of other people's behavior.

Although the MAIN model was originally devised to explain how different interface features of online environments influence the perceived credibility of online information or interface, it has also been applied to other psychological and behavioral outcomes such as behavioral intention toward the information such as sharing and adopting the information. In the following section, I will review the previous empirical findings in support of the theoretical arguments discussed thus far, identify gaps in the previous research, and propose perceived

social norms as an explanatory mechanism that influences perceived credibility of health misinformation as well as intention to share and practice the health misinformation.

3.4 Effects of social endorsement cues: empirical findings

3.4.1 Social endorsement cues and credibility

Over the last two decades, a large volume of previous research found that various types of social endorsement cues (in other words, bandwagon cues) influence the perceived credibility of online information. For instance, a study of online health information found that social validation of medical statements in the form of a positive five-star rating (e.g., 4 out of 5) from an anonymous mass was as influential as validation by an expert in assessing the credibility of the information (Jucks & Thon, 2017). In another study in an online commerce setting, social endorsement cues in the form of star-rating and sales ranking led to bandwagon perceptions, which is operationalized as one's perception of other people's likelihood of buying a given product. This bandwagon perception, then, led to higher perceived product credibility, product quality, and product value (Sundar et al., 2008).

Studies based on the warranting principle (Walther & Parks, 2002) or signaling theory (Donath, 2007) also demonstrated empirical findings in line with these results. For instance, it was found that consumer reviews were the strongest predictor of the trustworthiness of an online store than either the reputation of the store or assurance seals, both of which are more readily controlled by the store itself (Utz et al., 2012).

A similar finding was found in the context of news consumption. A study that examined the effects of different interface features (number of recommendations, source credibility, and recency of the news) on the evaluation of news website found that the number of Diggs (a form

of social recommendation of the news by other readers) was the primary predictor of perceived news credibility (Xu, 2013). Other studies similarly found that social endorsement cues in the form of the number of views, replies, star ratings, and shares influenced "bandwagon perception", which positively influenced the perceived credibility of online information (Kim & Sundar, 2011; Sundar et al., 2009). All in all, these previous studies consistently have shown that social endorsement cues are a positive contributor in assessing the credibility of online information or interface.

3.4.2 Social endorsement cues and intention to share and adopt online information

Previous research has also demonstrated that social endorsement cues can influence one's intention to share or adopt online information. With regard to sharing behavior, previous studies suggest that a higher number of social endorsement cues, including shares, likes, or comments positively influence one's intention to share the information. For example, a recent study in the context of health news consumption found that a news report shared on Facebook with high numbers of social media engagement metrics (high sharing, liking, and commenting) positively influenced participants' news sharing intention. This effect was also mediated by bandwagon perception (the likelihood of other people sharing the piece of news with their friends) (Kim, 2020).

A study about retweeting news also found that exposure to other people's retweeting behavior can positively influence one's decision to retweet a variety of news topics on Twitter (Rudat & Buder, 2015). Similarly, in the context of sharing disaster-related information on Twitter, it was found that one's likelihood of retweeting the tweet increased as a retweet count increased. But this study also revealed that this tendency was found only for the tweets from an

individual account, but not for the tweets from a news agency's account. Further, the effect of the number of retweets disappeared once the number of retweets was over several thousand (Li & Sakamoto, 2015). This suggests that one's intention to share online information may be stronger when the information comes from layperson users and there may be a threshold number of social endorsement cues that influences one's decision to share online information.

Previous studies also demonstrated that social endorsement cues predicted whether one decides to adopt certain information or not. For example, in an online shopping website, social endorsement cues in the form of the number of customer reviews and star ratings positively influenced participants' purchase intention (Sundar et al., 2008; Sundar et al., 2009). Similarly, in another study of a restaurant recommendation website, the number of reviews and star-ratings predicted the intention to use the restaurant recommendation websites again in the future through positive attitude toward the website, and the intention to revisit the recommended restaurants through positive attitudes the restaurant (Kim & Gambino, 2016).

Some studies in health contexts found that social endorsement cues influenced health-related behavior intention as well. For instance, one study demonstrated that when people were exposed to a health risk message on a Facebook page, high numbers of shares and likes created a greater perception of message influence on others as well as the self. Further, the high number of shares increased the perception of the message's influence on the self, and this, in turn, increased their intention to take preventive measures to prevent skin cancer (Kim, 2018b).

These experimental results are backed by studies that analyzed real-life data from a video-sharing site. These studies commonly found that popularity cues as in higher view counts strongly predicted users' selection of videos on the website, creating snowball effects or viewership cascade (Fu & Sim, 2011; Fu, 2012).

3.5 Moving forward: limitations of previous research

Taken together, findings of previous research suggest that social endorsement cues can influence the credibility judgment of information people come across online and can shape one's intention to share and adopt the information. In short, people rely on the social endorsement cues generated by other users when judging the credibility of information or making behavioral decisions. However, what is relatively neglected in this body of research is the psychological mechanism at work in producing such cognitive and behavioral effects. Specifically, previous research provides limited explanations as to why and how such cues that signal social endorsement by anonymous mass result in increased credibility perception and the relevant behavioral outcomes. Instead, many of the studies reviewed in the previous section were more focused on comparing the effect of social endorsement cues with different interface features, such as personalization, source expertise, and so forth. Further, previous research is heavily focused on social endorsement cues by anonymous mass (i.e., distant ties) and the effect of cues from close ties were relatively neglected.

Therefore, this dissertation aims to illuminate the psychological processes that underlie the effect of social endorsement cues by both close and distant ties. Furthermore, this study argues that normative mechanism (Deutsch & Gerard, 1995; Cialdini et al., 1990) is at work in the process of credibility judgment of online information and the following behavioral decisions.

Although previous studies discussed here did not include social norms as central elements of their work, indeed, some studies measured "bandwagon perception" as an explanatory variable that mediates the relationship between social endorsement cues and credibility judgment or behavioral outcomes (Kim & Sundar, 2011; Sundar et al., 2008; 2009; Xu, 2013; Kim, 2020). The "bandwagon perception" was measured using items asking the likelihood of other people

engaging in the behavior of interest. The fact that exposure to social endorsement cues increased the "bandwagon perception" suggest that respondents considered these cues (i.e., social endorsement cues in the form of star ratings, the number of likes or shares) as representations of other people's positive opinion about the given behavior. Further, the fact that these studies found the "bandwagon perception" positively predicted perceived credibility of information as well as relevant behavioral intentions indicates that the perception of other people's opinion about certain behavior influenced study participants' own behavioral decisions. In other words, these previous findings showed that study participants relied on the perceived opinion and (the likelihood of) behavior of others when making their own judgment about the given information and behavioral decisions.

The reliance on other people's opinions and behavior for one's own opinions and behavior is the fundamental premise of social norms theories. In the next section, I will review the studies that looked at the effect of social endorsement cues based on social norm theories. Then, I will discuss the contributions and limitations of these studies, and how these studies inform this dissertation and propose hypotheses of this study.

3.6 Social norms

3.6.1 Theories of social norms

Research on social norms traces back to the seminal works of Sherif (1937) and Asch (1955;1956) where they revealed that the physical presence of other people or being exposed to other people's judgment effectively induced experimental subjects' conformity to the other people, even when factual information was not consistent with the opinions of these people (i.e., experimental confederates). From the insights of these studies, Deutsch and Gerard (1955)

proposed two different types of social influences, namely informational influence and normative influence. Informational influence refers to one's reliance on others' attitudes or behavior when they lack information as to how to behave or make a judgment in an ambiguous situation (i.e., descriptive norm). Normative influence refers to one's conformity to a behavioral prescription in order to avoid social disapproval or to fulfill the need to belong (i.e., injunctive norm).

In line with the distinction between informational influence and normative influence (Deutsch & Gerard, 1995), Cialdini and his colleagues, in their focus theory of normative conduct (Cialdini et al., 1990; Reno et al., 1993), proposed a distinction between descriptive and injunctive norms. Descriptive norms refer to what is mostly done in society, in other words, the prevalence of certain behavior while injunctive norms refer to perceived social approval of behavior, typically by a certain reference group that is important to oneself.

Descriptive norms provide heuristic information for efficient decision-making, especially in a situation where one does not have a clear behavioral script. In this type of situation, one relies on descriptive social norms to gain a valid understanding of the situation and react to it appropriately, because, in many cases, the behavior performed by the majority of people is seen as correct or sensible (e.g., many people are doing it so it must be reasonable to do it). Focus theory posits that following a descriptive norm is based on humans' innate motivation to be accurate, and therefore, descriptive norms exert informational social influence.

Injunctive norms provide information about whether a certain behavior is socially approved or disapproved. In this sense, an injunctive norm shapes one's behavior by informing individuals of what they are expected to or should do in a given situation. Therefore, conforming to an injunctive norm is thought to be motivated by the desire to avoid potential social costs following the violation of the norm (e.g., social isolation).

In summary, the basic premise of the theory is that when people perceive that certain behavior is prevalent (i.e., a descriptive norm), it can act as a cue to guide one's behavior (e.g., many people are doing it so it must be right). Further, when the behavior is perceived as socially approved by others (i.e., injunctive norms), people are motivated to adopt the behavior to avoid social isolation or sanctions.

Other recent theories of social norms, including the theory of normative social behavior (Lapinski & Rimal, 2005; Rimal & Real, 2005), and the reasoned action approach (Fishbein & Ajzen, 2010), commonly posit that perception of descriptive and injunctive norms are likely to result in behavior that conforms to the norms.

Norms are not codified or documented as laws or regulations but rather implied in the process of social interaction (Rimal & Lapinski, 2015). For this reason, observing other people's behaviors or opinions plays an important role in the formation of norms perceptions (Hogg & Reid, 2006; Lapinski & Rimal, 2005).

Undeniably, media, including both traditional and new media, is a major window through which people obtain normative information about certain beliefs and behavior because media is a social space where people can observe other people's behavior or opinions very easily. Previous research has shown that individuals gather information about social norms by observing media depictions about a particular issue or behavior (e.g., Giles et al., 2007; Rhodes & Ellithorpe, 2016). Likewise, as social media platforms are becoming more and more important venues for people to observe and learn other people's beliefs and behavior (Beullens & Vandenbosch, 2016; Rheu et al., 2021; Rösner & Krämer, 2016; Young & Jordan, 2013), which warrants an in-depth study of social media use and its implications on social norms and subsequent behavioral decisions.

3.6.2 Social endorsement cues and social norms

Existing studies on social endorsement cues and social norms, in general, found that these cues are effective in eliciting perception of social norms. However, some of the previous studies tested social norms around the behavior of endorsing a social media post itself (i.e., social norms around sharing or liking a social media post) while other studies focused on perceived social norms around the behavior depicted in given information.

First of all, some studies straightforwardly looked at the relationship between the number of shares and perceived social norms around the content-sharing behavior, and their influence on message believability as well as intention to share the content (Kim, 2018a; Lee & Oh, 2017). These studies commonly found that a higher number of shares (i.e., retweets) displayed alongside a tweet increased perception of descriptive norms and injunctive norms of other social media users (i.e., most Twitter users) around the content sharing behavior (i.e., retweeting). Then the perceived descriptive norm and injunctive norm were positively related to the message believability as well as study participants' own intention to share the tweet.

Other studies explored the effect of social endorsement cues on the perception of social norms around the behavior described in given social media content. For example, a study found that exposure to a YouTube video about climate change that had a high number of views led people to think that most Americans consider climate change as an important issue and are concerned about it, which suggests that the high number of view generated the perception of the descriptive norm of most Americans around climate issue (Spartz et al., 2017).

Similarly, a study found that a higher number of shares on a blog post asserting the importance of bone-marrow donation increased the readers' perceived injunctive norms of significant others around bone marrow donation (e.g., most people who are important to me

would think I should join the bone marrow registry) than a low number of shares. This, in turn, increased the readers' intention to join a bone marrow registry (Lee-Won et al., 2016). Chung (2019) also found that a higher number of shares displayed alongside of an online news article about a health risk (norovirus) increased the perceived influence of the news on the self, which in turn, positively influenced the perceived injunctive norm of people important to the self around taking preventive measures for the virus. The perceived injunctive norms then predicted the intention to share the news article as well as intention to take the preventive measures.

In summary, previous research suggests that different types of social endorsement cues from anonymous others elicit the perception of both descriptive and injunctive norms. One important limitation of previous studies, however, is that they were primarily concerned with the social endorsement cues generated by non-specific, generic other social media users. As discussed earlier, an important goal of this study is to differentiate the two different types of social endorsement cues – cues from distant ties and cues from close ties, because they may have different influences on one's credibility judgment of health misinformation and behavioral intention to share or engage in misinformed health behavior.

For example, social endorsement cues from close and distant ties are likely to create perceived social norms of each of the different referent groups, which may have varying magnitude of influence on one's behavioral decisions (Yun & Silk, 2011). Indeed, some of the previous studies showed that social endorsement cues from close ties (in the forms of "likes" on Facebook) had positive influence on evaluation of the social media content (Phua & Ahn, 2016), in comparison to when such cues from close referents were absent, although these studies did not look into such cues' influence on social norms. Therefore, the present study will extend previous findings by testing the influence of social endorsement cues from both distant and close ties on

perceived social norms of close and distant referents, and their relative influences on credibility judgement and behavioral intention to share and adopt health misinformation.

3.7 Effects of social endorsement cues on dissemination and adoption of health misinformation

Taken together, the previous research provides empirical support for the fundamental argument of this dissertation that social endorsement cues can influence the perception of social norms around the content of health misinformation posted on social media, which in turn, influenced the perceived credibility of the misinformation as well as the behavioral intention of sharing and practicing the information. However, previous research also presents some gaps and limitations which are discussed in the following.

3.7.1 Social endorsement cues and perception of social norms around different behaviors

Some studies looked at the perception of social norms around the behavior described in the social media post, but others looked at the perception of social norms around the exact behavior of endorsing social media content. These are norms around two different behaviors and should be differentiated. The particular interest of this study is whether social endorsement cues create the perception of social norms around the behavior that is described in the social media post, rather than the behavior of liking or sharing the social media post itself. The number of social endorsement cues directly shows how many people interacted with the post, and thus its influence on the social norms around the interaction behavior itself is quite obvious. However, social endorsement cues are less directly indicative of whether people think that the behavior described in a social media post is prevalent and socially approved by others. Given the topic of

this study is whether people follow misleading health behavior based on the existence of social endorsement cues, the study will focus on perceived social norms around the behavior depicted in the social media post.

3.7.2 Descriptive norms and injunctive norms

As previously stated, norms are communicated through different means of communication, including both implicit and explicit ways (e.g., verbal and nonverbal languages). Traditional media can influence norm perceptions through a narrative (Paluck, 2009), statistics (Gerber & Rogers, 2009), or pre-recorded audience reactions (Rhodes & Ellithorpe, 2016). While these forms of messages can be influential on social media, this dissertation argues that one of the most prominent ways through which social norms are communicated on social media is social endorsement cues. An important question that arises here is that what types of norms could be communicated through those simple cues.

For example, do the numbers of likes on a picture of an exercising woman signal prevalence of the behavior or social approval of the behavior? One can argue that simple cues such as the number of likes or shares are more likely to signal descriptive norms rather than injunctive norms because it is difficult to convey social approval or disapproval through those simple modes of communication. However, although "liking" is a simple reaction, previous research has shown that it can indeed convey many different meanings. For example, one study found that a number of likes can be interpreted as the amount of support people receive when people share negative news in their lives (Sumner et al., 2018). Previous research also showed that very simple visual cues can signal injunctive norms. For example, studies in non-mediated settings found that a simple facial expression in the form of a smiley face or a frowning face

(Schultz et al., 2007) or a sign of watching eyes (Bateson et al., 2013) were able to communicate injunctive norms (social approval or disapproval). As discussed above, the review of previous studies indicates that social endorsement cues engendered perception of both descriptive and injunctive norms. Therefore, the present study argues that it is possible that these cues may create the perception of both descriptive and injunctive norms.

3.7.3 The issue of reference group

An important characteristic of social media is that users are exposed to a large number of people whom they would not have access to or be aware of if it were not for the large networks afforded by the social media websites. This particular characteristic of social media platforms vastly expands possible types of reference groups on a single platform. Some examples of reference groups on social media include one's close friends, extended networks of weak ties, or celebrity figures (e.g., social media influencers), with whom one shares their interests or other similarities (e.g., gender or age) or identify. This characteristic of social media increases the importance of the specification of a reference group when studying social norms on social media, because depending on the reference group, their norms may or may not exert influence one's cognitive processing and behavioral decisions (Abrams et al., 1990; Park & Smith, 2007; Yun & Silk, 2011). For this reason, every social norm measure is recommended to include it (Shulman & Levine, 2012).

Although there can be many different types of reference groups, generally, reference groups can be defined as two different categories: close and distant reference groups. Close referents include one's close social ties, such as family, friends, or a significant other while

distant referents include generic others who are not thought to have an intimate relationship with oneself (e.g., other college students or people in your age) (Rhodes et al., 2020).

Many of the current social media platforms allow users to see whether their social media friends reacted to social media content they see. For example, Facebook or Instagram shows users whether their social media friends liked or commented on social media posts they encounter. However, as mentioned previously, most of the previous studies were only concerned with the social endorsement cues generated by "other users" on a given platform, and the relative influence of social endorsement cues by these two different types of social ties (i.e., close and distant ties) has rarely been explored.

Moreover, although previous studies only presented social endorsement cues by generic others in their stimuli, some studies asked about perceived social norms of distant others such as "most Twitter users" or "most adults" (Kim, 2018a; Lee & Oh, 2017), while other studies asked about perceived social norms of people important to oneself such as friends or family members (Calabrese & Zhang, 2019; Chung, 2019; Lee-Won et al., 2016). However, these studies did not provide convincing arguments as to how these cues generated by other people whom one does not know come to influence the perception of injunctive norms of people important to the self.

Given that these cues can be generated by either generic others (any users on a particular social media platform) or by one's close connections on one's network, this study argues that each of these cues will influence people's perception of social norms – both descriptive and injunctive norms – of respective referent groups, that is, close ties (e.g., close friends, colleagues or family members on a social media platform) or distant ties (e.g., generic others on the platform that do not necessarily have offline relationships). Therefore, I propose the hypotheses as following.

Hypothesis 1: Social endorsement cues generated by close ties will influence one's perception of the descriptive norm (H1a) and injunctive norm (H1b) of the close referents around the behavior described in a social media post about health misinformation.

Hypothesis 2: Social endorsement cues generated by distant ties (generic, anonymous other uses) will influence one's perception of the descriptive norm (H1a) and injunctive norm (H1b) of users of the platform in general around the behavior described in a social media post about health misinformation.

3.7.4 Perceived social norms, credibility, and behavior

As previously discussed, previous studies found a significant relationship between social endorsement cues and the perceived credibility of online information (Kim, 2018a; Kim & Sundar, 2011; Jucks & Thon, 2017; Sundar et al., 2008; 2009). This is because other people's approval of the information is a critical factor that people use to decide whether the information is trustworthy or not (Schwarz et al., 2016). Focus Theory of Normative Conduct (Cialdini et al., 1990) also argues that social norms are used as information to make a quick judgment about certain information or behavior. For example, an early social norms study by Cialdini and colleagues demonstrated that people are likely to accept the ideas that are seemingly endorsed by a majority of people without closely scrutinizing them (Cialdini et al., 1990). Further, an interview with social media users found that most users rely on other people's reactions and opinions to make a credibility assessment of online information (Metzger et al., 2010).

Based on these previous findings, the present study proposes that perceived descriptive and injunctive norms will mediate the relationship between social endorsement cues and the perceived credibility of given health misinformation.

Hypothesis 3: The perception of descriptive and injunctive norms of close and distant ties will mediate the relationship between social endorsement cues and the perceived credibility of health misinformation.

Further, given that perceived social norms are strong determinants of one's behavioral decisions regarding health (Ajzen, 2011; McDermott et al., 2015), they may also influence one's intention to practice the health behavior described in the social media post. Accordingly, the relationship between social norms perception and behavioral intentions will also be hypothesized as below.

Hypothesis 4: The perception of descriptive and injunctive norms of close and distant ties will mediate the relationship between social endorsement cues and one's intention to adopt health misinformation.

In addition, given that social norms of proximal and distant ties have different influences on individuals' behavior (e.g., Park & Smith, 2007; Yun & Silk, 2011), descriptive and injunctive norms of close and distant ties may have varying influences on credibility judgement as well as behavioral intention to adopt the information in one's health decision. For example, it was found that proximal peer descriptive and injunctive norms were stronger predictors of one's intention to perform health behaviors as compared to social norms of a distal referent group (Yun & Silk, 2011). Further, previous research on social identity theory suggests that people tend to rely on the behavior of those who are psychologically close to themselves rather than that of others who are psychologically distant (e.g., Abrams et al., 1990).

Therefore, regarding the influence of perceived descriptive and injunctive norms from close and distant social ties on social media, the present study proposes the following hypotheses.

Hypothesis 5: Perceived social norms from close referent groups will have a stronger influence on one's credibility judgment of information (H5a) as well as behavioral intention to adopt health misinformation (H5b).

As discussed above, social endorsement cues were found to influence credibility assessment of online information as well as one's intention to share and adopt the information. Extending the findings of previous research, this study proposes that increased perception of credibility regarding health misinformation, due to high social endorsement cues and perceived social norms, in turn, will lead to one's decision to share the information as well as to follow the information in one's health practices. Indeed, some of the previous studies suggest that perceived credibility is an important determinant of the intention of sharing and adopting online information.

For example, a study about content sharing behavior on Twitter showed that individuals' perceptions of argument quality (which is closely related to message credibility) and source credibility of a tweet played a major role in their information sharing behavior via the perceived usefulness of the information (Ha & Ahn, 2011). Another study found that source trustworthiness and source expertise significantly predicted subjects' retweeting information about emergency events (Liu et al., 2012). In a similar vein, a study about news sharing behavior found that when the credibility of online news was disputed by diverse fact-checking agents, it negatively influenced the intention to share the news, regardless of whether the headline was true or false (Yaqub et al., 2020). A few recent studies also found that credibility assessment influenced by social endorsement cues led to intention to share the information (Kim, 2018a; Lee & Oh, 2017). These studies showed that increased message credibility due to high social endorsement cues, in turn, increased one's intention to share the information online.

With regard to the relationship between perceived credibility of online information and information adoption behavior, a study found that perceived credibility of information had a positive effect on the adoption of the information via perceived usefulness (Chung et al., 2015). Similarly, another study found that the strongest determinant of information adoption in online customer communities was the credibility of the information (Cheung et al., 2008). These findings suggest that credibility perception positively influences the intention to adopt the information in their subsequent behavioral decisions. However, these previous studies primarily focused on the role of credibility judgement based on source or argument quality, and therefore, it is not clear that whether credibility perception influenced by social endorsement cues will also have the same effects. Therefore, to further illuminate the role of credibility perception in the current study's context, the following hypothesis will be tested.

Hypothesis 6: Perceived credibility of health misinformation will mediate the relationship between perceived social norms, and one's behavioral intention to share health information (H6a) as well as intention to engage in the misinformed health behavior in the future (H6b), and thus creating a serial mediation from social endorsement cues, perceived social norms, message credibility, and behavioral intention.

In summary, based on the extensive review of previous research, the dissertation posits that the social endorsement cues by close and distant ties, displayed alongside of health misinformation on social media, influence perceived descriptive and injunctive norms of close and distant ties respectively, around the misinformed health behavior. Increased perception of social norms lead to greater perceived credibility of health misinformation, which in turn, increases the intention to share the information and intention to adopt and practice the information.

CHAPTER 4: METHODS

Pilot Test

4.1 Stimuli development

As discussed previously, this dissertation specifically focuses on health misinformation that is often unverified and lacks rigorous scientific evidence. When carelessly adopted by individuals, this type of unverified health misinformation can have significant harmful effects on mental and physical health of the individuals who take such information in their health decisions. Instagram is one of the social media platforms that has been consistently criticized for spreading this type of health misinformation, such as miracle diet posts, which primarily targets young women (Rosenbloom, 2019).

Therefore, the stimuli for the study was a fictitious Instagram post that contained common health misinformation primarily targeting young females, who take up the majority of Instagram users. According to the recent research by Pew Research Center (Auxier & Anderson, 2021), Instagram has a strong following among young adults. Specifically, the survey result indicated that, among the survey respondents, 71 percent of young adults betwen18 to 29 years old reported that they use Instagram. Similarly, another survey of the distribution of Instagram users worldwide as of January 2021 found that 62.8% of Instagram users were aged between 19 to 35 (Statista Research Department, 2021).

The messages were created based on distinctive characteristics identified based on previous research (Bellows & Moore, 2013; de Regt et al., 2020; Nan et al., in press). First of all, health misinformation uses evidence or research that is non-scientific or inaccurate but seemingly convincing by selectively using misleading facts and/or research results. Sources of health misinformation are often dubious, such as self-proclaimed health professionals, or social

media influencers and celebrities that do not have expertise in health or medical domains. Health misinformation often promises a quick and immediate effect, using exaggerated or extravagant expressions (e.g., break-through, miracle, etc.). It often relies on testimonials and anecdotes of other people and appeals to different emotions when devising messages (e.g., fear, guilt, or anger; for example, fear of missing out claiming that the product is available in limited quantities). Lastly, it promotes socially accepted images such as a healthy lifestyle or self-management. These characteristics were used to create the fictitious Instagram posts.

Specifically, the message started with introducing a health product, and then provide an argument made by a proclaimed health advocate or influencer. The name of the advocate or influencer was provided but relevant qualifications were not included in the message. The next sentence claimed that the introduced product guarantees positive effects on their health in a short period of time. Then the message introduced a testimonial from another person. The message ended with a sentence soliciting readers to check out the link on the poster's profile page to learn more about it (See Appendix A for the full content of the messages).

In order to increase the generalizability of the study results and confirm that manipulated variables work in different health misinformation topics, six commonly found health misinformation topics were selected and pilot-tested. The topics included: drinking detox tea, grapefruit diet, using indoor tanning oil, eating apricot seeds for cervical cancer prevention, drinking papaya juice for promoting bone health, and using cannabidiol (CBD) oil to improve overall health. These topics were selected based on previous literature that discussed common health misinformation (Suarez-Lledo & Alvarez-Galvez, 2021; Wang et al., 2019).

To select the topics to be included in the main study, the following criteria were used. Study participants should be vaguely familiar with the given health topic, but do not have deep

knowledge of it. Also, although the content of stimuli itself is inaccurate health information, as the message was constructed to reflect the popular persuasive tactics that are often used for this type of social media post (i.e., subtle, unverified health misinformation), the stimuli should still be seen moderately credible and viral-worthy. Another criterion of selecting the topics for the main study was that personal relevance should not be affected by the message, as it can influence how much participants exerts efforts when processing information. To test this, respondents were exposed to three of the six topics and answered personal relevance to the all six topics after the exposure. Then their reported personal relevance to the exposed topics were compared to that of the other respondents who were not exposed to the topics.

Forty-one participants (18-35 years old females) on Amazon Mechanical Turk were asked to evaluate topic familiarity, virality, sharing intention, perceived credibility, and personal relevance of three of the six stimuli messages. The selection criteria were such that topic familiarity should score between 2-4 on a 7-point Likert scale, and sharing intention, viral quality, and credibility scores should range in the middle (between approximately 3 to 5) on a 7-point Likert scale.

Overall, all topics met the selection criteria except for drinking of papaya juice for bone health, which was dropped because there was a significant difference in personal relevance between those who were exposed to the topic versus those who were not exposed to the topic ($t(36) = 2.14$, $p < .05$). Personal relevance of the other topics was not significantly affected. Among the five remaining, indoor tanning was dropped because of the lower sharing intention. Among the remaining four topics that all met the criteria, drinking senna tea for detox and eating apricot seeds to prevent cervical cancer were selected for the final study. CBD oil was excluded because this topic is relatively well-known to the wider public than other topics (Norton, 2020).

The grapefruit diet was excluded because the other two topics had lesser degree of variance and standard deviation compared to this topic, which means that the two topics were evaluated more similarly across participants compared to the grapefruit diet.

	N	Familiarity	Viral Quality	Sharing Intention	Message Credibility
Topic1 Senna Tea	19	*M* = 3.04 *SD* = 0.99	*M* = 4.62 *SD* = 1.89	*M* = 3.60 *SD* = 2.32	*M* = 4.11 *SD* = 2.18
Topic2 Grapefruit diet	19	*M* = 2.85 *SD* = 1.31	*M* = 4.12 *SD* = 2.29	*M* = 3.47 *SD* = 2.23	*M* = 3.85 *SD* = 2.41
Topic3 Indoor Tanning	19	*M* = 2.53 *SD* = 1.15	*M* = 3.95 *SD* =1.91	*M* = 2.91 *SD* =2.10	*M* = 3.73 *SD* =1.83
Topic4 Apricot Seed	21	*M* = 2.83 *SD* =1.42	*M* = 5.24 *SD* =1.22	*M* = 4.60 *SD* =2.03	*M* = 4.83 *SD* =1.83
Topic5 Papaya Juice	18	*M* = 2.81 *SD* = 1.38	*M* = 5.17 *SD* = 1.33	*M* = 4.48 *SD* = 2.04	*M* = 4.78 *SD* = 1.79
Topic6 CDB Oil	18	*M* = 2.94 *SD* =1.15	*M* = 4.78 *SD* = 1.51	*M* = 3.78 *SD* = 2.06	*M* = 4.75 *SD* = 1.80

Table 1. The means and standard deviation of familiarity, viral quality, sharing intention, and message credibility for the tested topics.

Main Study

4.2 Research design and procedure

Two experimental studies with a 2 (Social endorsement cues by distant ties: a low number of likes vs. a high number of likes; LDT hereafter) x 2 (Social endorsement cues by close ties in one's network: presence of likes by close ties vs. absence of the likes by close ties; LCD hereafter) factorial design were conducted through an online survey created on Qualtrics. Participants were randomly assigned to one of the four conditions. Participants were also randomly exposed to one of the two health topics included in the study.

Upon the start of the study, participants first read the consent form. Once they agreed to participate in the study after reading the consent form, they first answered a series of screening

questions about their Instgram use and age. Only those who met the participation criteria were able to proceed after completing the first questionnaire. Then, they were randomly assigned to one of the four conditions and exposed to a stimulus according to their condition. All participants were asked to pay close attention to the stimuli (the "likes" by close or distant ties). Then they moved on to the next step where they answered the survey questions regarding their perceived descriptive and injunctive norms of both close and distant reference groups, the credibility of the health information, intention to share the information, and intention to engage in the misinformed health behavior introduced in the stimuli.

4.2.1 Manipulation of social endorsement by distant ties

The first independent variable – social endorsement cues by other users in general (i.e., likes by distant ties; LDT) – was manipulated by presenting a low or a high number of likes to the fictitious Instagram post. In the low number of likes condition, the Instagram post had eight likes in total. In the high number of likes condition, Instagram had several 12,477 likes. The numbers (low vs. high) were chosen based on the previous studies that investigated social endorsement cues on different social media platforms. These studies used a single-digit number of likes or shares for low social endorsement cues condition and three to five-digit number of likes or share for high social endorsement cues condition (Chung, 2019; Kim, 2018; Lee& Oh, 2017; Lee & Su, 2019). Further, a recent report showed that Instagram users on average earn 1,261 likes and median number of likes is around 200 (Whatman, 2018). Given that three to four-digit likes are relatively common on Instagram, single-digit likes vs. five-digit likes were chosen to maximize the effectiveness of the experimental manipulation.

4.2.2 Manipulation of social endorsement cues by close ties

With regard to the second independent variable – endorsement by close ties on social media (i.e., likes by close ties; LCT) – two different methods of manipulation were used for each of the two studies: a cover story and a hypothetical scenario. Participants were randomly assigned to one of the two manipulation types, and the data collected using each of these two different manipulation methods were analyzed and reported separately as Study 1 and Study 2. This was because the data collected using the first manipulation included self-selected sample whereas the data collected using the second manipulation included non-self-selected sample (See Figure 1).

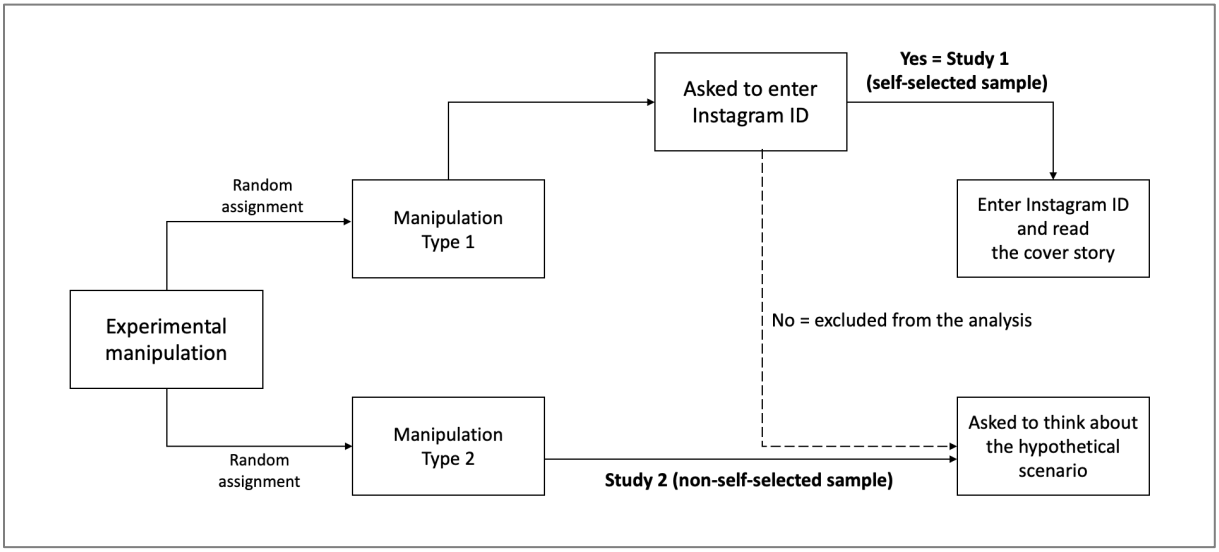

Figure 1. The different manipulation types and samples included in the final studies (Study 1 and Study 2).

Study 1 included participants who were exposed to a cover story. Participants who were randomly assigned to the manipulation type 1 were asked to enter their real Instagram ID. If the participant agreed to provide their Instagram ID, they were then randomly assigned either to the absence or the presence of LCT condition. To those randomly assigned to the absence of LCT

condition, a message saying that "According to the data you provided, none of your Instagram friends you follow liked this post" was shown. To those assigned to the presence of LCT condition, the statement that "According to the data you provided, five of your Instagram friends you follow and closely interact with (ex. like, comment, or tag) also liked this post" was shown.

To increase the persuasiveness of the manipulation, they were exposed to the cover story, which stated that the information was presented by analyzing the publicly accessible user data on Instagram, such as an account holder's followers, following, and likes and comments, using computational methods, including social network analysis and data mining, and the program used to analyze the data is developed by researchers at Michigan State University for the research purpose. Those who provided the IDs were informed that the information would only be used to verify if the ID actually exists or not, and no data about their identity or content on their social media feed would be collected or used in the study.

Because providing the personal information (i.e., Instagram ID) could not be required to participate in the study, if participants declined to expose their Instagram ID, they were asked to imagine one of the two hypothetical scenarios for the manipulation of LCT. In the absence of LCT condition, they were asked to "imagine you encountered this social media post on Instagram and none of your close friends or connections you follow on Instagram liked this post." In the other condition (i.e., presence of LCT), they were asked to "imagine you encountered this social media post on Instagram, and about five of your close friends or connections you follow on Instagram also liked this post." Participants were also asked to be aware of the given hypothetical scenario while answering the questionnaire followed by this manipulation.

Because participants self-selected to opt in to or opt out of the manipulation using the cover story, to test whether the self-selection process violated the experimental randomization and introduced any potential source of biases, those who opted in and those who opted out were compared for demographic characteristics, need for closure, and need to belong. Need for closure and need to belong were measured and tested because these two factors were found to moderate the norm perceptions from social endorsement cues in previous studies (Chung, 2019), which suggests that individuals' motives related to social conformity and consensus influence how they infer (perceive) social norms from social endorsement cues.

Results showed that age, race, education, income, hours per day, Instagram use (days per week, hours per day) did not significantly differ between participants in each of the three different manipulation types. However, those who agreed to provide their Instagram ID (i.e., those who opted in to the cover story version of manipulation) scored significantly higher for need for closure (M = 5.01, SD = 0.89) than those who declined (M = 4.70, SD = 0.98), F (1, 384) = 3.18, p <.01, η_p^2= .02). Since the group equivalence was not established, those who declined to provide the information and opted out from the original manipulation method that used a cover story was deleted from the further analysis.

The last group of participants were recruited to make sure the results are replicated on a non-self-selected sample. Participants in this group were exposed to the hypothetical scenario for the manipulation of LCT, which was described above. As imagining or writing a hypothetical scenario has been widely used in lab experiments and has been proven to be effective (Allen, 2017), the assumption was that whether participants were exposed to the cover story or asked to think about the hypothetical scenario, both manipulation types would successfully engender the psychological state that the study intended.

4.2.3 Sample

Because the study chose Instagram as an experiment, only those who use Instagram at least once or twice a week were allowed to participate in the study. Regarding demographic characteristics of the sample, young females aged between 18 and 35 were recruited. As discussed previously, health misinformation on Instagram often targets young women, as they are the primary user base of the social media platform. Moreover, a meta-analysis (Rhodes et al, 2020) suggested that younger generations are more susceptible to normative influences (i.e., social norm manipulations) on their behavior decisions than older populations, which further justifies the selection of sample demographics. Regarding the gender of the participants, the common topics of health misinformation included in the stimuli were primarily targeting young women (weight loss and preventing cervical cancer). Therefore, taken all together, the sample included females age between 18 to 35 who use Instagram on a daily basis and reside in the United States.

Four hundred sixty-nine participants were recruited on Amazon MTurk (combining Study 1 and 2 in total). The survey included three attention check questions and 2.8% did not pass any of it, 5.1% passed only one, and 17.1% passed two of the three questions. Overall, the great majority of the participants (82.9%, $N = 389$) passed all attention check questions. Accordingly, the following analyses only included those who passed all attention check questions. All participants who completed their experimental session were paid $2.5 for their participation.

4.3 Outcome variables

4.3.1 Perceived descriptive norm

The perceived descriptive norms of a close reference group and a distant reference group were measured using four items based on the previous studies (Park & Smith, 2007; White et al., 2009). The items included "How many of your close ties on your Instagram network will want to _____?" and "How many of your close ties on your Instagram network _____?" These items were measured on a 7-point Likert scale from *none* to *all.* The third item asked to indicate how much they agree with the sentence "My close ties on Instagram I follow will want to _____" on a 7-point Likert scale from *strongly disagree* to *strongly agree.* The last question asked participants to indicate what percentage of their close ties on Instagram would engage in the behavior described in the Instagram post. The last item was "Think of your close ties on your Instagram. What percentage of them _____?" In the blank, depending on the topic that the participants were assigned, one of the two: Drinking Senna tea for detoxing or adding apricot seed to diet to prevent cervical cancer was shown to the participants. The same questions were used to measure the perceived descriptive norm of distant reference group: Instagram users in general. For these questions, instead of "your close ties on your Instagram network", "Instagram users in general" was used in each item.

4.3.2 Perceived injunctive norm

The items used to measure perceived injunctive norms of a close reference group and a distant reference group are also modified from the same previous studies (Park & Smith, 2007; White et al., 2009). The items to measure perceived injunctive norms of close reference group included "My close ties on Instagram network think that _____ is something that I should

do", "My close ties on my Instagram network approve of me _____.", "My close ties on Instagram I follow would endorse my _____", and "My close ties on Instagram I follow would support that I _____" on a 7-point Likert scale from *strongly disagree* to *strongly agree*. Again, the same items were used to measure the perceived injunctive norm of a distant reference group. For these questions, instead of "your close ties on your Instagram network", "Instagram users in general" was used in each item.

4.3.3 Message credibility

To measure message credibility, the three items from the scale developed by Appelman and Sundar (2016) and six items created based on the study by Metzger and her colleagues (2003) were used. Participants were asked to rate how *accurate, authentic, believable, organized, clear, comprehensive, current, reliable, and valid* they think the information presented in their stimuli was. All responses were measured using a 7-point Likert scale from *strongly disagree* to *strongly agree*.

4.3.4 Intention to share the post

Intention to share the post was measured using items from previous studies that investigated sharing behaviors on different social media platforms including Facebook and Twitter (Alhabash et al., 2015; Chung, 2019; Kim, 2018). Based on the various sharing behaviors that are available on Instagram, each item asked about different sharing behaviors, including *like the post, comment on the post, tag friends to the post, share on Instagram story, share through one's own Instagram feed or other social media feed, share through Instagram*

direct message, share through other messaging apps, or tell their friends about the information in the post. The full scale can be seen in Appendix B.

4.3.5 Intention to adopt the behavior in the social media post

Another behavioral outcome, the intention to adopt the behavior described in the stimuli, was measured using items used in previous social norms research (Ajzen, 2013; Park & Smith, 2007). The items asked participants' behavioral intention in different time frames, including next week, next month, and next year. The items included "I intend to _____ in the next week/next month/next year", "I am likely to _____ in the next week/next month/next year", "I mean to _____ in the next week/next month/next year", "I have it in my mind to _____ in the next week/next month/next year", and "I will _____ in the next week/next month/next year." Multiple items were used to ensure the reliability of these items in measuring participants' behavioral intention.

4.3.6 Other variables

Demographics including age, gender, race/ethnicity, education level, and social media use (Instagram use, Instagram dependency) were collected. Also, topic familiarity and personal relevance to the given health topic were collected and used as control variables because they may influence the norm perception, credibility, and behavioral intentions. The full list of items can be seen in Appendix B.

CHAPTER 5: RESULTS

5.1 Study 1

5.1.1 Sample

One-hundred and ninety-two participants were randomly assigned to the manipulation Type 1 (i.e., asked to provide their Instagram ID), and of those, 107 participants agreed to provide their Instagram ID and 85 participants declined to do so. Among those included in the Study 1 for data analysis, 68.2% was White, 10.3% was African-American, 2.8% was Hispanic, Latino, or Other Spanish Origin, and 6.5% was Asian. 0.9% was American Indian or Alaska Native. The other 10.3% was mixed race or did not specify their race. The mean age of participants was 28.8 (*SD* = 4.42). On average they used Instagram 6.75 (*SD* = 3.92) days a week and 2.78 hours (*SD* = 8.15) per day.

5.1.2 Reliability

The items used to measure dependent variables all had good reliability. Because descriptive norms were measured on different scale points, standardized z-scores (the mean score is 0 and standard deviation is 1) were used in the main analysis. Perceived descriptive norm of close ties (α = 0.93) distant ties (α = 0.87) both had a good reliability. Injunctive norm of close ties (*M* = 3.88, *SD* = 1.48, α = 0.93) and distant ties (*M* = 4.21, *SD* = 1.29, α = 0.91) also showed good reliability. Perceived message credibility (*M* = 3.79, *SD* = 1.54, α = 0.95) and intention to share the health misinformation also had good reliability (*M* = 2.38, *SD* = 1.84, α = 0.98). With regard to the intention to adopt the misinformed behavior, intention for next week (*M* = 2.31, *SD* = 1.91, α = 0.99), next month (*M* = 2.46, *SD* = 2.00, α = 0.99), and next year (*M* = 2.62, SD = 2.17, α = 0.99) all had a good reliability. The intention for the three different time frames were

highly correlated with each other (Intention for next week and next month, $r = .97$, $p < .01$; intention for next week and next year, $r = .91$, $p < .01$; intention for next month and next year, $r = .96$, $p < .01$). Therefore, in the main analysis, the three scales were combined into one and used as single scale that reflect participants' intention to engage in the misinformed health behavior in the future ($M = 2.46$, $SD = 1.99$, $\alpha = 0.99$). Lastly, two control variables, topic familiarity ($M = 2.74$, $SD = 1.04$, $\alpha = 0.60$) and personal relevance ($M = 2.44$, $SD = 1.22$, $r = .62$) also showed good reliability.

5.1.3 Manipulation check

To make sure that participants perceived the numbers of likes in each condition as intended, the survey included two manipulation check questions based on a previous study (Phua & Ahn, 2016). The first question was to make sure the number of likes in each condition (i.e., a high number of likes and a low number of likes) was indeed perceived as high or low. They were asked to indicate how much they agree with the statement saying "the Instagram post I just saw has a high number of like" on a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree). The next question was to confirm that whether participants actually thought that their close ties on Instagram liked the post or not. Participants were asked to indicate how much they agree with the statement saying that "my close ties on Instagram liked this Instagram post" on a 7-point Likert scale (1= strongly disagree, 7 = strongly agree).

Independent t-tests showed that the manipulation of LDT (likes by distant ties) was successful such that those assigned to the high LDT condition reported a significantly higher score for the manipulation check question that asked whether the post received a high number of likes ($M = 5.15$, $SD = 1.23$), as compared to those assigned to the low LDT condition ($M = 3.57$,

SD = 1.23), $t(87.8) = 4.88$, $p < .001$(Levene's test for equality of variance indicated the variances across these two groups were not equal, and therefore, the reported result is when the assumption of homogeneity of variance was not met). The manipulation of LCT (likes by close ties) was also successful, such that those assigned in the presence of LCT condition reported significantly higher score (*M* = 5.38, *SD* = 1.24) on the manipulation check question compared to those in the absence of LCT condition (*M* = 1.78, *SD* = 1.73), $t(105) = 12.32$, $p < .001$.

Further, to assure that the cover story was believable to the participants, at the end of the experiment, participants were asked that how much they thought the information regarding how many of their close friends or connections on Instagram "liked" the social media post (stimuli) was accurate and believable (1 = Not at all, 5 = Extremely). On average participants thought that the information was moderately accurate (*M* = 2.74, *SD* = 1.54) and believable (*M* = 2.56, SD = 1.40).

5.1.4 The number of likes and perception of social norms (H1 and H2)

The first hypothesis predicted that "Likes" from close ties to the social media post that contains health misinformation will influence one's perception of descriptive norm as well as injunctive norm of the close reference group around the health behavior described in the social media post. The second hypothesis predicted that the perceived descriptive and injunctive norms of generic others would be influenced by the number of likes received from non-specific generic others on Instagram. A multivariate analysis of variance (MANOVA) was used to test each of the two hypothesis. For the test of Hypothesis 1, LCT and LDT were entered as independent variables and perceived descriptive and injunctive norms of close ties were entered as dependent variables as they were correlated with each other (See Table 2). Topic familiarity, personal

relevance were included as control variables in all of the following analyses. Topic familiarity was significantly associated with descriptive norm of close ties ($F(1, 101) = 8.72$, $p < .01$) but not with injunctive norm of close ties ($F(1, 101) = 1.88$, $p =. 17$). Personal relevance to the topic was also significantly associated with descriptive norm of close others ($F(1, 101) = 9.94$, $p <.01$), injunctive norm of close others ($F(1, 101) = 13.07$, $p < .001$).

	1	2	3	4	5	6	7	8
1. LDT								
2. LCT	-0.01							
3. Des Close	-.19*	.29**						
4. Inj Close	-0.16	.34**	.76**					
5. Des Distant	-0.10	0.11	.73**	.63**				
6. Inj Distant	-0.15	.20*	.65**	.75**	.67**			
7. Msg Credibility	-0.09	0.10	.65**	.67**	.58**	.57**		
8. Adopt	-0.12	0.06	.65**	.56**	.56**	.49**	.75**	
9. Share	-0.17	0.08	.80**	.70**	.73**	.61**	.78**	.81**

Table 2. Bivariate correlations between independent and dependent variables (Study1). *Note. LDT = Likes by distant ties, LCT = Likes by close ties, Des Close = Descriptive norm of close ties, Inj Close = Injunctive norm of close ties, Des Distant = Descriptive norm of distant ties, Inj Distant = Injunctive norm of distant ties, Msg Credibilty = Message credibility, Adopt = Intention to adopt the health misinformation in one's health decision, and Share = Intention to share the information with others. ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).*

The results indicated that the likes by close ties, significantly influenced participants' perception of descriptive norm ($F(1,101) = 8.77$, $p <.01$, $\eta_p^2 = .08$) and injunctive norms ($F(1, 101) = 13.45$, $p <.001$, $\eta_p^2 = .12$) of close ties around the health behavior introduced in the social media post. Specifically, those assigned to the presence of LCT (likes by close ties) condition reported significantly higher scores ($M = -0.03$, $SE = 0.09$) than those assigned to the absence of LCT condition ($M = -0.41$, $SE = 0.09$) for perceived descriptive norm ($M_{diff} = 0.38$, $SE = .13$, $p <.01$). Likewise, those in the presence of LCT condition ($M = 4.34$, $SE = 0.17$) scored

significantly higher for perceived injunctive norm of close ties than those in the absence of LCT condition (M = 3.43, SE = 0.17), M_{diff} = 0.90, SE = 0.25, p <.001.

The number of LDT (likes by distant ties) did not influence the either the descriptive norm, $F(1, 101) = 1.45$, $p = .23$, nor injunctive norm of close referent group on Instagram, $F(1, 101) = 0.76$, $p = .39$. There was no interaction effect between LCT and LDT on either descriptive ($F(1, 101) = 0.14$, $p = .71$) or injunctive norm ($F(1, 101) = 0.01$, $p = .92$) of close ties.

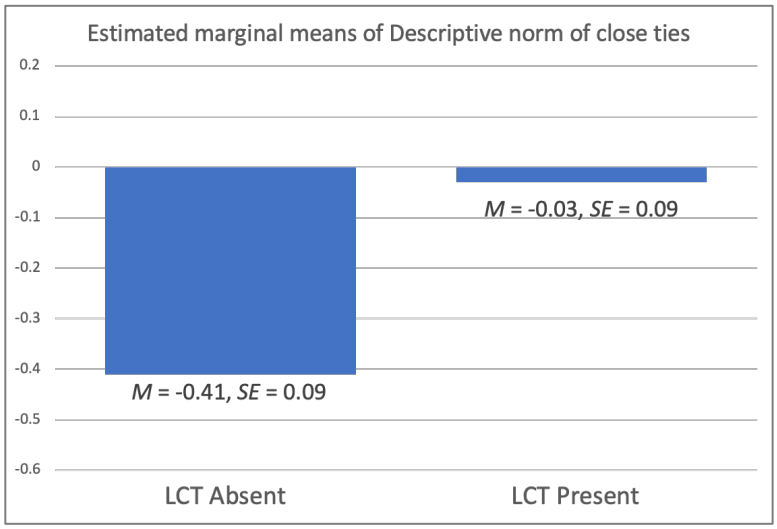

Figure 2. Estimated marginal means of descriptive norm of close ties by LCT conditions.

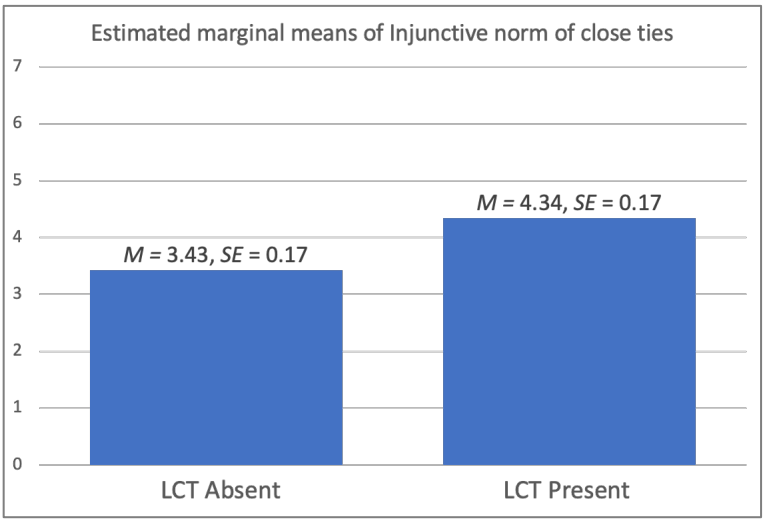

Figure 3. Estimated marginal means of injunctive norm of close ties by LCT conditions.

With regard to the second hypothesis, neither the effect of the number of LDT on perceived descriptive norm of generic others (i.e., Instagram users in general) ($F(1, 101) = 0.10$, $p = .75$) nor perceived injunctive norm of generic others was significant ($F(1, 101) = 0.91$, $p = .34$). The presence or absence of LCT did not influence descriptive norm of general Instagram users ($F(1, 101) = 0.51$, $p = .48$) or injunctive norm ($F(1, 101) = 3.06$, $p = .08$) either. There was no interaction between the two independent variables. In summary, Hypothesis 1 was supported whereas Hypothesis 2 was rejected.

5.1.5 Social norms, credibility, and behavioral intention (H3, H4, and H5)

The third hypothesis predicted that the perceived descriptive and injunctive norms of close and distant ties would mediate the relationship between the social endorsement cues and the perceived credibility of health misinformation. Given that Hypothesis 1(the effect of LCT on perceived social norms) was supported while Hypothesis 2 (the effect of LDT on perceived social norms) was rejected, and there was no interaction between the two independent variables, the mediation paths from LCT to message credibility through four different types of perceived social norms were tested, using SPSS PROCESS (Hayse, 2018) Model 4, which allows the test of mediation with multiple parallel mediators. Regression coefficients reported are unstandardized coefficient, and 95% confidence intervals were assessed using 5,000 bootstrap samples.

In the model, LCT was entered as a focal predictor, the four different types of perceived social norms were entered as parallel mediators, and perceived credibility of the Instagram post that contains health misinformation was entered as the outcome variable. The presence of LCT positively predicted perceived descriptive norm of close ties ($b = 0.38$, $t(103) = 2.96$, $p < .01$)

and injunctive norm of close ties (b = 0.90, t(103) = 3.68, p < .001), but did not predicted descriptive norm of Instagram users in general (b = 0.10, t(103) = 0.72, p = .47) and injunctive norm of Instagram users in general (b = 0.41, t(103) = 1.75, p = .08). The credibility of the given message was positively predicted by the injunctive norm of close ties (b = 0.33, t(99) = 2.64, p < .01), but not by descriptive norm of close ties (b = 0.29, t(99) =1.24, p = .22), descriptive norm of distant ties (b = 0.33, t(99) =1.57, p = .12), and injunctive norm of distant ties (b = 0.01, t(99) = 0.11, p = .91). Topic familiarity was not significantly associated with message credibility (b = 0.05, t(99) = 0.43, p = .66) but personal relevance was significantly associated with it (b = 0.39, t(99) = 3.94, p <.001). There was no direct effect of the presence of LCT on perception of message credibility (b = 0.17, t(103) = 0.69, p = .49).

The indirect effect of LCT on credibility through perceived injunctive norm of close ties (b = 0.30, SE = 0.14, 95% CI [0.06, 0.62]) was statistically significant. The indirect effect of descriptive norm of close ties (b = 0.11, SE = 0.11, 95% CI [-0.05, 0.37]), descriptive norm of distant ties (b = 0.03, SE = 0.06, 95% CI [-0.06, 0.18]), and injunctive norm of distant ties (b = 0.02, SE = 0.05, 95% CI [-0.10, 0.14]) were not found.

The pairwise comparison of indirect effects indicated that the effect of the indirect path from LCT to injunctive norm of close ties and to message credibility was significantly bigger than descriptive norm of distant ties (b = 0.26, SE = 0.13, 95% CI [0.03, 0.55]) or Injunctive norm of distant ties as a mediator (b = 0.27, SE = 0.17, 95% CI [0.01, 0.66]). However, although the path through injunctive norm of close ties was the only significant path, the effect size was not significantly different from the path through the descriptive norm of close ties as a mediator (b = -0.19, SE = 0.19, 95% CI [-0.58, 0.17]). Therefore, hypothesis 3 was partially supported (only for injunctive norm of close ties as a mediator), and hypothesis 5a (comparison between

the effect sizes of perceived norms of close ties and distant ties on message credibility) was supported.

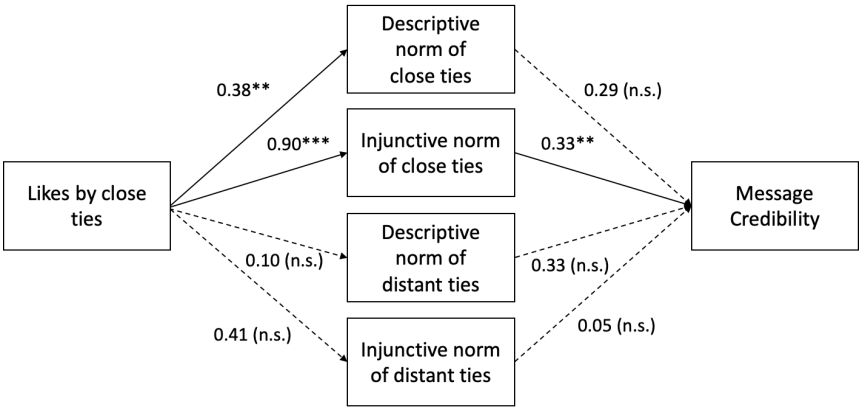

Figure 4. The mediation from LCT (Likes by close ties), social norms, and message credibility (*N* = 107). *Note. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$, n.s. indicates not significant.*

Hypothesis 4 predicted that the perceived descriptive and injunctive norms of close and distant ties would also directly influence one's intention to adopt the misinformed behavior, mediating the relationship between the social endorsement cues and the behavioral intention to take the information in one's health decision. Again, the indirect effect was tested using the same model (PROCESS Model 4), with LCT entered as the focal predictor, the four types of social norms as the mediators, and the behavioral intention to perform the health behavior described in the stimuli in the future as the dependent variable.

The associations between LCT and the four types of norms were the same as what was described previously (See Figure 3). The behavioral intention to engage in the misinformed health behavior in the future was significantly predicted by descriptive norm of close ties (b = 0.62, $t(99) = 2.27$, $p < .05$) as well as descriptive norm of distant ties (b = 0.54, $t(99) = 2.15$, $p < .05$). The behavioral intention was not predicted by injunctive norm of close ties (b = 0.05, $t(99) = 0.34$, $p = .73$) or injunctive norm of distant ties (b = 0.02, $t(99) = 0.11$, $p = .91$). Topic

familiarity was not significantly associated with the behavioral intention (b = 0.07, t(99) = 0.11, p = .91) but personal relevance was significantly associated with it (b = 0.82, t(99) = 7.06, p <.001). And there was no direct effect of LCT on the behavioral intention (b = 0.01, t(103) = 0.03, p = .98).

The test of indirect effect revealed that descriptive norm of close ties mediated the relationship between LCT on the behavioral intention to engage in misinformed health behavior in the future, b = 0.24, SE = 0.14, 95% CI [0.02, 0.57]. The indirect effect of LCT on the behavioral intention through descriptive norm of distant ties (b = 0.05, SE = 0.14, 95% CI [-0.10, 0.24]), injunctive norm of close ties (b = 0.05, SE = 0.14, 95% CI [-0.27, 0.33]), and injunctive norm of distant ties (b = 0.01, SE = 0.07, 95% CI [-0.14, 0.16]) were not statistically significant.

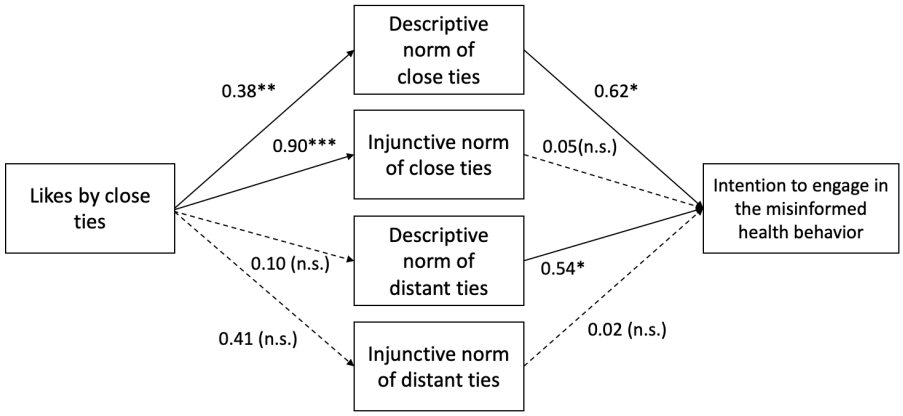

Figure 5. The mediation from LCT (Likes by close ties), social norms, and the behavioral intention to engage in the misinformed behavior in the future (*N* = 107). *Note. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$, n.s. indicates not significant.*

Although the indirect path from LCT to descriptive norm of close ties to the behavioral intention was the only significant path, the difference between all the other insignificant mediation paths were not statistically significant. Therefore, hypothesis 4 was partially supported (only for descriptive norm of close ties as a mediator), and hypothesis 5b (comparison between

the effect sizes of perceived norms of close ties and distant ties on intention to adopt the misinformed health behavior) was not supported.

5.1.6 Message credibility and intention to share and adopt the health misinformation (H6)

Lastly, hypothesis 6 proposed serial mediations from the social endorsement cues, to perceived social norms, to message credibility, and to two different behavioral intentions of interests: the intention to share the information about the misinformed health behavior with others (H6a) and the intention to engage in the misinformed health behavior in the future (H6b). That is, the perceived credibility of the message, increased by the perceived social norms (which are elicited by social endorsement cues, i.e., "likes" by close and distant ties), would consequently increase one's intention to share the health misinformation and/or intention to adopt the behavior for one's health decision.

Again, because hypothesis 2 (the influence of LDT on social norms) was not supported, the serial mediation from LCT to the four types of social norms to message credibility and to intention to share the information was tested using PROCESS Model 80 (Hayse, 2018) which allows the test of serial mediation with multiple parallel mediators (See Figure 6). The relationship between LCT, the four types of social norms, and the message credibility was identical to what was reported previously for hypothesis 3. The perceived message credibility significantly predicted the intention to share the social media post describing the given health misinformation, $b = 0.36$, $t(98) = 4.38$, $p < .001$. Among the two control variables personal relevance was significantly associated with the intention for sharing ($b = 0.25$, $t(98) = 2.87$, $p < .01$) but topic familiarity was not ($b = 0.02$, $t(103) = 0.19$, $p = .85$).

The serial mediation path from LCT to injunctive norm of close ties to credibility and to the behavioral intention to share the given health misinformation was significant, $b = 0.11$, $SE = 0.06$, 95% CI [0.02, 0.25]. The serial mediation through all the other three types of norms were not significant (descriptive norm of close ties, $b = 0.04$, $SE = 0.04$, 95% CI [-0.02, 0.14]; descriptive norm of distant ties, $b = 0.01$, $SE = 0.02$, 95% CI [-0.02, 0.07]; injunctive norm of distant ties, $b = 0.01$, $SE = 0.02$, 95% CI [-0.03, 0.05]).

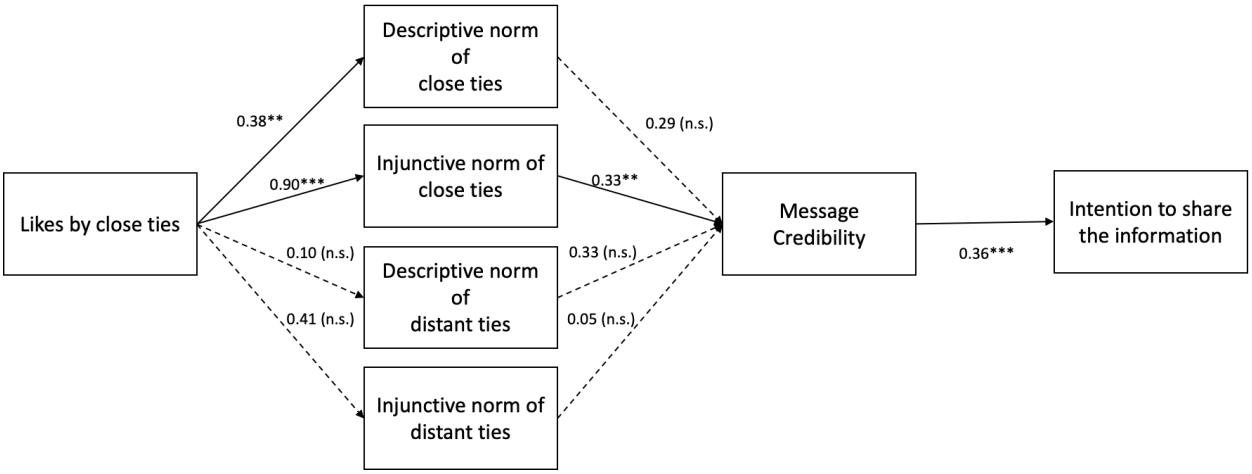

Figure 6. The serial mediation from LCT (Likes by close ties), social norms, message credibility, and the intention to share the information with others ($N = 107$). *Note. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .00$, n.s. indicates not significant.*

The same model was used to test hypothesis 6b, with the intention to engage in the misinformed health behavior as the final outcome variable. The perceived message credibility significantly predicted one's intention to engage in the exposed health behavior in the future, $b = 0.48$, $t(98) = 4.39$, $p < .001$. With credibility was entered the second mediator, none of the four types of social norms were directly associated with the behavioral intention, suggesting that message credibility is a critical mediating factor that predicts the behavioral intention to adopt the behavior (descriptive norm of close ties, $b = 0.48$, $t(98) = 1.91$, $p = .06$; injunctive norm of

close ties, b = -0.11, t(98) = -0.77, p = .45; descriptive norm of distant ties, b = 0.38, t(98) = 1.62, p = .11; injunctive norm of distant ties, b = -0.01, t(98) = -0.07, p = .95). Among the two control variables personal relevance was significantly associated with the intention to engage in the health behavior (b = 0.64, t(98) = 5.53, p < .001) but topic familiarity was not (b = 0.06, t(103) = 0.52, p = .60).

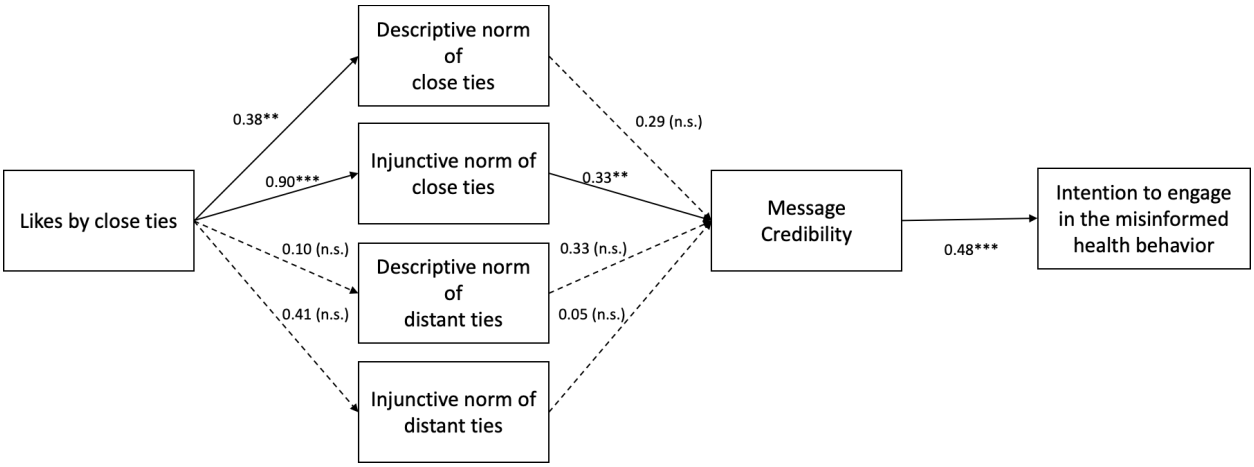

Figure 7. The serial mediation from LCT (Likes by close ties), social norms, message credibility, and the intention to engage in the misinformed health behavior in the future (N = 107). *Note. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$, n.s. indicates not significant.*

Importantly, the indirect path from LCT to injunctive norm of close ties to credibility, and to the behavioral intention to adopt the misinformed behavior was significant, b = 0.14, SE =0.08, 95% CI [0.02, 0.31]. The serial mediation through all the other three types of norms were not significant (descriptive norm of close ties, b = 0.05, SE = 0.05, 95% CI [-0.02, 0.19]; descriptive norm of distant ties, b = 0.02, SE = 0.03, 95% CI [-0.03, 0.09]; injunctive norm of distant ties, b = 0.01, SE = 0.03, 95% CI [-0.05, 0.06]).

5.2 Study 2

As discussed earlier, Study 2 included the non-self-selected sample who, for the manipulation of LCT, were not asked to provide their Instagram ID but were only asked to

imagine the hypothetical scenario about their close ties' liking of the Instagram post depending on the condition that they were randomly assigned. Note that manipulation of LDT was identical across the two studies. Study 2 serves to further test whether the results from the Study 1 replicated for the non-self-selected sample.

5.2.1 Sample

One-hundred and ninety-seven participants were recruited for Study 2. Racial composition was that 73.6% was White, 8.6% was African-American, 4.6% was Hispanic, Latino, or Other Spanish Origin, and 4.6% was Asian. 7% was mixed race and 1.6% did not specify their race. Mean age of participants was 28.8 (SD = 4.15). On average they used Instagram 6.23 (SD = 3.06) days a week and 2.25 hours (SD = 3.91) per day. Overall, the demographic characteristics of the sample for Study 2 was very similar to those of Study 1.

5.2.2 Reliability

Perceived descriptive norm of close ties (α = 0.93) and distant ties (α = 0.89) both had a good reliability (As noted, because descriptive norms were measured on different scale points, standardized z-scores were used in the main analysis). Injunctive norm of close ties (M = 3.99, SD = 1.79, α = 0.95) and distant ties (M = 4.17, SD = 1.56, α = 0.96) also showed good reliability. Perceived message credibility (M = 3.84 , SD = 1.63, α = 0.95), intention for sharing the information (M = 2.60, SD = 1.88, α = 0.98) and intention to engage in the misinformed health behavior (M = 2.71, SD = 1.99, α = 0.99) all had a good reliability.

With regard to the topic familiarity, its reliability between the three items were low (α = 0.56), and the following factor analysis indicated that the first item ("I have encountered similar

information in the social media post online") had the lowest factor loading (.685) compared to the other two items (item 2 = .718; item 3 = .783). According to the suggestion that factor loading over 0.7 can be considered as a good item to be included in a scale (Hair et al., 2010), the first item was dropped for the final analysis. The correlation between the two items were moderately high (M = 2.47, SD = 1.14, r = .35, p <.01). The two items used to measure personal relevance also had a high correlation (M = 2.58, SD = 1.31, r = .64, p <.01).

5.2.3 Manipulation check

Those assigned to the high LDT condition reported a significantly higher score for the manipulation check question that asked whether the post received a high number of likes (M = 5.74, SD = 1.56), as compared to those assigned to the low LDT condition (M = 2.34, SD = 1.69), $t(195) = 14.71$, $p < .001$. The manipulation of LCT (likes by close ties) was also successful, such that those assigned in the presence of LCT condition reported significantly higher score (M = 5.81, SD = 1.27) on the manipulation check question compared to those in the absence of LCT condition (M = 1.77, SD = 1.63), $t(169.4) = 19.19$, $p < .001$ (The assumption of homogeneity of variance was not met, so the adjusted results was reported).

5.2.4 The number of likes and perception of social norms (H1 and H2)

A multivariate analysis of variance (MANOVA) was used to test the first and second hypothesis. To test Hypothesis 1, LCT and LDT were entered as independent variables, and descriptive norm and injunctive norm of close ties were entered as dependent variables. Topic familiarity and personal relevance were included as covariates. Topic familiarity was significantly associated with descriptive norm of close ties, $F(1, 191) = 8.94$, $p < .01$, but not

with injunctive norm of close ties, $F(1, 191) = 0.36$, $p = .55$. Personal relevance to the topic was also significantly associated with both descriptive norm of close ties ($F(1, 191) = 36.95$, $p < .001$) as well as injunctive norm of close ties ($F(1, 191) = 25.05$, $p < .001$).

	1	2	3	4	5	6	7	8
1. LDT								
2. LCT	.02							
3. Des Close	-.02	.37**						
4. Inj Close	-.03	.45**	.74**					
5. Des Distant	-.08	.12	.56**	.43**				
6. Inj Distant	-.001	.13	.43**	.56**	.72**			
7. Msg Credibility	.01	.06	.49**	.58**	.53**	.53**		
8. Adoption	-.02	.07	.63**	.60**	.56**	.59**	.73**	
9. Sharing	.02	.08	.63**	.56**	.60**	.58**	.75**	.90**

Table 3. Bivariate correlations between independent and dependent variables (Study2).
*Note. LDT = Likes by distant ties, LCT = Likes by close ties, Des Close = Descriptive norm of close ties, Inj Close = Injunctive norm of close ties, Des Distant = Descriptive norm of distant ties, Inj Distant = Injunctive norm of distant ties, Msg Credibilty = Message credibility, Adoption= Intention to adopt the health misinformation in one's health decision, and Sharing = Intention to share the information with others. ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).*

The results indicated that the likes by close others, significantly influenced participants' perception of descriptive norm ($F(1,191) = 36.94$, $p < .001$, $\eta_p^2 = .16$) as well as injunctive norms ($F(1, 191) = 52.14$, $p < .001$, $\eta_p^2 = .21$) of close friends and connections on Instagram. Those assigned to the presence of LCT condition reported significantly greater perceived descriptive norm ($M = 0.17$, $SE = 0.07$) as compared to those in the absence of LCT condition ($M = -0.42$, $SE = 0.07$; $M_{diff} = 0.59$, $SE = .10$, $p < .001$). Likewise, those in the presence of LCT condition ($M = 4.70$, $SE = 0.15$) scored significantly higher for perceived injunctive norm of close ties than those in the absence of LCT condition ($M = 3.15$, $SE = 0.16$; $M_{diff} = 1.54$, $SE = 0.21$, $p < .001$).

The number of LDT did not influence the either the descriptive norm of close referents on Instagram ($F(1,191) = 0.78$, $p = .38$), nor the injunctive norm ($F(1, 191) = 0.002$, $p = .98$).

There was no interaction effect between LCT and LDT for either descriptive norm ($F(1, 191) = 1.87$, $p = .17$) or injunctive norm ($F(1, 191) = 1.47$, $p = .23$) of close ties. Therefore, Hypothesis 1 was supported.

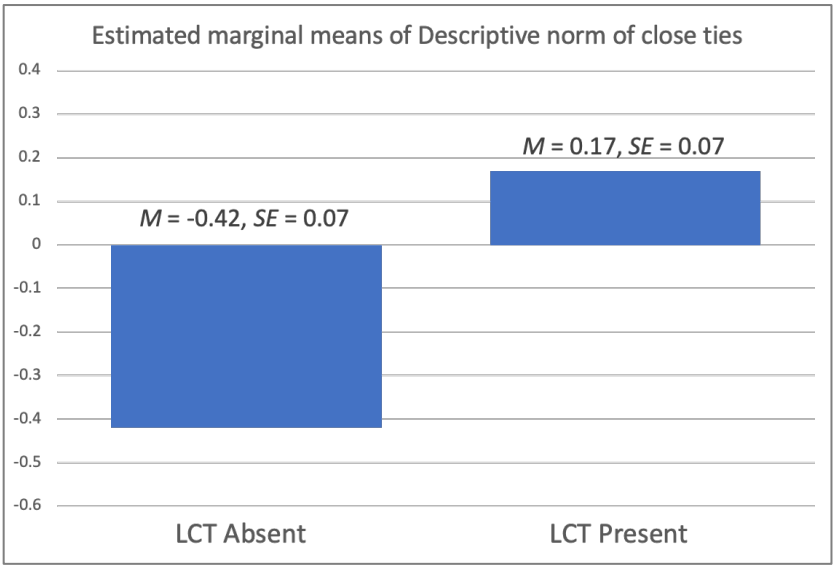

Figure 8. Estimated marginal means of descriptive norm of close ties by LCT conditions.

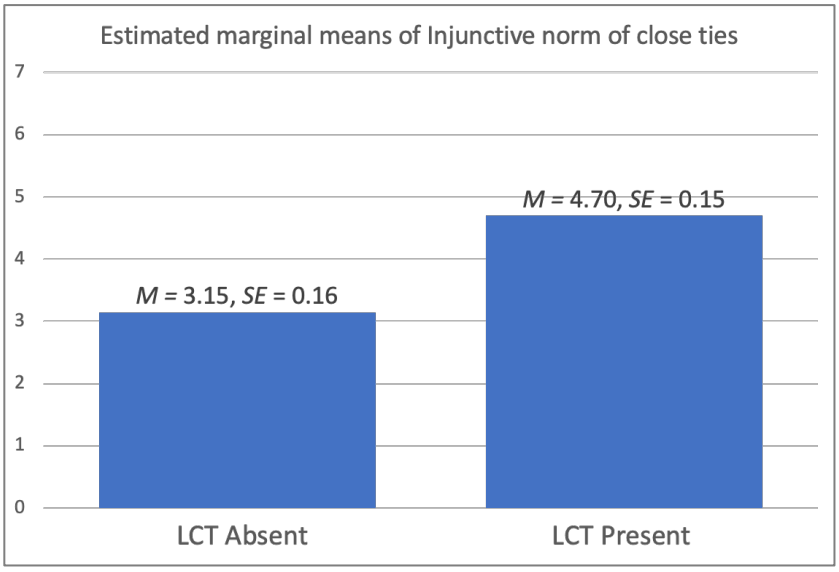

Figure 9. Estimated marginal means of injunctive norm of close ties by LCT conditions.

With regard to the second hypothesis, the number of LDT significantly increased the perception of descriptive norm of other Instagram users in general ($F(1, 191) = 7.03$, $p < .01$), but did not increase the perceived injunctive norm of the distant ties ($F(1, 191) = 0.75$, $p = .39$).

LCT did not influence either descriptive norm of distant ties ($F(1, 191) = 2.55$, $p = .11$) nor injunctive norm of distant ties ($F(1, 191) = 2.68$, $p = .10$). There was no interaction effect between the two independent variables on neither descriptive norm of distant ties ($F(1, 191) = 0.25$, $p = .62$) nor injunctive norm of distant ties ($F(1, 191) = 1.73$, $p = .19$). Additionally, topic familiarity was significantly associated with descriptive norm of distant ties ($F(1, 191) = 30.60$, $p < .001$) as well as injunctive norm of distant ties, $F(1, 191) = 6.85$, $p < .05$). Personal relevance to the topic was also highly associated with both descriptive norm of distant ties ($F(1, 191) = 20.42$, $p < .001$) as well as injunctive norm of distant ties ($F(1, 191) = 23.32$, $p < .001$).

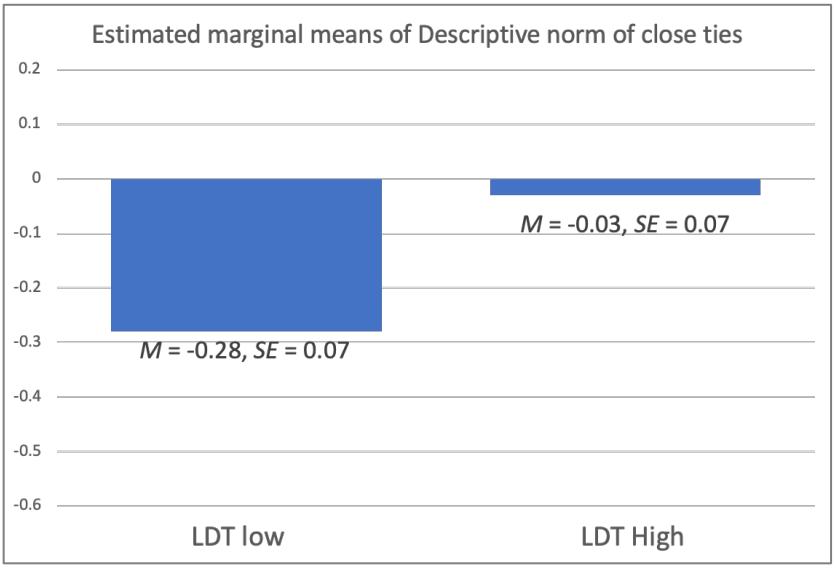

Figure 10. Estimated marginal means of descriptive norm of close ties by LDT conditions.

In conclusion, Hypothesis 2 was only supported for the descriptive norm of distant ties, which is, Instagram users in general, but not for the injunctive norm of distant ties (Estimated

marginal means for the low LDT condition: $M = 4.07$, $SE = 0.15$; the high LDT condition: $M = 4.23$, $SE = 0.14$).

5.2.5 Perceived social norms, credibility, and behavioral intention (H3, H4, and H5)

To test Hypothesis 3, same as Study 1, the mediation paths from LCT to message credibility through four different types of perceived social norms were tested, using SPSS PROCESS Model 4 (Hayse, 2018).

The presence of LCT positively predicted perceived descriptive norm of close ties ($b = 0.60$, $t(193) = 6.09$, $p < .001$) and injunctive norm of close ties ($b = 1.55$, $t(193) = 7.24$, $p < .001$), but did not predicted descriptive norm ($b = 0.17$, $t(193) = 1.65$, $p = .10$) and injunctive norm of Instagram users in general ($b = 0.34$, $t(193) = 1.68$, $p = .10$). The credibility of the Instagram post was positively predicted by the injunctive norm of close ties ($b = 0.48$, $t(189) = 5.70$, $p < .001$), descriptive norm of distant ties ($b = 0.48$, $t(189) = 2.75$, $p < .01$). However, it was not predicted by descriptive norm of close ties ($b = -0.16$, $t(189) = -0.89$, $p = .37$) and injunctive norm of distant ties ($b = 0.02$, $t(189) = 0.20$, $p = .84$). The two covariates, topic familiarity ($b = 0.17$, $t(189) = 2.04$, $p < .05$) and personal relevance ($b = 0.21$, $t(189) = 2.83$, $p < .01$) were significantly associated with message credibility. There was no direct effect from the presence of LCT on perception of message credibility ($b = 0.13$, $t(193) = 0.64$, $p = .52$).

Consistent with the finding from Study 1, the indirect path from LCT to perceived injunctive norm of close ties to credibility was significant ($b = 0.75$, $SE = 0.19$, 95% CI [0.39, 1.14]), but the mediating paths through descriptive norm of close ties ($b = -0.09$, $SE = 0.13$, 95% CI [-0.35, 0.17]), descriptive norm of distant ties ($b = 0.08$, $SE = 0.06$, 95% CI [-0.02, 0.21]), and injunctive norm of distant ties ($b = 0.01$, $SE = 0.05$, 95% CI [-0.10, 0.10]) were not found

statistically significant. The pairwise comparison of indirect effects indicated that the indirect path from LCT to injunctive norm of close ties to message credibility was significantly bigger than descriptive norm of distant ties (b = 0.66, SE = 0.18, 95% CI [0.32, 1.02]) or injunctive norm of distant ties (b = 0.74, SE = 0.22, 95% CI [0.34, 1.21]) as a mediator. As found in the Study 1, although the path through injunctive norm of close ties was the only significant indirect path, the effect size was not significantly different from the indirect path through the descriptive norm of close ties as a mediator (b = 0.07, SE = 0.09, 95% CI [-0.06, 0.28]).

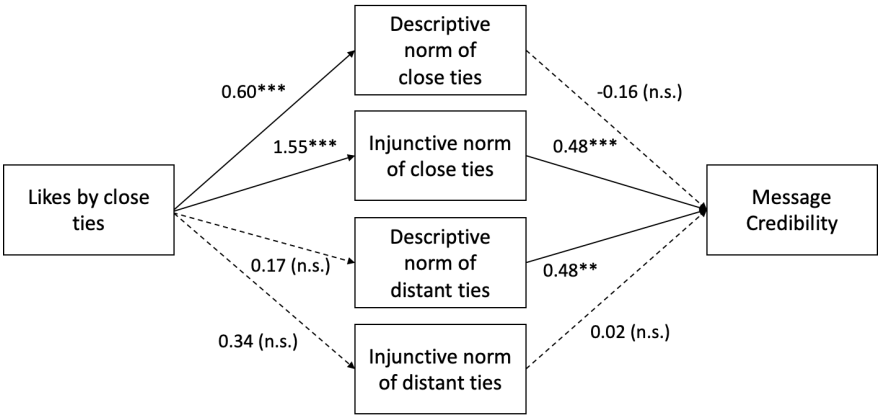

Figure 11. The mediation from LCT (Likes by close ties), social norms, and message credibility (*N* = 197). *Note. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$, n.s. indicates not significant.*

In summary, consistent with the findings from Study 1, Hypothesis 3 was partially supported (only for injunctive norm of close ties as a mediator), and Hypothesis 5a (comparison between the effect sizes of perceived norms of close ties and distant ties on message credibility) was supported.

An inconsistent finding from Study 1 was that descriptive norm of Instagram users was predicted by the high number of LDT. Therefore, the mediation analysis from LDT to perceived descriptive norm of Instagram users to message credibility was conducted. The high number of

LDT was positively associated with the increased perception of descriptive norm of Instagram users in general (b = 0.27, t(193) = 2.67, p < .01), but not with the other types of social norms (descriptive norm of close ties, b = 0.10, t(193) = 0.89, p = .38; injunctive norm of close ties, b = 0.07, t(193) = 0.30, p = .76; injunctive norm of distant ties, b = 0.21, t(193) = 1.02, p = .31).

Again, controlling for topic familiarity (b = 0.19, t(189) = 2.17, p < .05) and personal relevance (b = 0.25, t(189) = 3.22, p < .01), message credibility was positively predicted by both injunctive norm of close ties (b = 0.41, t(189) = 4.89, p < .001) as well as descriptive norm of distant ties (b = 0.46, t(189) = 2.52, p < .05), but not by descriptive norm of close ties (b = -0.21, t(189) = -1.19, p = .24) and injunctive norm of distant ties (b = 0.05, t(189) = 0.52, p = .60). LDT did not directly predict the message credibility (b = 0.30, t(193) = 1.45, p = .15).

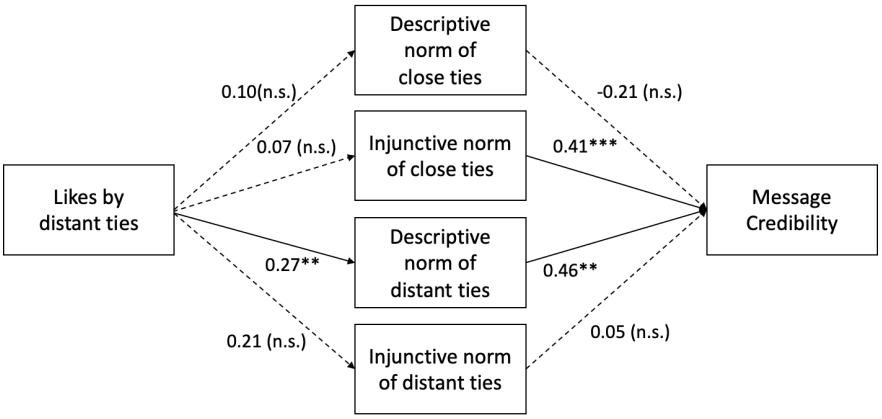

Figure 12. The mediation from LDT (Likes by distant ties), social norms, and message credibility (*N* = 197). *Note. * p ≤ .05, ** p ≤ .01, *** p ≤ .001, n.s. indicates not significant.*

The test of indirect effect found that descriptive norm of distant ties was the significant mediator between LDT and message credibility (b = 0.12, SE = 0.08, 95% CI [0.001, 0.31]). Further, the pairwise comparison of indirect effect found that although the indirect path through descriptive norm of distant ties was the only significant indirect path, the effect size was not

statistically different from the other three types of norms (descriptive norm of close ties, b = -0.14, SE = 0.11, 95% CI [-0.40, 0.01]; injunctive norm of close ties, b = -0.09, SE = 0.11, 95% CI [-0.33, 0.11]; injunctive norm of distant ties, b = 0.11, SE = 0.10, 95% CI [-0.06, 0.35]).

Hypothesis 4 predicted the indirect path from social endorsement cues to perceived descriptive and injunctive norms of close and distant ties and to the intention to adopt the misinformed behavior. Using the same SPSS PROCESS Model 4, it was found that the behavioral intention to engage in the misinformed behavior was significantly associated with descriptive norm of close ties (b = 0.48, t(189) = 2.77, p < .01), injunctive norm of close ties (b = 0.29, t(189) = 3.49, p < .001), and injunctive norm of distant ties (b = 0.22, t(189) = 2.54, p < .05). However, descriptive norm of distant ties (b = 0.08, t(189) = 0.46, p = .64) did not predict the behavioral intention. Topic familiarity (b = 0.24, t(189) = 2.93, p < .01) and personal relevance (b = 0.55, t(189) = 7.44, p < .001) was both significantly associated with the information adoption intention.

The test of indirect effect revealed that descriptive norm of close ties (b = 0.29, SE = 0.14, 95% CI [0.02, 0.58]) and injunctive norm of close ties (b = 0.45, SE = 0.15, 95% CI [0.16, 0.77]) mediated the relationship between LCT on the behavioral intention to engage in misinformed health behavior in the future. The indirect effect of LCT on the behavioral intention through descriptive norm of distant ties (b = 0.01, SE = 0.04, 95% CI [-0.07, 0.10]), injunctive norm of distant ties (b = 0.08, SE = 0.06, 95% CI [-0.02, 0.22]) were not statistically significant.

The pairwise comparison of indirect effect found that the path through injunctive norm of close ties had a significantly bigger mediating effect than that of descriptive norm of distant ties (b = 0.43, SE = 0.15, 95% CI [0.16, 0.74]) as well as injunctive norm of distant ties (b = 0.37, SE = 0.17, 95% CI [0.04, 0.72]). The indirect path through the descriptive norm of close ties was not

statistically different from the path through injunctive norm of close ties (b = -0.16, SE = 0.26, 95% CI [-0.68, 0.35]), descriptive norm of distant ties (b = 0.27, SE = 0.16, 95% CI [-0.02, 0.61]), and injunctive norm of distant ties (b = 0.21, SE = 0.13, 95% CI [-0.03, 0.48]).

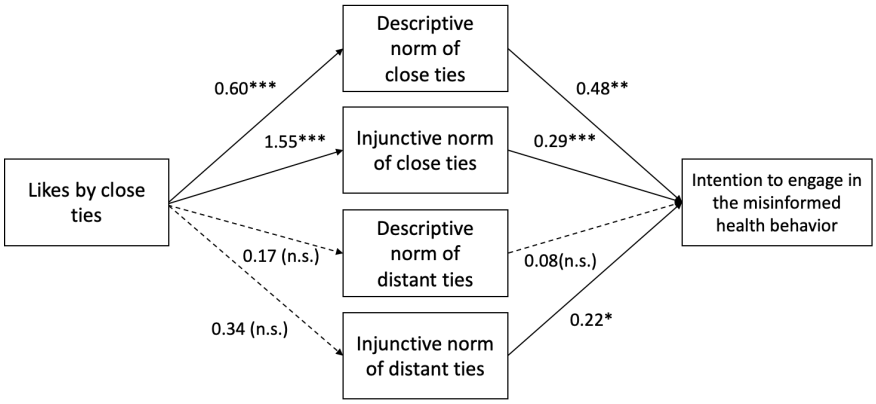

Figure 13. The mediation from LCT (Likes by close ties), social norms, and the behavioral intention to engage in the misinformed behavior in the future (N = 197). *Note. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$, n.s. indicates not significant.*

Further, because LDT predicted the descriptive norm of close ties, the indirect path from LDT to descriptive norm of distant ties to the behavioral intention to engage in the misinformed health behavior was tested using SPSS PROCESS Model 4, with LDT as a focal predictor. LDT predicted the descriptive norm of distant ties (b = 0.27, t(189) = 2.67, $p < .01$), but because descriptive norm of distant ties was not associated with the behavioral intention to engage in the misinformed health behavior (b = 0.04, t(189) = 0.25, p = .80), indirect effect was not found significant (b = 0.01, SE = 0.07, 95% CI [-0.12, 0.16]).

In summary, hypothesis 4 was supported for the indirect paths from LCT to descriptive norm of close ties and injunctive norm of close ties, and to the behavioral intention to engage in the behavior. hypothesis 5b was supported for injunctive norm of close ties, but not for descriptive norm of close ties.

5.2.6 Message credibility and intention to share and adopt the health misinformation (H6)

Lastly, Hypothesis 6 proposed serial mediations where perceived social norms and message credibility serially mediate between social endorsement cues and two different behavioral intentions of interests: the intention to share the health misinformation with others (H6a) and the intention to engage in the misinformed health behavior in the future (H6b).

To test these hypotheses regarding the two different behavioral outcomes, same as in Study 1, SPSS PROCESS Model 80 was used. Given that the indirect path from LCT to injunctive norm of close ties to credibility, as well as the indirect path from LDT to descriptive norm of distant ties to credibility were found significant in the analysis of H3, two separate serial mediation models were reported here, with each of the independent variables as a focal predictor.

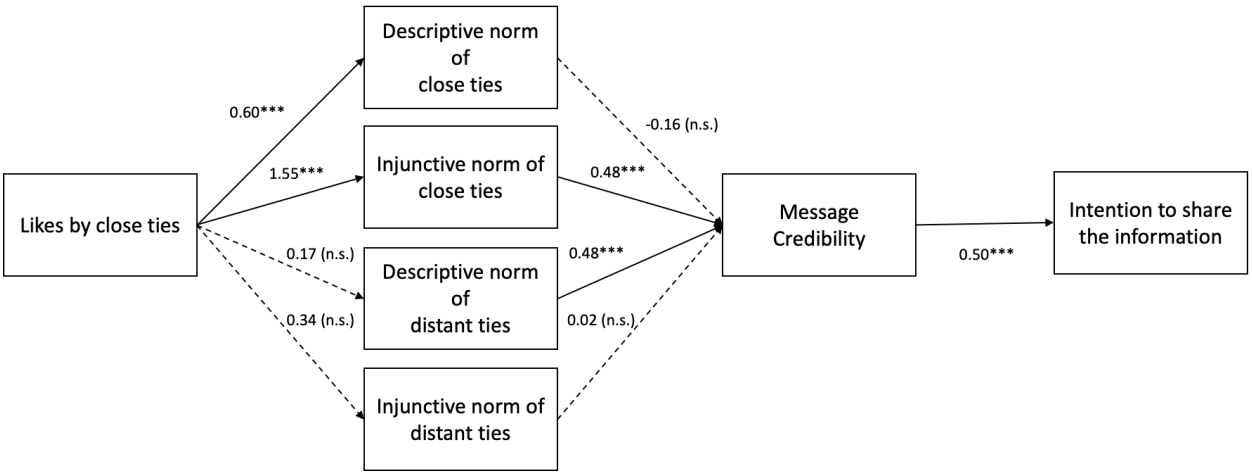

Figure 14. The serial mediation from LCT (Likes by close ties), social norms, message credibility, and the intention to share the information with others (*N* = 197). *Note. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .00$, n.s. indicates not significant.*

First, when LCT was entered as a focal predictor, the serial mediation path from LCT to injunctive norm of close ties to credibility and to the behavioral intention to share the information was significant, $b = 0.37$, $SE = 0.10$, 95% CI [0.19, 0.58] (The relationships between

LCT, the four types of social norms, and the message credibility were identical to what was reported for Hypothesis 3. The sharing intention was significantly predicted by message credibility ($b = 0.50$, $t(188) = 7.96$, $p < .001$). The serial mediation through all the other three types of norms were not significant (descriptive norm of close ties, $b = -0.05$, $SE = 0.06$, 95% CI [-0.17, 0.09]; descriptive norm of distant ties, $b = 0.04$, $SE = 0.03$, 95% CI [-0.01, 0.10]; injunctive norm of distant ties, $b = 0.003$, $SE = 0.02$, 95% CI [-0.04, 0.05]).

When LDT was entered as the focal predictor, the serial mediation path from LDT to descriptive norm of distant ties to credibility to the intention for sharing did not reach the statistical significance ($b = 0.06$, $SE = 0.04$, 95% CI [-0.0001, 0.15]).

The same model 80 was used to test H6b, with the intention to engage in the misinformed health behavior as the final outcome variable. Message credibility was significantly associated with the intention to engage in the misinformed behavior in the future ($b = 0.44$, $t(188) = 6.90$, $p < .001$), and the serial mediation path from LCT to injunctive norm of close ties to credibility and to the behavioral intention to share the information was significant, $b = 0.33$, $SE = 0.09$, 95% CI [0.16, 0.52]. The serial mediation through all the other three types of norms were not significant (descriptive norm of close ties, $b = -0.04$, $SE = 0.06$, 95% CI [-0.15, 0.08]; descriptive norm of distant ties, $b = 0.03$, $SE = 0.03$, 95% CI [-0.01, 0.10]; injunctive norm of distant ties, $b = 0.003$, $SE = 0.02$, 95% CI [-0.04, 0.05]).

Again, the serial mediation path from LDT to descriptive norm of distant ties to credibility to the intention to engage in the misinformed health behavior also did not reach the statistical significance ($b = 0.06$, $SE = 0.04$, 95% CI [-0.0004, 0.14]).

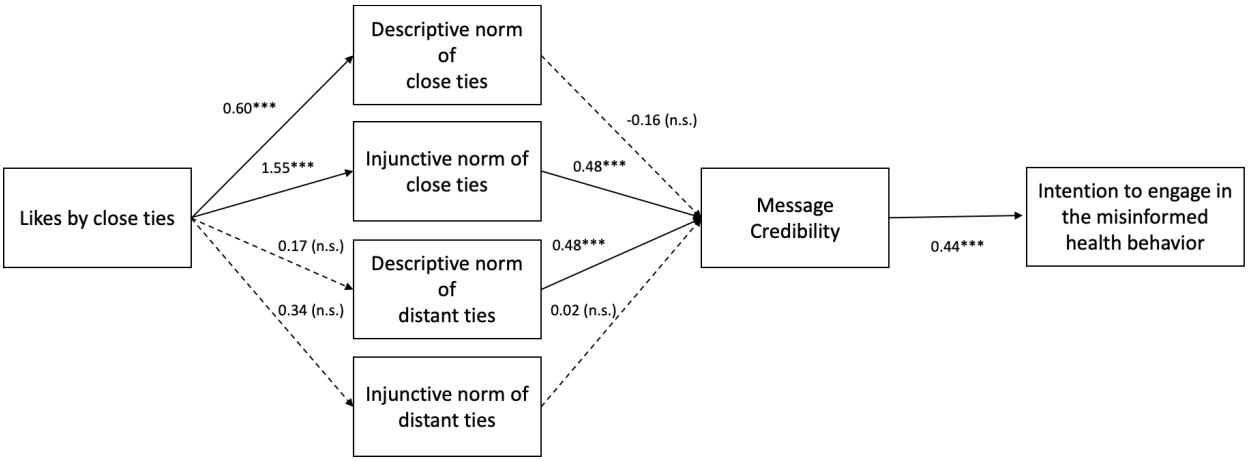

Figure 15. The serial mediation from LCT (Likes by close ties), social norms, message credibility, and the intention to engage in the misinformed health behavior (*N* = 197). *Note. * p ≤ .05, ** p ≤ .01, *** p ≤ .00, n.s. indicates not significant.*

5.3 Summary of findings

The following Table 4 summarizes the findings from Study 1 and Study 2. Overall, the findings from Study 1 and Study 2 were consistent with a few additional statistically significant findings in Study 2. Both studies found that, as expected, social endorsement (i.e., "likes") from the close social media connections contributed to the perception of descriptive norm (prevalence of the misinformed health behavior) and injunctive norms (social approval of the misinformed health behavior) among their close ties on Instagram. The influence of likes by distant ties showed inconsistent results across the two studies. While the first study did not find the effect of LDT on either descriptive or injunctive norms of distant ties, the second study found that LDT positively influenced the perception of descriptive norm of other Instagram users in general.

Regarding the mediating role of perceived social norms, Study 1 found that injunctive norm of close ties mediated the relationship between LCT and the perceived message credibility. In addition to that, Study 2 found that descriptive norm of other general social media users mediated the relationship between LDT and message credibility.

H#		Results	
		Study1	Study2
H1	Social endorsement cues from close ties → Descriptive and injunctive norm of close ties	· LCT → Descriptive norm of close ties · LCT → Injunctive norm of close ties	· LCT → Descriptive norm of close ties · LCT → Injunctive norm of close ties
H2	Social endorsement cues from distant ties → Descriptive and injunctive norm of distant ties	· Not supported	· LDT → Descriptive norm of distant ties (*)
H3	Social endorsement cues → Social norms → Msg Credibility	· LCT → Injunctive norm of close ties → Msg Credibility	· LCT → Injunctive norm of close ties → Msg Credibility · LDT → Descriptive norm of distant ties → Msg Credibility (*)
H4	Social endorsement cues → Social norms → Adoption	· LCT → Descriptive norm of close ties → Adoption	· LCT → Descriptive norm of close ties → Adoption · LCT → Injunctive norm of close ties → Adoption (*)
H5a	The effect of Social norms of close ties on msg credibility > the effect of social norms of distant ties on msg credibility	· Injunctive norm of close ties > Descriptive norm of distant ties, Injunctive norm of distant ties	· Injunctive norm of close ties > Descriptive norm of distant ties, Injunctive norm of distant ties
H5b	The effect of Social norms of close ties on adoption > the effect of social norms of distant ties on adoption	· Not supported	· Injunctive norm of close ties > Descriptive norm of distant ties, Injunctive norm of distant ties (*)
H6a	Social endorsement cues → Social norms → Msg Credibility → Sharing	· LCT → Injunctive norm of close ties → Msg Credibility → Sharing	· LCT → Injunctive norm of close ties → Msg Credibility → Sharing
H6b	Social endorsement cues → Social norms → Msg Credibility → Adoption	· LCT → Injunctive norm of close ties → Msg Credibility → Adoption	· LCT → Injunctive norm of close ties → Msg Credibility → Adoption

Table 4. Summary of findings from Study 1 and Study 2. *Note. LDT = Likes by distant ties, LCT = Likes by close ties, Des Close = Descriptive norm of close ties, Inj Close = Injunctive norm of close ties, Des Distant = Descriptive norm of distant ties, Inj Distant = Injunctive norm of distant ties, Msg Credibilty = Message credibility, Adoption = Intention to adopt the health misinformation in one's health decision, and Sharing = Intention to share the information with others. (*) indicates the inconsistent findings between Study 1 and Study 2.*

When the behavioral intention to engage in the misinformed health behavior was tested as an outcome variable, Study 1 and 2 both found that descriptive norm of close ties mediated the relationship between LCT and the behavioral intention. In addition to that, Study 2 found that injunctive norm of close ties also mediated the relationship between LCT and the behavioral intention.

Regarding the comparison between the indirect effects of perceived social norms of close ties versus distant ties, when credibility was the outcome variable, the two studies equally found that the indirect path through injunctive norm of close ties had a significantly bigger effect size than the path through injunctive and descriptive norms of distant ties. For the parallel mediation analysis with the information adoption intention as the outcome variable, both studies found that the mediating effect of descriptive norm of close ties was not significantly bigger than the other three types of norms. Study 2 found that, again, the mediating effect of injunctive norm of close ties was significantly bigger than that of descriptive norm of distant ties and injunctive norm of distant ties (note that these two variables did not have significant mediating effects).

Finally, both studies found that the serial mediation from LCT to injunctive norm of close ties to message credibility and to sharing intention, as well as the serial mediation from LCT to injunctive norm of close ties to message credibility and to information adoption intention were found significant.

CHAPTER 6: DISCUSSION AND CONCLUSION

6.1 Intention of the study

Social media has become an easily accessible venue for many of us to consume different types of health information. Although social media allows unprecedented opportunities for people to search and share useful health information, with the overwhelming amount of unverified health information, the spread and consumption of health misinformation have become serious threats to the health of individuals and the society as a whole.

While a significant volume of previous research focused on unequivocally false misinformation (Nan et al., in press), a critical but understudied threat to the majority of the social media users is health misinformation that is unverified and lacks scientific evidence. This type of health misinformation takes up a significant volume of health misinformation online and is easily found on social media platforms (Al Khaja et al., 2018; Ecker et al., 2014), and further, when adopted inadequately, it can pose a serious threat to one's physical and mental health (Al Khaja et al., 2018). What adds to the problem is that social media users often do not have the motivation or ability to think through and evaluate the veracity or quality of such information (Boczkowski et al., 2018; Lee et al., 2017; Metzger, 2007), because such information is often accidentally encountered on social media rather than intentionally searched. Therefore, people tend to rely on peripheral cues that signify the credibility of the information, rather than scrutinizing its actual content or quality (Sundar, 2008).

Given these backgrounds, this dissertation specifically aimed to understand how people come to trust, adopt, and share this type of common but dangerous health misinformation. This study examined social endorsement cues as a key factor to influence the credibility of health misinformation as well as the intention to adopt or share such information. The role of social

endorsement cues has been studied in various contexts, but relatively less in the context of health misinformation. Because social endorsement cues can provide information regarding how other people (including close and distant referents) assess certain information, when lacking motivation or ability to evaluate health (mis)information, people are likely to rely on these cues to decide whether to trust the health misinformation and to adopt the misinformed health behavior.

Social endorsement cues are displayed to users in two representative forms, either in the form of aggregated quantified information (e.g., number of "likes"), which represents the popularity of social media content to other social media users in general, or in the form of a notification about whether one's direct social connections on the social media platform reacted to certain content or not. While previous research primarily focused on the aggregate form of social endorsement cues (Kim & Sundar, 2011; Sundar et al., 2009; Xu, 2013), a volume of previous research suggests that, in online spaces, information about close ties' behavior has a substantial influence over one's own behavior (Centola, 2013; Meng, 2016; Phua & Ahn, 2016).

Therefore, the present study explored the differing influences of social endorsement cues from two distinct referent groups – distant ties (as in other social media users in general) as well as close ties (as in close connections on social media) – arguing that these cues create the perceived the social norms of close and distant reference groups, respectively, which in turn, increase the credibility of the health misinformation as well as behavioral intentions to share and adopt the information.

6.1.1 The effect of social endorsement cues from close and distant ties on social norms

Paralinguistic social endorsement cues, notably "likes" or as such, have become quintessential elements of social media platforms. Previous studies of social endorsement cues and social norms found that these social endorsement cues influenced perceived social norms (either descriptive or injunctive norms) of different referent groups. However, as discussed previously, they primarily focused on social endorsement cues in the form of an aggregate number of likes, views, or shares. Further, while some studies showed that these cues elicit the norms of distant others (e.g., other users on Twitter; Kim, 2018a; Lee & Oh, 2017), other studies looked at whether these cues increased the perceived social norms of one's offline close connections (e.g., Lee-Won et al., 2016; Chung, 2019).

Extending previous research, this study examined the social endorsement cues from close and distant ties, by juxtaposing them with each other. Both Study 1 and Study 2 found that the presence of "likes" by close ties led to the perception of descriptive and injunctive norms of close ties. Study 2 found that the high number of "likes" led to the greater perception of the perceived descriptive norm of other Instagram users. These findings are in line with the previous research that demonstrated that the primary function of simple social endorsement cues, such as "likes", is for people to express their support, agreement, or acknowledgment of the social media content (Carr et al., 2016; Wohn et al., 2016). This study showed that, in addition to these social meanings, social endorsement cues also represent the normative information regarding other people's behavior and approval of the behavior.

While Study 2 found the effect of LDT on the perceived descriptive norm of distant ties, Study 1 did not. This inconsistent finding between Study 1 and Study 2 may be explained by the different sample characteristics in each of the studies. As stated earlier, the sample from Study 1

scored relatively high in the need for closure. The need for closure is the motivation or desire to avoid uncertainty or ambiguity and seek an unambiguous state (Webster & Kruglanski, 1994), and involves a desire for consensual validation and is related to cultural conformity (Fu et al., 2007) as well as preference for familiarity and simplicity (Fortier & Burkell, 2014).

This suggests that when processing given information (in this experiment, social endorsement cues from different social groups), people with a high need for closure tend to focus on something familiar and are more likely to conform to what is accepted within their close social boundaries. Accordingly, one possible explanation of why the first study did not find the influence of LDT on descriptive norms of distant ties is that those with a relatively high need for closure may attend more to the cues from close social ties, and relatively pay little attention to the cues from distant ties, and therefore, LDT did not have significant influence perceived social norms of distant ties. Indeed, a previous study found that a high number of social media cues (i.e., retweets) induced significantly greater perceived injunctive norms of close ties than a low social media metric, among those who scored higher in need for closure (Chung, 2019).

Therefore, the inconsistent finding between Study 1 and Study 2 suggests that an individual's preference of or desire for conformity and familiarity may influence how much the person attends to the social endorsement cues from different social groups to infer social norms from these cues.

Additionally, in Study 2, social endorsement cues by distant ties only influenced the perceived descriptive norm of the distant reference group, but not on the injunctive norm of the distant reference group. The items used to measure the injunctive norm of distant ties asked participants how much they think other Instagram users, in general, would approve, endorse, and support their engagement in the (misleading) health behavior introduced in the Instagram post.

Considering that no other information was given to participants about the distant reference group (i.e., "general Instagram users"), although the high number of likes might have been enough to imply how the unknown individuals would accept the given health information, it might have been difficult for participants to infer, from the very simple cues (i.e., number of likes), how these unknown individuals would react or assess the participants' health behavior choice.

6.1.2 Social norms, credibility, and behavioral intention

As discusses earlier, the current research on credibility judgment in online settings emphasizes the quantified, aggregate endorsement cues from "other users in general" as an important factor increasing perceived credibility of information (e.g., Metzger et al., 2010; Sundar, 2008; Walther & Parks, 2002). The argument is that because there are so many different types of information sources and it is ambiguous and complicated to identify them (Metzger et al., 2010), people are much more reliant on social endorsement cues from "many others" as they think these cues cannot be easily fabricated (Walther & Parks, 2002).

In a similar vein, the MAIN model (Sundar, 2008) asserts that people heavily rely on diverse technological cues that trigger cognitive heuristics to judge the credibility of online information. Among diverse technology cues, agency cue (e.g., number of likes, shares, or comments) is made available by visually representing aggregate information from a large number of users, and this cue triggers bandwagon heuristics which then lead people to trust and adopt the information rather uncritically. This theoretical proposition has been supported in many previous studies (e.g., Kim & Sundar, 2011; Sundar et al., 2009; Xu, 2013). In line with these studies, Study 2 found that the perceived descriptive norm of distant ties mediated the relationship between LDT and message credibility, which is consistent with this argument.

However, the other findings from the present study strongly suggest that people rely more heavily on social endorsement cues from close ties, than distant ties, when assessing online information or making behavioral decisions. The parallel mediation analysis found that the indirect path through the injunctive norm of close ties to credibility was significant, and this indirect effect was significantly bigger compared to descriptive and injunctive norms of distant ties in both Study 1 and Study 2. Further, the serial mediation paths from LCT to intention to share or adopt the given information were significant, whereas the paths from LDT to the two types of behavioral intentions were not. Further, the intention to adopt the misinformed health behavior was predicted by the descriptive and injunctive norm of close ties, but not by those of distant ties (See Table 4 for the full summary of the results).

These results suggest that, compared to "other users" as a source of credibility judgment, when available, people do rely more on social endorsement cues from identifiable, relationally close ties. These results can be explained by a few different theoretical mechanisms.

For instance, when people have a strong positive attitude toward an object or source (i.e., highly accessible positive attitude), it orients their attention to the object or source and makes them ignore others, and this cognitive state consequently governs their information processing by making them process the information in a biased fashion (i.e., more favorably), or use the "likeability" heuristics (Roskos-Ewoldsen & Fazio, 1992; Roskos-Ewoldsen et al., 2002). In the context of this study, it is safe to assume that people would have had a more positive attitude toward their close ties rather than unknown others on Instagram as a source of the social information (i.e., social endorsement cues). Therefore, when they were believed (or asked to imagine that the message (the social media post promoting health misinformation) was liked by close ties, their attention might have been drawn to the social endorsement cues from close ties

while the cues from distant ties were relatively neglected. Subsequently, their evaluation of the message would have been more positive, either because they processed the message in a biased fashion or because they used the "likeability" heuristics when evaluating the health misinformation. This may have led to the increased the credibility of the message (or their liking of or agreement with the message), and then the increased credibility may have further influenced their intention to engage in the behavior described in the message or share the message with others.

Another possible explanation is that influence of social norms on one's behavioral decision varies depending on the relational closeness of the reference group within which individuals perceived social norms. Specifically, people are more likely to be influenced by descriptive or injunctive norms among the members of close referent groups (e.g., close friends) either because they have a better awareness of the behavior of close ties or a violation of norms among close ties may incur greater social cost than violation of norms of distal ties (Yanovitzky et al., 2006; Yun & Silk, 2011). Consistent with this argument, research on social reinforcement and behavior diffusion in online networks has demonstrated that people are more influenced by the behaviors of others who are closer or similar to themselves (e.g., Centola, 2010; Carpenter & Amaravadi, 2019; Meng, 2016).

Lastly, it should be noted that this study was mainly interested in two different behavior related to the spread and consumption of health misinformation: information sharing behavior and adoption behavior. These two behaviors may have different connotations for people. Particularly, compared to sharing behavior which is a relatively easier act (just a click-away), deciding to adopt a new health behavior to their daily routine usually requires more thoughtful decision-making processes (i.e., systematic information processing) as it has a direct influence

on one's well-being. (Fazio, 1990). By comparison, sharing behavior is likely to involve relatively less systematic processing. Since information processing mode was not explored in this study, this prediction could not be tested. However, the relative importance and magnitude of cognitive efforts involved in the decision to engage in these two different behaviors are worth further exploration.

In conclusion, the results from this study imply that the influence of "other users" and the bandwagon effect may be reduced or even negated when social endorsement cues from close ties are present. The results also shed a light on the role of social endorsement cues from close ties as credibility judgment criteria, which has been relatively neglected in the discussion of online credibility judgment.

6.2. Theoretical and practical implications

A major contribution of this study is that it compared the relative effects of social endorsement cues on social media, specifically the number of likes, for two different referent groups – close ties and distant ties. This study provides a valuable addition to the existing research by illuminating the role of social endorsement cues from proximal ties, which has been relatively understudied despite being one of the key features of social media platforms.

Further, the study investigated the psychological processes through which social endorsement cues influence one's credibility judgment, information sharing intention, or intention to adopt health misinformation in one's health decisions. There was no direct effect of social endorsement cues on the focal dependent variables, and these cues influenced the outcome of interests only through the perceived social norms. This finding confirms the argument of this study that, among the many social meanings represented by social endorsement cues available on

social media (i.e., “likes” or other similar types of cues such as the number of “hearts” on Twitter, “Upvote” on Reddit), normative information about other people’s behavior and approval plays an important role in enhancing the credibility of health misinformation as well as relevant behavioral outcomes.

The results from this study can be utilized in an effort to correct and prevent spread or adoption of health misinformation. For example, one possible option is to address health misinformation may be removing social endorsement cues from controversial health misinformation shared on social media platforms. Recently social media companies have tested the removal of such social endorsement cues to prevent their potentially harmful psychological impact (Meisenzahi, 2019), although it was not officially implemented. Given the importance of such cues on social media platforms, it is doubtful that these features will disappear in near future. However, as it is becoming more and more important for the tech companies to fulfill their social and ethical responsibilities by monitoring the content produced by their users, they may consider eliminating such social endorsement cues for certain information (e.g., politically sensitive information, or health or political mis/disinformation) to reduce and prevent the wide-spread of mis or disinformation on social media platforms. Alternatively, it is possible to utilize a form of disapproval cues (e.g., dislikes) to reduce the credibility of mis or disinformation, by creating the “norm of disapproval” on inaccurate and harmful information. Not a lot of social media platforms provide this option, and it will be an interesting question to ask in future research.

Conversely, the influence of social endorsement cues from close referents can be utilized in health interventions to increase the credibility of the promoted health behavior and motivation to follow the intervention. Although the particular context of this study is concerned with health

misinformation, the role of social endorsement cues can be applied to the consumption of beneficial health information as well.

One thing to note is that the underlying assumption of the study was that, in a social media environment where there is always an overflow of diverse information, people rarely put an extended effort to evaluate the quality of the information, but rather rely on peripheral cues, notably social endorsement cues by different referent groups. In other words, the default mode of information processing of social media users would be peripheral processing (Petty & Caioppon, 1986; Chen & Chaiken, 1999). This dissertation was particularly interested in this context because incidental consumption of health misinformation (with a low motivation to process the information) frequently occurs in real-world settings of social media use. In line with this assumption, this study purposely picked health topics that were relatively less familiar and relevant to the participants and controlled the influences of topic familiarity and personal relevance in the statistical analysis.

However, this assumption may not apply to other health misinformation where people are highly involved in the health topic, such as anti-vaccination. When a given topic is highly relevant or people hold a strong attitude toward a certain topic, people substantially pay more attention to and selectively expose themselves to information regarding the highly relevant topic (Knobloch-Westerwick & Meng, 2009). Further, previous studies found that for the topics toward which one has a strong positive attitude (thus presumably a high personal relevance), they tend to process information more thoroughly (i.e., central processing), and more resistant to counter-arguments (Rhodes et al., 2008).

Social media algorithms are designed to expose users to personalized content that meets their existing interests, preference, and worldview, and it is likely that people are likely to be

encountered with online information that they feel highly relevant. And this means that people are more likely to pay attention to such information. Accordingly, it is reasonable to assume that the influence of social endorsement cues may be less relevant to health mis or disinformation toward which people tend to have a strong attitude and feel highly personal, and this is a question worthy of exploration in future research.

6.3 Limitation

The biggest limitation of this study is that, because of the nature of the experimental study, the experimental setting was not as natural as daily life settings where people encounter health misinformation on social media platform. Further, there are different nuances associated with "close ties or connections" on social media platforms. Although for most people, offline social networks overlap with online social network, it might not be always true for people who use the social media platform for particular purposes such as to promote their artwork or share interests with people they know only online. Therefore, the liking of their "close connections" on Instagram may have created different meanings to different people, which might have compromised the effectiveness of the experimental manipulation. Future studies should provide additional support on the findings of this present study using other methodological approaches, such as social network data analysis, or qualitative methods, such as interviews.

6.4 Conclusion

The study demonstrated that social endorsement cues, specifically the number of "likes", from close and distant ties created a perception of social norms – both descriptive and injunctive norms –around the health misinformation people encounter on social media platforms. The likes

from close social media connections resulted in a heightened perception of the descriptive and injunctive norm of close ties. The likes from unknown other social media users influenced the perception of the descriptive norm of general social media users. The injunctive norm of close ties and descriptive norm of distant ties both influenced the perceived credibility of a social media post containing health misinformation. The increased credibility, in turn, led to a greater intention to engage in the misinformed health behavior as well as a greater intention to share the misleading health information.

APPENDICES

APPENDIX A: EXPERIMENTAL STIMULI

Participants randomly assigned to one of the four conditions of a 2 (Social endorsement cues by distant ties: a low number of likes vs. a high number of likes) x 2 (Social endorsement cues by close ties in one's network: presence of likes by close ties vs. absence of the likes by close ties) factorial design experiment.

Independent Variable 1: Social endorsement by general Instagram users

Likes by distant ties: high (Topic 1, Apricot seed as an example).

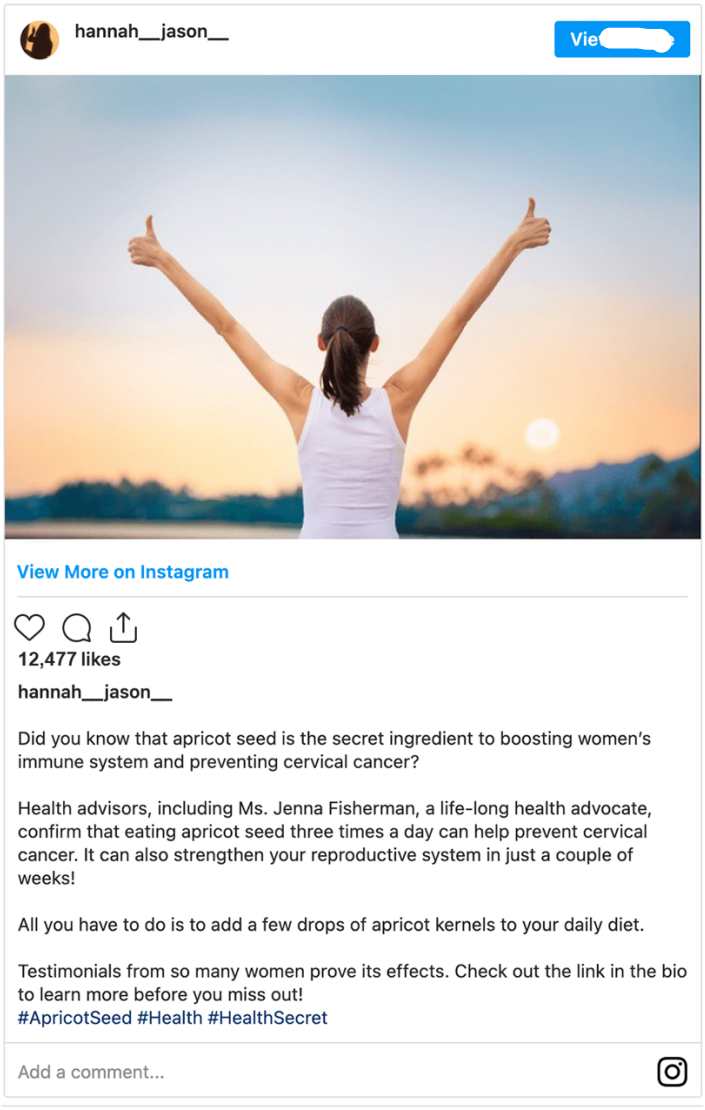

Figure 16. Manipulation type 1, LDT high condition

Likes by distant ties: low (Topic 1, Apricot Seed as an example).

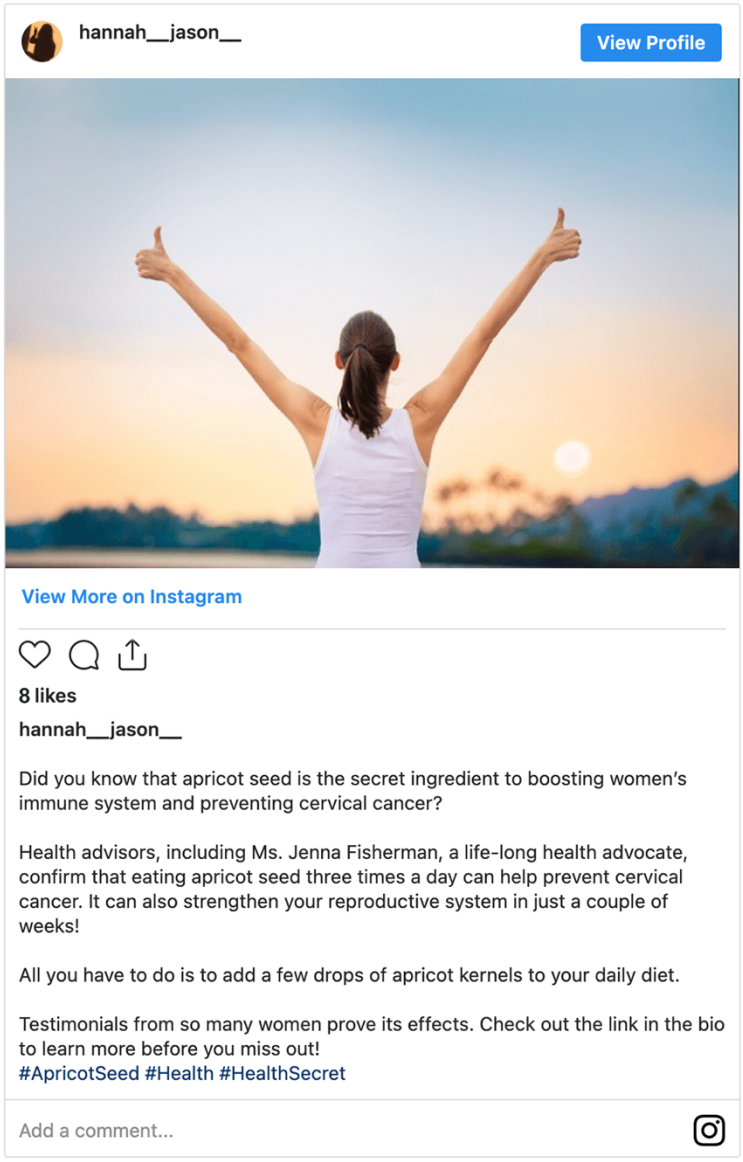

Figure 17. Manipulation type 1, LDT low condition.

Independent Variable 2: Social endorsement by close ties on Instagram

To manipulation endorsement by close Instagram followers, the manipulation Type 1 (opt-in) employed a cover story, using the following steps.

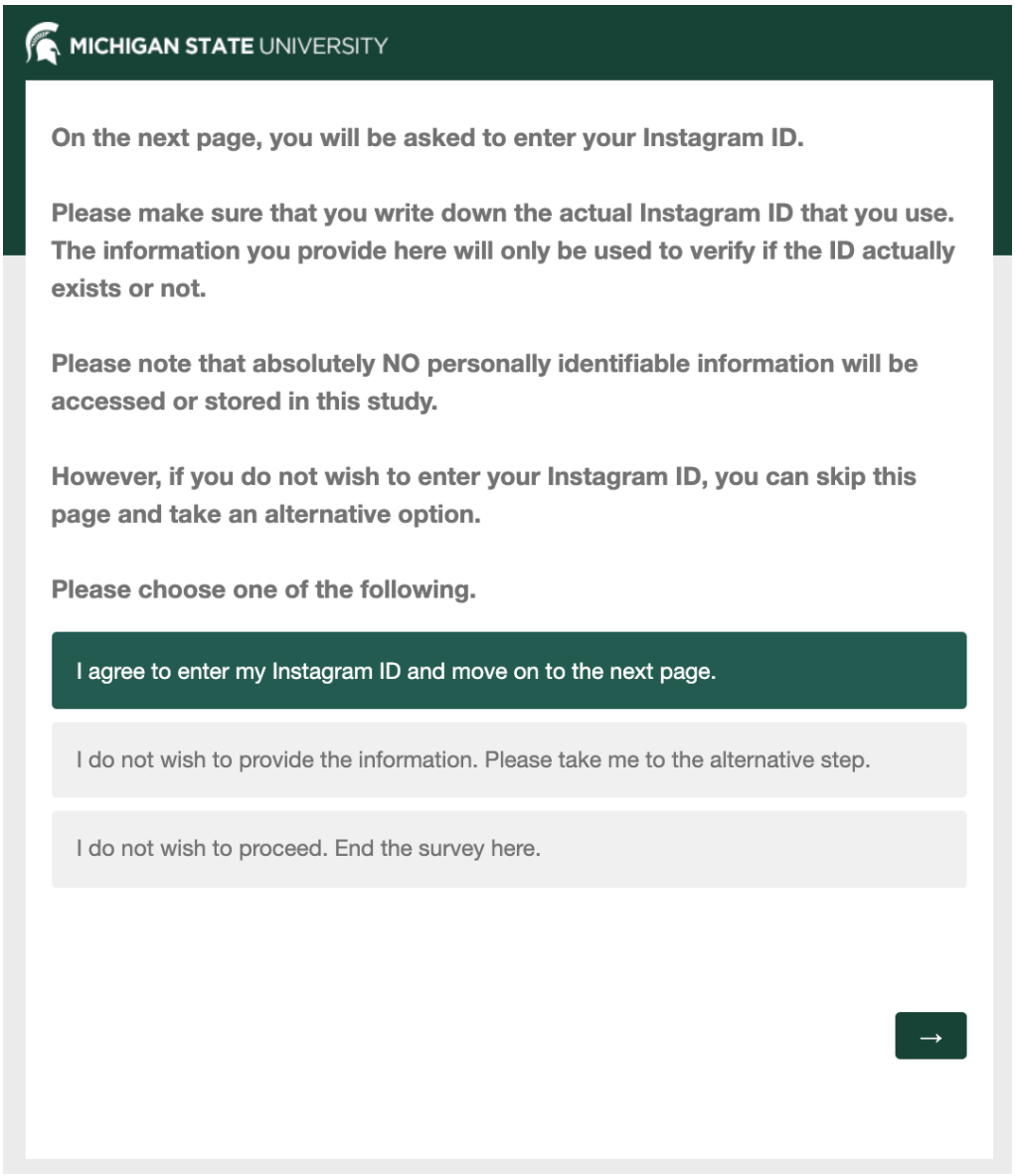

Figure 18. Manipulation type 1 question.

If the participant agreed to provide their Instagram ID, they were prompted to the question below asking to enter their Instagram ID.

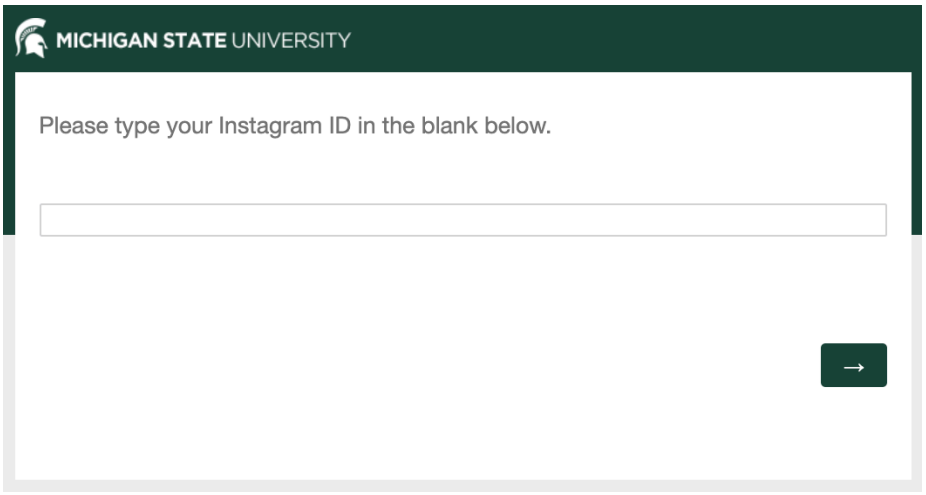

Figure 19. Manipulation type 1 question (continued).

After they entered their ID, they were exposed to the below explanation.

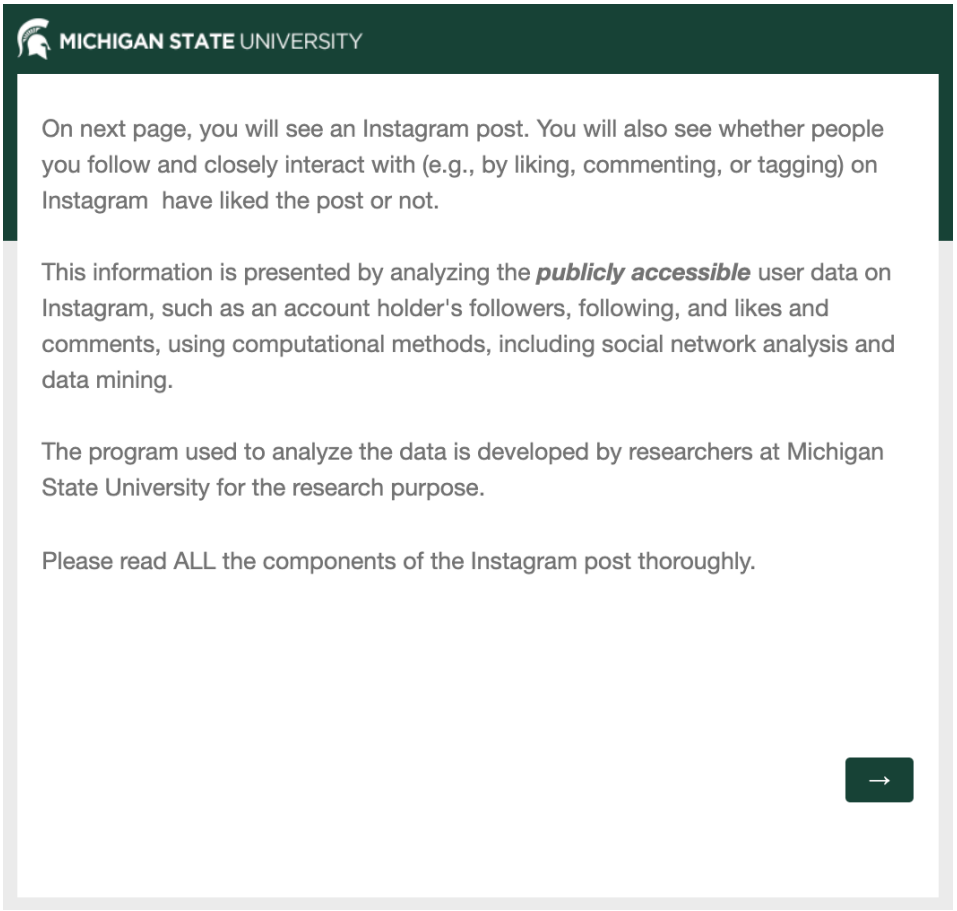

Figure 20. Manipulation type 1 cover story.

Those who entered the IDs saw either of the below images. The first image is the "absence of endorsement by close ties" condition, and the second is the "presence of endorsement by close ties" condition.

Likes by close ties: Absent (Topic 1, Apricot seed as an example)

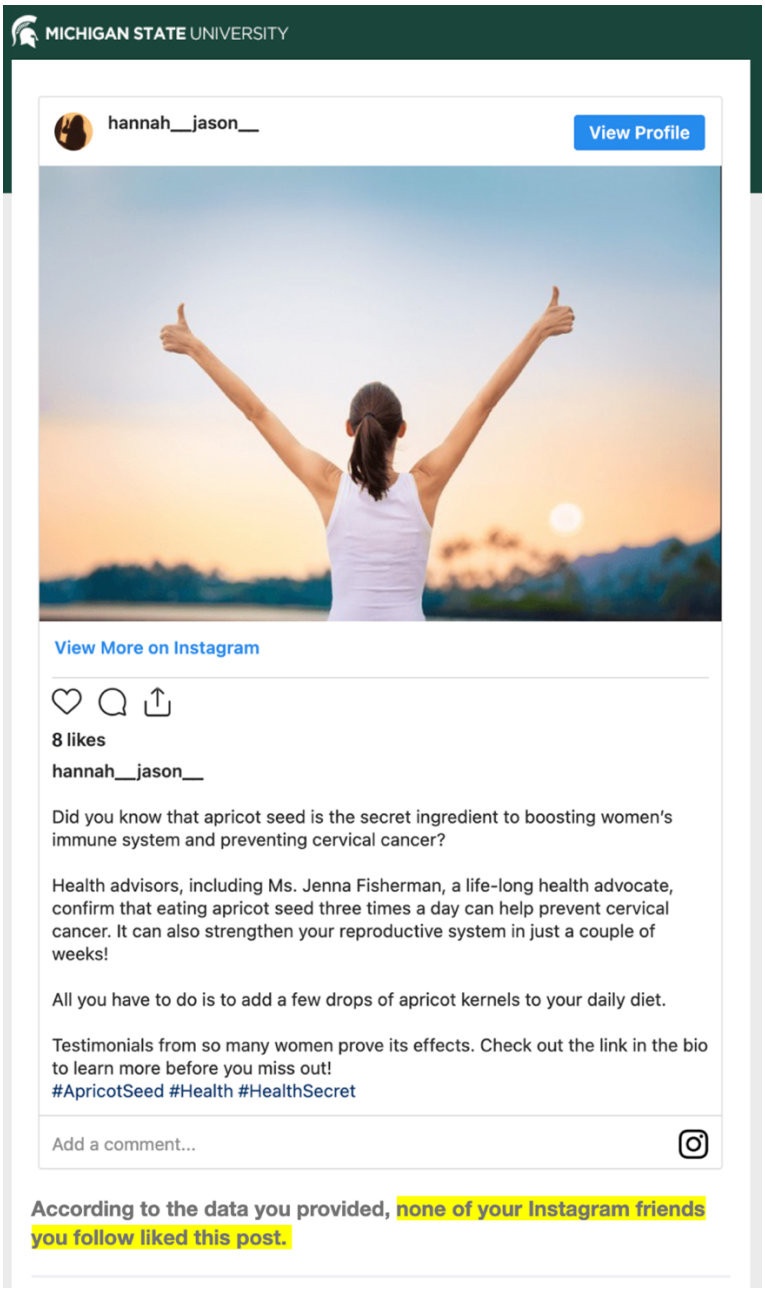

Figure 21. Manipulation type 1, LCT absent condition.

Likes by close ties: Present (Topic 2, Senna tea as an example)

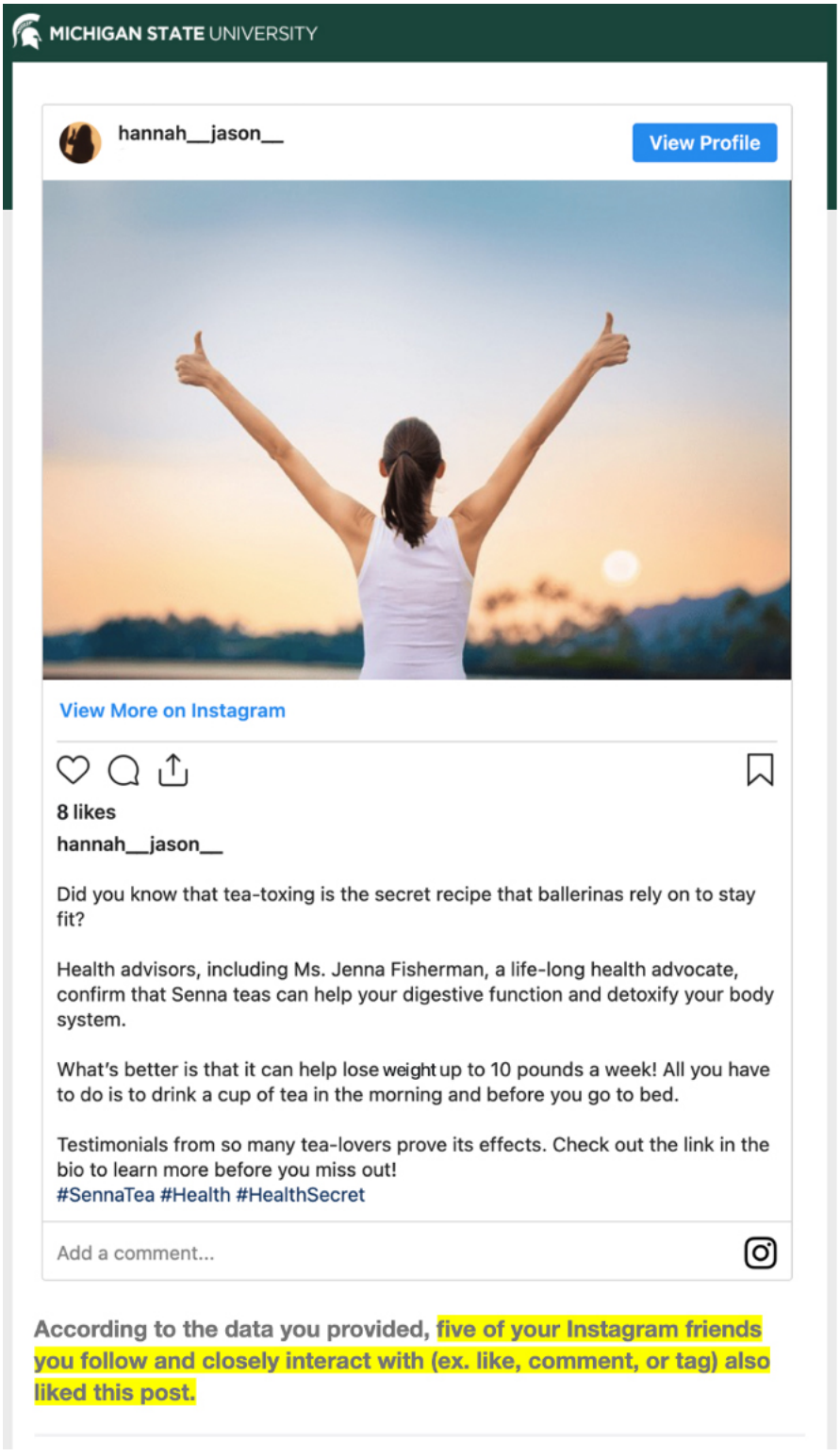

Figure 22. Manipulation type 1, LCT present condition.

To the participants who chose not to provide their Instagram ID (Type 1, opt-out) or who were randomly assigned to the hypothetical scenario option (Type2) the below stimuli were used.

Likes by close ties: Absent (Topic 1, Apricot seed as an example)

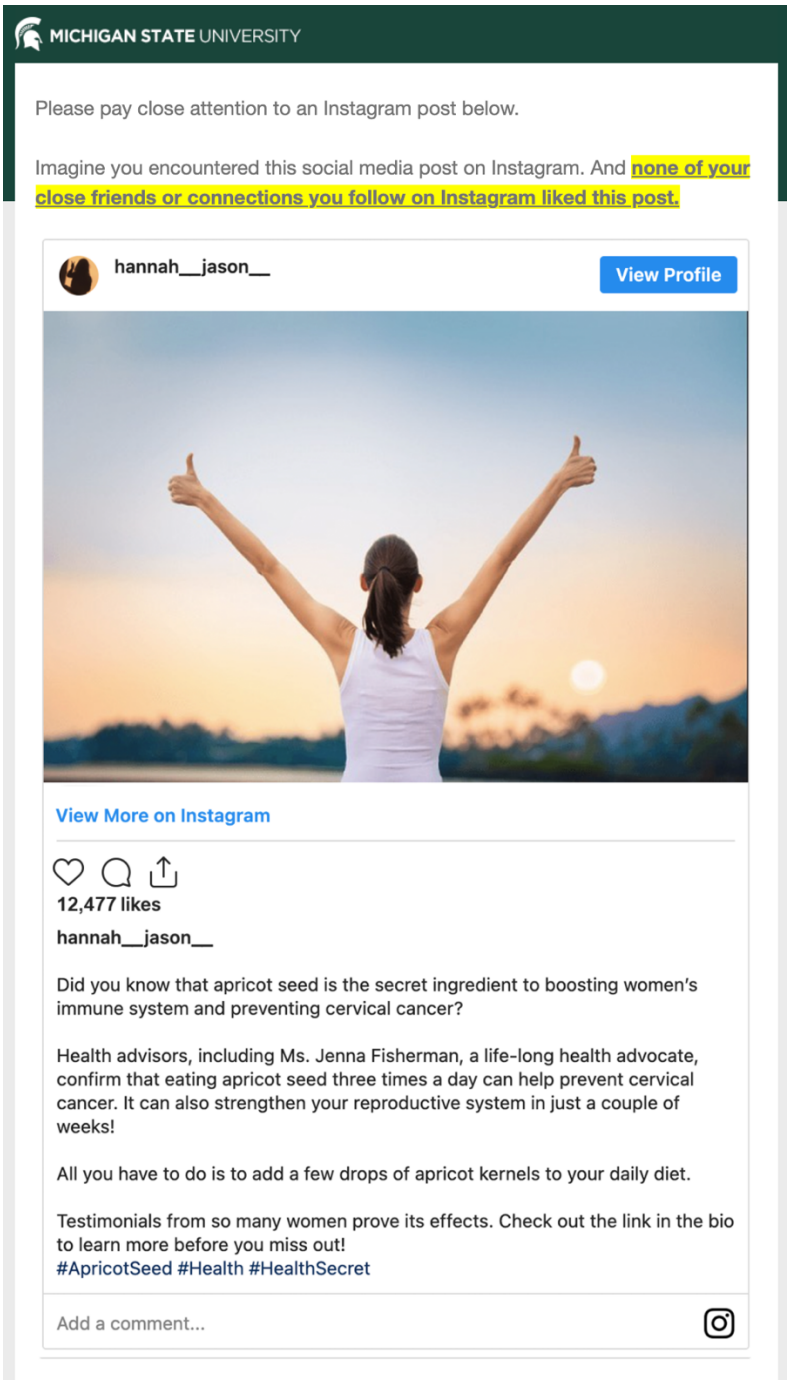

Figure 23. Manipulation type 2, LCT absent condition.

Likes by close ties: Present (Topic 1, Apricot seed as an example)

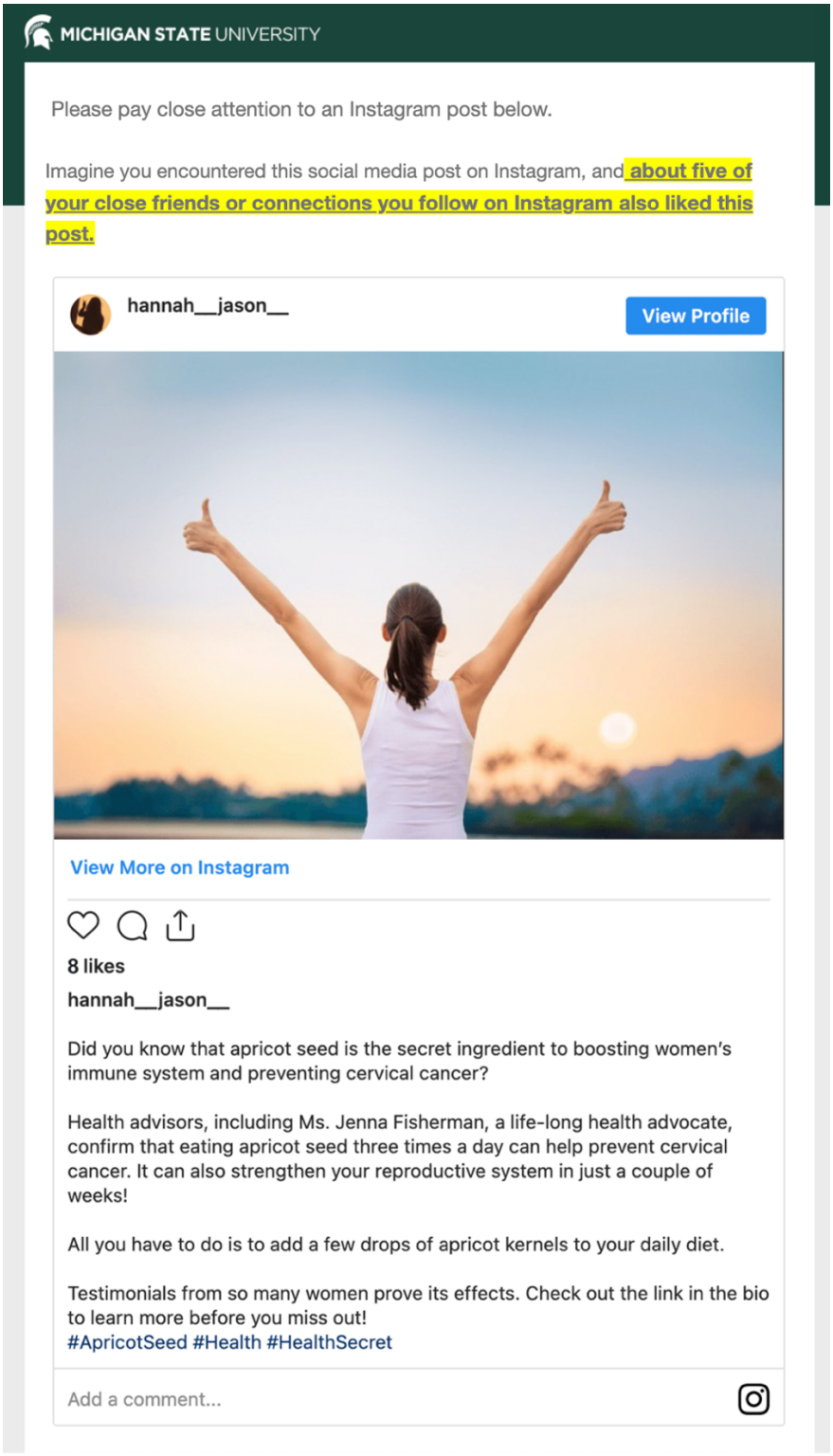

Figure 24. Manipulation type 2, LCT present condition.

APPENDIX B: SURVEY ITEMS

Screening

1. How often do you use Instagram?
    a. Daily
    b. Several days a week
    c. Once or twice a week
    d. Once or twice a month
    e. Rarely
    f. Never

2. What is your age? (enter a number)
3. What is your gender? (choose between female, male, and prefer not to answer)

Manipulation check

i. My close ties on my Instagram liked this Instagram post (1 strongly disagree to 7 strongly agree)
ii. The Instagram post I just saw has a high number of likes (1 strongly disagree to 7 strongly agree)

Perceived descriptive norm among close ties

In the blank, depending on the topic that the participant was assigned, one of the following topics was used.

- Drink Senna tea for detoxing
- Add apricot seed to diet to prevent cervical cancer

1) How many of your close ties on your Instagram network will want to _____? (1 none to 7 all)
2) How many of your close ties on your Instagram network _____? (1 none to 7 all)
3) My close ties on Instagram I follow will want to _____. (1 strongly disagree to 7 strongly agree)
4) Think of your close ties on your Instagram. What percentage of them _____? Please enter a number between 0 to 100.

Perceived injunctive norm among close ties

1) My close ties on my Instagram network think that _____is something that I should do. (1 strongly disagree to 7 strongly agree)
2) My close ties on my Instagram network approve of me _____. (1 strongly disagree to 7 strongly agree)
3) My close ties on Instagram I follow would endorse my _____. (1 strongly disagree to 7 strongly agree)
4) My close ties on Instagram I follow would support that I _____. (1 strongly disagree to 7 strongly agree)

Perceived descriptive norm among generic others

1. How many of *Instagram users in general* will want to _____? (1 none to 7 all)
2. How many of *Instagram users in general* _____? (1 none to 7 all)
3. *Instagram users in general* _____.
4. Think of *Instagram users in general.* What percentage of them _____? Please enter a number between 0 to 100.

Perceived injunctive norm among generic others

1. *Instagram users in general* think that _____is something that I should do. (1 strongly disagree to 7 strongly agree)
2. *Instagram users in general* approve of me _____. (1 strongly disagree to 7 strongly agree)
3. *Instagram users in general* would endorse my _____.(1 strongly disagree to 7 strongly agree)
4. *Instagram users in general* would support that I _____. (1 strongly disagree to 7 strongly agree for the item 2-4)

Credibility of the information

Please indicate how well the following adjectives represent the article they just read (1 describes very poorly to 7 describes very well)

1) Accurate
2) Authentic
3) Believable
4) Organized
5) Clear
6) Comprehensive
7) Current
8) Reliable
9) Valid

Intention to share the post

Please indicate how much you agree with the following statements. In the following statements, "this post" refers to the Instagram post you saw earlier.

1. I would "like" this post on Instagram.
2. I would "comment" this post on Instagram.
3. I would "tag my friends" to this post on Instagram.
4. I would share this post through my Instagram "story"
5. I would share this post on my own Instagram feed or other social media feed.
6. I would share this post through Instagram direct message.
7. I would share this post thorough other messaging apps.
8. I would tell my friends about the information in the post.

Intention to adopt the behavior in the social media post

1) I intend to _____ in the next week/ next month / next year.
2) I am likely to _____ in the next week/ next month / next year.

3) I mean to _____ in the next week/ next month/ next year.
4) I have it in my mind to _____ in the next week/ next month / next year.

Control variables

Topic Familiarity (1 definitely not to 5 definitely yes)

1. I have encountered a similar information in the social media post online before.
2. I have tried what the social media post is describing.
3. I am well aware of what the social media post is talking about.

Personal involvement (1 definitely not to 5 definitely yes)

1. I frequently think about _____.
2. I found _____ personally relevant.

Need for closure (1 strongly disagree to 7 strongly agree; used to test group equivalence, not statistically controlled in the data analysis)

1) I don't like situations that are uncertain.
2) I dislike questions which could be answered in many different ways.
3) I find that a well-ordered life with regular hours suits my temperament.
4) I feel uncomfortable when I don't understand the reason why an event occurred in my life.
5) I feel irritated when one person disagrees with what everyone else in a group believes.
6) I don't like to go into a situation without knowing what I can expect from it.
7) When I have made a decision, I feel relieved.
8) When I am confronted with a problem, I'm dying to reach a solution very quickly.
9) I would quickly become impatient and irritated if I would not find a solution to a problem immediately.
10) I don't like to be with people who are capable of unexpected actions.
11) I dislike it when a person's statement could mean many different things.
12) I find that establishing a consistent routine enables me to enjoy life more.
13) I enjoy having a clear and structured mode of life.
14) I do not usually consult many different opinions before forming my own view.
15) I dislike unpredictable situations.

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