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Regina Connolly
Dublin City University, Regina.connolly@dcu.ie

Otavio P. Sanchez
Fundacao Getulio Vargas - FGV EAESP, otavio.sanchez@fgv.br

Deborah Compeau
Washington State University, deborah.compeau@wsu.edu

Fabiana Martins de Souza Tacco
Fundacao Getulio Vargas - FGV EAESP, souza.m.fabiana@gmail.com

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Understanding Engagement in Online Health Communities: A Trust-Based Perspective

Regina Connolly,[1] Otavio Próspero Sanchez,[2] Deborah Compeau,[3] Fabiana Tacco[4]

[1]Dublin City University, Ireland, regina.connolly@dcu.ie
[2]Fundacao Getulio Vargas – FGV EAESP, Brazil, otavio.sanchez@fgv.br
[3]Washington State University, USA, deborah.compeau@wsu.edu
[4]Fundacao Getulio Vargas – FGV EAESP, Brazil, souza.m.fabiana@gmail.com

Abstract

Online health communities (OHCs) represent a popular and valuable resource for those seeking health information, support, or advice. They have the potential to reduce dependency on traditional health information channels, increase health literacy and empower a broader range of individuals in relation to their health management decisions. Successful communities are characterized by high levels of trust in user-generated contributions, which is reflected in increased engagement and expressed through knowledge adoption and knowledge contribution. However, research shows that the majority of OHCs are composed of passive participants who do not contribute via posts, thereby threatening the sustainability of many communities and their potential for empowerment. Despite this fact, the relationship between trust and engagement, specifically the trust antecedents that influence engagement in the OHC community context has not been adequately explained in past research. In this study, we leverage *social capital behavior* and *social exchange theory* frameworks in order to provide a more granular trust-based elucidation of the factors that influence individuals' engagement in OHCs. We collected data from 410 Brazilian participants of Facebook OHCs and tested the research model using partial least squares. The results confirm two new constructs—online community responsiveness and community support—as trust antecedents that influence engagement in OHCs, resulting in knowledge adoption and knowledge contribution responses. These findings contribute to the trust and engagement literatures and to social media research knowledge. From a practitioner perspective, the study findings can serve as an important guide for moderators and managers seeking to develop trusted and impactful OHCs.

Keywords: Online Health Communities, Trust, Engagement, Community Support, Community Responsiveness, Knowledge Contribution, Knowledge Adoption

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1 Introduction

As internet penetration becomes more extensive, the range of purposes for which it has been employed has equally increased. Some of these purposes contain the potential to educate and improve citizen well-being in ways that were previously not possible. This is particularly evident in the area of health. For example, online health communities (OHCs) enable individuals to interact with others who share similar health concerns in order to learn from their experiences and gain useful advice (Eysenbach et al., 2004; Hajli et al., 2014) and to reciprocate by sharing health information that is frequently based on personal experience (Ziebland & Wyke, 2012).

Patients and those who support their care can use these networks to expand their understanding of diseases, treatments, or recommended healthy practices (Goonawardene & Tan, 2013; Ram et al., 2008; Rupert et al., 2016). They can source information about many aspects of medical conditions or concerns, making the issue seem less complex and more manageable. These networks also enable them to receive much-needed psychological support (Yan & Tan, 2014). This is particularly salient since a lack of informational and psychological support is consistently highlighted by those with serious illness and their caregivers (Luszczynska et al., 2013). OHCs can also increase inclusion by providing a supportive environment for those who may not be able to access health information easily due to location or socially stigmatized conditions and associated privacy sensitivities (Still, 2008), enabling them to overcome spatial or temporal limitations (Fan et al., 2014). For these reasons, OHCs are a valuable resource for expanding the understanding of medical conditions, treatments, or recommended healthy practices (Goonawardene & Tan, 2013; Ram et al., 2008), empowering patients to become more informed about how to self-manage their conditions and take an active role in their treatment, thereby improving clinical outcomes. In this way, these communities also have the potential to contribute to preventive healthcare (Goh et al., 2016), something that in a context of changing demographics and strained healthcare systems (England & Azzopardi-Muscat, 2017) has assumed greater social and economic significance.

Notwithstanding the potential value of OHCs, research has shown that engagement in online health communities is highly variable—in some cases, as few as 1% of members contribute up to 75% of information (Carron-Arthur, 2014, Van Mierlo, 2014). The underpinning reasons for this appear to be trust related. For example, a recent survey found that only 4% of those surveyed said that they trust the health and medical information available on social media, 5% reported believing what they read on discussion forums, and only 15% stated that they trust information available on health websites (IPSOS MRBI and MSD, 2019). That deficit of trust is critical, as it limits individuals' engagement with OHCs and the positive potential contained therein. While research has begun to identify the factors that may increase an individual's trust in an OHC (Fan & Lederman, 2018; Fan et al., 2014; Fan et al., 2010), research on how those same factors influence OHC engagement remains limited. This gap in understanding has important implications as it limits the potential of these communities to support health self-management and improved health outcomes. This research addresses this deficiency in a number of distinctive ways.

First, it advances our contextual understanding of trust generation in OHCs, illustrating how trust antecedents influence engagement in OHCs and, through engagement, influence knowledge contribution and knowledge adoption. We theorize that three trust-related antecedents influence member engagement and behavioral trust (knowledge adoption and knowledge contribution). By examining this relationship and its formation pathways, our findings yield important implications for research and practice, providing insight into how more engaged membership of these communities and their associated positive outcomes can be supported and maintained. The fact that the majority of online community users are lurkers who do not participate by contributing or adopting knowledge (Amichai-Hamburger et al., 2016; Rafaeli et al., 2004; Sun et al., 2014) has amplified the need to understand how the trustworthiness of online health environments can be more effectively developed in order to increase the active participation of their members and accelerate the realization of these communities' empowering benefits. This study advances this understanding and is therefore not just interesting but important (Tihanyi, 2020).

Second, our focus on OHCs complements the existing literature. For example, much attention has been paid to trust in online transactional contexts (e.g., Connolly & Bannister, 2007; Fang et al., 2014; Gefen et al., 2003; Lee et al., 2011; Pavlou & Gefen, 2004) and, to a lesser extent, to trust in general online social networks (e.g., Grabner-Kräuter & Bitter, 2015; Matook et al., 2015). While this is valuable, the findings of these studies are bounded to those contexts and research focusing on trust in an OHC context remains limited. Moreover, what does exist varies considerably in focus, ranging from examinations of cognitive and affective trust development mechanisms (Fan & Lederman, 2018; Tacco et al., 2018) to trust stage progression (Fan et al., 2014), language, and similarity cues that indicate member trustworthiness (Sillence, 2013) and the consideration of trust dimensions in tandem with several other constructs in the context of value co-creation (Zhao et al., 2013b; Zhao et al., 2015). Furthermore, no empirical research has examined the relationship between trust antecedents and engagement, or the consequents of that relationship, in an OHC context, despite the fact that the empowerment of OHC members has been shown to relate directly to their level of engagement with the community (Oh & Lee, 2012), manifested through information disclosure (Petrič & Petrovčič, 2014) and knowledge adoption (Johnston et al., 2013), both of which are trust behaviors. However, this research does just that, answering repeated calls to address this absence of research on engagement in OHCs—answering, in particular, the call to investigate whether the outcomes of such research are similar to those obtained in other contexts (Hur et al., 2019), as

well as the call (Demiris, 2006) to clarify how engagement in OHCs might empower members to make healthcare decisions. Our research yields insights that contribute to the small but growing body of knowledge on engagement in the OHC context, empirically illustrating the role of engagement as a mediator between trust antecedents and behavioral trust responses in the unique context of OHCs.

Additionally, this research answers calls from the IS field for trust research that focuses on trust targets other than technology (Söllner et al., 2016) by focusing on OHC members and their responses to nontechnical trust antecedents. Finally, our findings advance an understanding useful to community hosts. Engagement is critical in determining the sustainability of social networks (Thielst, 2011), and researchers (Wang et al., 2017) have shown that those who contribute informational support in an OHC context remain members of those communities for longer periods of time than those who simply seek and receive informational support. The findings of our study yield important insights into how trust can be more effectively generated in an OHC context to support increased member engagement, thereby providing valuable guidance for those seeking to promote the sustainability of these platforms.

This study is structured as follows. First, we outline the theoretical background of this examination of trust in the OHC context. This includes a review of the relevant literature and the study hypotheses. Then, we describe the methodology employed to test the research model. Finally, we discuss the study findings and their implications for theory and practice. The paper concludes with an outline of study limitations and potential directions for future studies in this area.

2 Theoretical Background

The objective of this paper is to examine trust formation in OHCs. We examine the relationship between trust and engagement, both in terms of the specific trust antecedents that predict engagement and in terms of the trust responses related to engagement. To that end, we draw on social capital theory and social exchange theory. Social capital is a term used to describe the "norms and networks that facilitate collective actions for mutual benefits" (Woolcock, 1998, p. 155). It has been described (Beaudoin & Tao, 2007) as the actual or potential resources that result from social connections and senses of reciprocity and trust, which can bring about outcomes at the individual and collective levels. It has been argued (Nahapiet & Ghoshal, 1998) that social capital encompasses distinct structural, relational, and cognitive dimensions. In the OHC context, the structural dimension is represented by social interaction links and ties between members of the community, as manifested in network density, interaction frequency, duration, and depth. These structural links are conduits for resources, such as credible information and experiential knowledge. The relational dimension encompasses relationship connections between community members and trust and identification with other members, as evidenced in the perceived support and perceived responsiveness of the online community. The cognitive dimension is represented by the shared understanding, values, and normative expectations of the community, all of which bind a community together and facilitate the achievement of its objectives. In the context of this study, it is proposed that the presence of these three dimensions is likely to influence a trust response and the intent to engage with the community.

However, the unique nature of OHCs means that they are characterized by particular vulnerabilities—specifically, the adoption of incorrect health advice may result in significant consequences for the individual; similarly, the disclosure of personal health information represents privacy loss. As a consequence, both of the trust responses examined in this study involve a risk-benefit calculus with more impactful outcomes than would be the case in many other online contexts. In the case of knowledge contribution, it contains the elements of social exchange, one that takes place under a condition of risk, which in this case is loss of privacy. We thus employ social exchange theory (SET) as one of the theoretical frameworks guiding this study because the transfer of personal information is an exchange between social actors that involves awareness of the risks associated with the disclosure of this information (Youn & Hall, 2008). SET bridges disciplines, including anthropology, social psychology, and sociology, and conceptualizes social behavior as an exchange process in which individuals evaluate relationships in terms of their benefits and risks. It therefore emphasizes behavior as a process of resource exchange (Emerson, 1976) where one person evaluates the cost associated with exchanging a resource (such as health information) with someone else in order to receive a specific benefit (such as advice). The explanatory power of this theory has been applied to examine issues as diverse as psychological contracts (Rousseau, 1995), employee responses (Jones, 2010), trust generation, and privacy concerns (Luo, 2002). In an online context, it has been used (Tsai & Kang, 2019) to examine reciprocal intention in knowledge seeking, online repurchase intentions (Chou & Hsu, 2016), and knowledge sharing in OHCs (Yan et al., 2016). The literature has made it clear that trust is only required in conditions of uncertainty and risk and is necessary for exchange relationships to succeed. This applies to disclosure relationships, as without some form of trust among online community members, most individuals would be reticent to disclose personal information, particularly to online community members with whom they are unfamiliar. SET is also relevant to knowledge

contribution from a benefit-evaluation perspective, as it emphasizes the intrinsic rewards that accrue from information sharing, which include feelings of belonging, network ties, trust, and community commitment—all of which are rewards that strengthen the further development of social capital. The unit of exchange (in this case personal health information) may also contain intrinsic socioemotional value for the recipient of that information, motivating their desire to reciprocate (Cropanzano & Mitchell, 2005). That value relates to the fact that disclosure of such information demonstrates trust, respect, and appreciation of their expertise. For example, researchers (Foa & Foa, 1980, 1974) have long contended that units of exchange (including information) may provide symbolic benefit to the recipient, a benefit that conveys a meaning that transcends objective worth to the individual and enables these units of value to be exchanged in a more open-ended manner. This is particularly true in the context of an online health community, where the disclosure of personal health information and the request for guidance regarding the management of one's health conveys a message that the recipients' expertise is trusted, respected, and needed (Shore, Tetrick & Barksdale, 2001). In this way, the provision of personal health information may be evaluated by the recipient as having intrinsic social value (Redmond, 2015), which facilitates their participation in an altruistically motivated interpersonal exchange, motivating their contribution to the development of an online community that they value.

The SET framework therefore provides an empirically tested scaffolding for exploring the normative aspects of exchange that affect online information sharing choices, specifically trust in the online community. In the context of the current study, it indicates that when OHC members evaluate the informational and socioemotional supports that the community is providing as trustworthy and aligned with their needs, they are more likely to actively engage through applying that information, contributing health advice, and disclosing their own experiences. Our decision to integrate social exchange with social capital is consistent with an increasing body of work that has recognized the value of this integrated approach in examining trust or trust-related factors in the online community context (Ho & Lin, 2016; Jin et al., 2015; Munzel & Kunz, 2014; Wang & Liu, 2019).

2.1 Trust

Trust is a construct of enduring interest whose value and contribution to interpersonal, interorganizational, and transactional relationships is widely acknowledged by researchers and practitioners. The former seek to understand the antecedents of trust, whereas the latter seek to use those insights to reduce risk and improve interaction outcomes in situations of uncertainty. Golembiewski and McConkie (1976, p. 131) remark that there is "no single variable which so thoroughly influences interpersonal and group behavior as does trust." Notwithstanding significant interest in the construct by the academic community, there are numerous conceptualizations of trust. The multiplicity of definitions and the conceptual diversity that surrounds the construct results from the different disciplines of researchers and their different research foci and emphases (McKnight et al., 1998). Nonetheless, some points of commonality are evident in the literature, with trust frequently defined in terms of optimistic expectations or confidence. For example, McAllister (1995) perceives trust in terms of positive expectations regarding consequent behavior, while Jarvenpaa and Leidner (1999) define trust as the optimistic expectation that the trusted person will act ethically and morally, even without being monitored (Jarvenpaa & Leidner, 1999; Moorman et al., 1992). While Hosmer (1995) describes trust as a positive expectation that the other party will not exploit or take advantage of a situation through opportunistic behavior, a slightly more nuanced approach is provided by Golembiewski and McConkie (1976), who view trust in terms of confidence in an event, person or process based upon personal perceptions and experiences. Interestingly, they also view trust as a dynamic phenomenon, one that can evolve over time and can be influenced by positive experiences.

Trust definitions frequently reference issues such as the potential for exploitation or perceived risk, thereby pointing to the fact that trust is critical for the success of all social interactions that involve uncertainty and dependency. In fact, Mayer et al. (1995, p. 711) note that the need for trust only arises in a situation of risk. It has also been asserted that "willingness to take risks may be one of the few characteristics common to all trust situations" (Johnson-George & Swap, 1982, p. 1306). Engaging with an OHC, either through disclosing personal information or acting on health advice, places participants in a position of vulnerability and risk. Because it involves a significant dependency on that community (for the provision of trustworthy health advice) in order to ensure a positive outcome, the potential vulnerability and risk from opportunistic behaviors are correspondingly greater. Since this study focuses on the OHC context, it incorporates these perspectives and draws on Corritore et al. (2003) to define trust as "an attitude of confident expectation in an online health community context that one's vulnerabilities will not be exploited."

Trust research typically examines the relationship between trust antecedents, cognitive and affective trust (e.g., Fan & Lederman, 2018; Johnson & Grayson, 2005; Kanawattanachai & Yoo, 2002), and outcomes such as the intention to adopt technology. In our study, we advance knowledge in two ways: First, we advance

knowledge in our choice of outcomes, we focus on knowledge adoption and knowledge contribution, which aligns with our OHC context. Our outcome variables also focus on behaviors rather than intention. Second, we advance knowledge by focusing on engagement as the mediating mechanism between trust antecedents and outcomes. There are two main reasons for this: First, the trust antecedents employed in this study conflate with cognitive and affective trust because they are all measured perceptually. For example, the literature has repeatedly confirmed that evaluations of information credibility reflect a cognitive trust judgment, and evaluations of community support and community responsiveness influence both cognitive and affective trust perceptions. Second, we believe that engagement is a more important mediating mechanism to examine than cognitive and affective trust because its strong association with behavior makes it particularly salient to the stability and continuation of online communities (Algesheimer & Dholakia, 2005).

Thus, our model comprises an examination of cognitive and affective trust antecedents, engagement, and behavioral trusting responses, providing new insight into which type of trust antecedent and which pathway is most effective in influencing engagement and behavioral trust responses in OHCs. We turn now to an examination of engagement in the literature.

2.2 Engagement

Engagement—conceptualized in this study as a state of involvement and connection between the individual and community that creates value for the individual, as manifested by behavioral outcomes—has its roots in the marketing literature. Engagement has been found to be related to consumption and purchase behaviors (van Doorn et al., 2010), online brand community engagement (Wirtz et al., 2013), and online engagement and advertising effectiveness (Calder et al., 2009). Researchers have criticized the definitional confusion associated with engagement (e.g., Ray et al., 2014; Suh et al., 2017) and Cheung et al. (2011) observed that the definition, dimensionality, and consequent operationalization of customer engagement in many marketing studies is inconsistent and mixed. Our definition of engagement builds on existing research (Webster & Ahuja, 2006; Webster & Ho, 1997) that defines engagement in a system as something that "holds [users'] attention and they are attracted to it for intrinsic rewards" (Jacques et al., 1995, p. 58). This definition is also consistent with Higgins's (2006, p. 442) description of engagement as being involved, occupied, and interested in something, and Calder and Malthouse's (2008) view of engagement as a state of involvement and connectedness between the user and the object of engagement that can motivate behavioral outcomes. This involvement and holding of attention is not temporally bounded to a specific instance of information exchange (Eldor, 2021; Eldor & Harpaz, 2015; Brodie et al., 2011) because a responsive and supportive community can provide an intrinsic socioemotional reward that equally interests and captures the attention of community members.

A small but steadily increasing body of work has started to examine engagement in more diverse and non-product-specific online community contexts where the focus is on interaction and value co-creation (Hollebeek et al., 2017). These include online magazine communities (Heinonen, 2018), social media platforms (Di Gangi & Wasko, 2016), online travel communities (Fang et al., 2018), online learning communities (Ryle & Cumming, 2007), online gaming communities (Chuang, 2020), and OHCs (Hur et al., 2019; Litchman et al., 2018), among others. Within these examinations, the locus of attention varies considerably, ranging from usage metrics, antecedents of online engagement, and the consequents of that engagement to motivations and valence, social identity, and telepresence—variations that have, at times, bounded the dimensionality and generalizability of these examinations. However, this focal diversity is accompanied by valuable conceptual work, including literature reviews that have provided much-needed structure and guidance regarding the construct (Suh & Cheung, 2019; Unal et al., 2017). One point on which most researchers agree is that engagement is context dependent (Brodie & Hollebeek, 2011; Brodie et al., 2011; Brodie et al., 2013; de Oliveira et al., 2016); as a consequence, there is a need for further research within more diverse social and cultural contexts in order to progress our understanding of the predictors and consequents of the construct and to increase its conceptual clarity (Cheung et al., 2011; Dessart et al., 2015; Suh et al., 2017).

Engagement and trust are related in that they share cognitive and affective elements; nonetheless, they remain distinctive constructs, as is evident in their conceptual composition and expression. For example, trust is frequently defined in terms of beliefs and an attitude of confident expectation that vulnerabilities will not be exploited, in contrast to engagement, which is typically conceptualized as a state of involvement and connection that creates value for the individual. Engagement has a stronger association with behavior and has been found to influence trust responses in the online community context (Islam & Rahman, 2016; Kang et al., 2016). For example, Ray et al. (2014) demonstrated the relationship between online engagement and the trust-related outcomes of satisfaction and knowledge contribution, while Rich et al. (2010) found that engagement mediates behavior. However, the majority of studies examining the relationship between engagement and trust focus on

online brand communities or discussion communities; as a consequence, whether that relationship extends to the specific OHC context remains undetermined.

Both cognitive (rational evaluation) and emotional (indicating an affective perception) factors enable the expression of engagement (Kahn, 1990). By examining information credibility, community support, and community responsiveness as trust-related determinants of engagement, this study explores the cognitive and emotional components of engagement that trigger the behavioral activation component, demonstrating that engagement can effectively be measured through specific interactions (and that trust-related components can influence this). In doing so, it advances understanding of the nature of the trust-engagement relationship in an online health community context, answering calls (e.g., Ray et al., 2014) to better understand engagement through expanded frameworks that incorporate related constructs.

3 Model Development

The research model for this study is shown in Figure 1. It proposes that OHC engagement is influenced by information credibility, community support, community responsiveness, and the propensity to trust. Community support is conceptualized as a reflective second-order construct, with four dimensions corresponding to the four facets of community support (Chiu et al., 2015). The model also shows that engagement influences knowledge adoption and knowledge contribution behaviors, both of which are also influenced by the propensity to trust. Information Credibility

In an OHC, participants seek credible information to help them cope with the uncertainty associated with the illness they are trying to overcome. This is a significant challenge, as much of the communication in online groups is subjective, discursive, experiential, and frequently anonymous (Fan et al., 2010). Moreover, it is a challenge with potentially serious consequences (Hilligoss & Rieh, 2008), as acting on incorrect information regarding aspects of a disease or its management could negatively impact health outcomes (Hajli, 2014; Hajli et al., 2014; Lober & Flowers, 2011; Maloney-Krichmar & Preece, 2005).

We argue that information credibility influences engagement, knowledge adoption, and knowledge contribution in the online health community context. As online communities are characterized by the lack of face-to-face interaction and the inability to verify expertise, this amplifies perceived and behavioral uncertainty regarding the credibility of information provided by other members. As a result, members of these communities place greater reliance on signals of information trustworthiness, such as member feedback (Pavlou & Dimoka, 2006) expressed in comments or posts, treating these as important indicators of information approval (Fan et al., 2014; Flanagin & Metzger, 2013). The presence of such signals of information credibility has been shown to stimulate members' participation in general online communities (Benlian & Hess, 2011) and is likely to be equally relevant to OHC contexts. Based on the above discussion, we propose:

H1a: In the OHC context, information credibility is positively related to engagement.

Research by Fan and Lederman (2018) on patient OHCs found that perceived information credibility influences knowledge adoption. Similarly, a reexamination of trust antecedents in internet-based health information (Sillence et al., 2019) confirms the predictive importance of information credibility on the intention to act on that information. Although in this case, the focus was health websites rather than online communities, it is likely that the same outcome may extend to OHCs. We therefore propose:

H1b: In the OHC context, information credibility is positively related to knowledge adoption.

Moreover, because credible information benefits the recipient by enhancing their knowledge, this results in an increase of social capital and their desire to reciprocate through information contribution. Empirical support for this is found in prior work (Benlian & Hess, 2011) showing that quality-assured content shapes the trust perceptions of online community users, thereby increasing their participation behavior. Researchers such as Chan and Li (2010) have demonstrated that interactivity or engagement in a virtual context can be developed via structural or experiential routes, both of which influence reciprocity. The structural route comprises community features that provide credible information resources to users (with the experiential route comprising social bonds and enjoyment that provide socioemotional resources to users). These authors have shown that both routes to interactivity influence the norm of reciprocity and voluntary co-creation behaviors, which in the case of this study is expressed through the contribution of knowledge. The current study is therefore consistent with extant research in proposing that the provision of information which is perceived as credible strengthens the structural bonds that stimulate community involvement and connection, motivating reciprocal engagement as expressed through knowledge contribution. Based on the above discussion, we propose:

H1c: In the OHC context, information credibility is positively related to knowledge contribution.

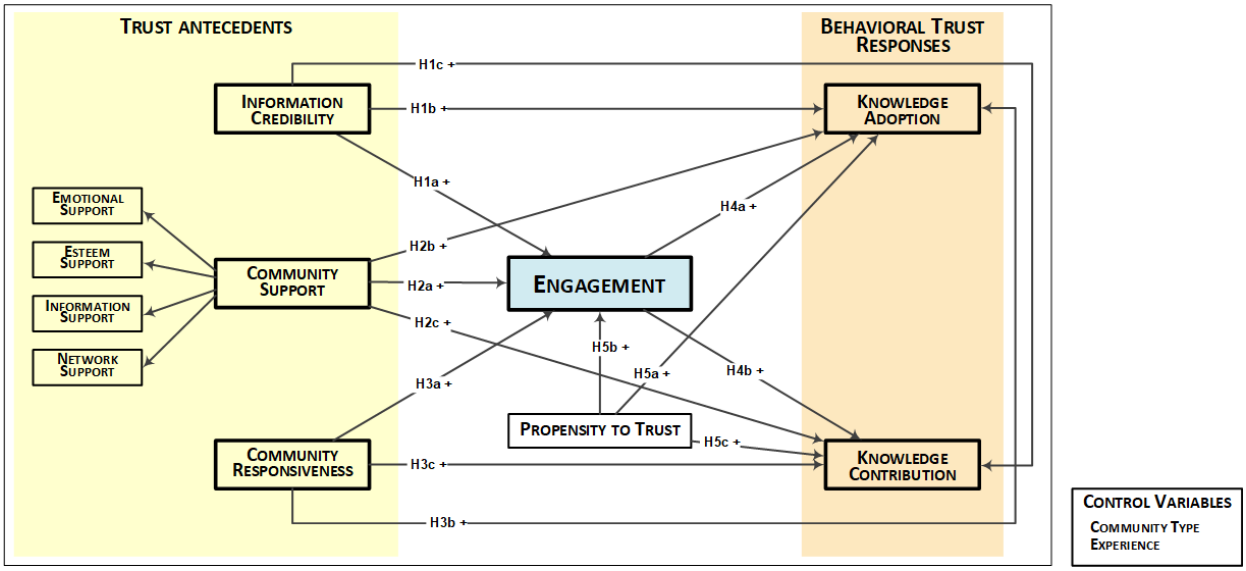

Figure 1. Research Model

3.1 Online Community Support

Supportive interactions among individuals in a traditional healthcare environment can play a protective role in countering the health-related effects and life-stressing consequences of a disease situation, thus contributing to participants' well-being (Cobb, 1976; Schaefer et al., 1981). OHCs can also perform this protective role by promoting social interaction. Further, participants benefit from learning from the experience of others, resulting in improved health outcomes and greater engagement in the self-management of disease (Yan & Tan, 2014). Community support is a multidimensional construct comprising facets such as emotional support, informational support, tangible support, network support, and esteem support (Mattson & Hall, 2011; Schaefer et al., 1981). While tangible support does not apply in the context of online communities, the other support categories do apply and serve as manifestations of social support within online communities. Such support provides an intrinsic socioemotional reward that equally interests and captures the attention of community members. We therefore propose:

H2a: OHC support is positively related to engagement.

Once an individual has been diagnosed with a disease, it is understandable that they would search for health information and advice regarding how best to proceed in treating their illness (Yan & Tan, 2014; Schaefer et al., 1981). When members of an OHC perceive that they are receiving informational support, through salient information, valuable advice, and informed guidance on specific issues, this is likely to engender beliefs regarding the competency of other community members. In this way, informational support aligns with the ability dimension of trust, contributing to the decision to engage in trusting behavior. Emotional support, reflecting the demonstration of concern and care, fills the affective needs of the individual. Such concern and care has been described as empathy and sympathy (Yoo et al., 2014), encouragement and security, and care and affection. It helps to engender a sense that the community is positively intentioned and genuinely supportive of the individual and their well-being (Schueller, 2009) and thus aligns with the concept of benevolence (Mayer et al., 1995). Esteem support can be expressed through online interactions that reinforce the individual's self-esteem and their belief in their capacity to cope with the situation by moving through the stages of their health condition (Mattson & Hall, 2011). Because of their positive intention, such interactions are also analogous to the trust concept of benevolence. Finally, network support demonstrates that the individual is a member of a support network that is available to assist others, thereby providing the participant with a sense of belonging to the community and the ability to share their experiences (Yan & Tan, 2014; Schaefer et al., 1981; van Uden-Kraan et al., 2008). Research (Tsai & Hung, 2019) has shown that a sense of belonging or identification with an online community influences both cognitive and affective trust formation, which, in turn, predict continuous use intentions.

In the literature, explicit support is provided for the predictive influence of social support on engagement and trust-related behavioral outcomes. For example, recent work by Mirsaei and Esmaeilzadeh (2021) in the U.S. found that perceived social support (as an indicator of channel richness) influences engagement in OHCs, as well as patient participation in care

management. The work of Wang et al. (2021) demonstrated that social support is a key predictor of a new user's continued engagement in an OHC. Similarly, Yang et al. (2017) revealed the relationship between perceived social support, trust in health information, and engagement in health information-seeking actions, while an earlier study by Jin et al. (2016) confirmed the influence of emotional support on healthcare knowledge adoption behavior within an online community context. We therefore propose:

H2b: OHC support is positively related to knowledge adoption.

As previously noted, Chan and Li (2010) confirmed that interactivity or engagement in a virtual context can be developed via experiential routes that include the provision of socioemotional resources to users and that interactivity developed in this way influences the norm of reciprocity and voluntary co-creation behaviors, which in the case of this study is expressed through the contribution of knowledge. More recently, Abidin et al. (2020) demonstrated the relationship between social support and trust formation within an OHC, showing its influence on knowledge sharing and community promotion. Based on this discussion, we propose:

H2c: OHC support is positively related to knowledge contribution.

3.2 Online Community Responsiveness

Many individuals join an OHC to increase their knowledge regarding a specific health concern and prefer to receive answers to their questions from others who have either experienced or are familiar with their health issue and can therefore provide informed insights. Consequently, an OHC that is perceived as being responsive to information requests by providing timely responses to posts, is likely to result in more satisfied members and higher levels of member participation and is more likely to be evaluated as trustworthy (Zhao et al., 2013a).

In this study, we argue that community responsiveness positively influences engagement, knowledge adoption, and knowledge contribution in the online health community context. If other community members respond speedily to member requests, this indicates that they have the competence to provide informed guidance, are willing to do so, and are interested in the needs of the community, demonstrating their ability, integrity, and benevolence. It also builds confidence in the community as a valuable source of socioemotional support for guiding decisions. As a result, individuals are more likely to increase their participation in the community over time by reciprocating through responding to other members' posts.

Lin and Lee's (2006) examination of the determinants of success for online communities confirmed the importance of perceived responsiveness to behavioral intentions, which in turn increases member loyalty to the community, as indicated by participation in the community. Later, work by Singh (2012) also showed that responsiveness can strongly influence the participation of new members of communities. Similarly, Casaló et al. (2013) found that response speed, value, and frequency influence online community members' satisfaction and their participation intentions, while Sheng (2019) empirically demonstrated that perceived responsiveness is a motivational driver of customer engagement. Although the context of these studies was general, technical, travel, and review online communities, it is a reasonable expectation that these relationships would equally extend to the OHC context. Based on this discussion, we propose:

H3a: OHC responsiveness is positively related to engagement.

Because a responsive online community provides a range of informed and supportive perspectives, this increases trust in the perceived competence, integrity, and benevolence of the community (Zhao et al., 2013a) and correspondingly reduces the perception of risk associated with acting on information provided by community members. This is consistent with Bagozzi and Lee's (2002) view that social processes are important determinants of decision-making. We therefore propose:

H3b: OHC responsiveness is positively related to knowledge adoption.

The work of both Mpinganjira (2018); Ridings et al. (2002) affords further insights, illustrating that perceived responsiveness in an online community, through its ability to engender trust, influences members' intentions not only to obtain but also to provide information. Consistent with this, recent work by Tsai and Kang (2019) and Guan et al. (2018) has confirmed that knowledge growth motivates reciprocal knowledge contribution in online professional communities. This aligns with earlier work by Rodgers and Chen (2005) in the context of an online breast cancer discussion board, which demonstrated that the orientation of members who make frequent posts tends to change over time from an emphasis on seeking information to one of supporting other members through the provision of information. Thus, we propose:

H3c: OHC responsiveness is positively related to knowledge contribution.

3.3 Engagement and its Relationship to Knowledge Adoption and Contribution

Our final hypotheses focus on the relationship between engagement and the outcomes of knowledge adoption and knowledge contribution. We reason that the more a person actively participates in an OHC—for example, by posting questions or requesting advice—the broader the range of information they will accumulate from other members, which they can then evaluate and use to guide their behavior. In addition, the psychosocial and relational benefits that result from participation will increase their confidence in member benevolence and reassure them that they are making informed and correct decisions.

Support for this position is provided by Jin et al. (2016), who found that the level of involvement positively affects online community members' adoption of healthcare information. Similarly, Zhou (2020) found that informational support and emotional support, through their effect on social capital, influence Chinese online community users' participation, as expressed through health knowledge acquisition and contribution. This is also consistent with the work of Liao and Chou (2012, 2017), which showed that prior positive exchanges with an online health community engender the trust necessary for leveraging a contributor's social capital for the purpose of information adoption. As a result, we propose:

H4a: OHC engagement positively influences knowledge adoption.

Because members of OHCs seek to protect their privacy (and avoid negative repercussions such as being trolled if dealing with a stigmatized health condition), a significant perceived risk is associated with the self-disclosure of personal health information. We contend that active participation in an OHC generates the trust necessary to overcome that perception of risk, reasoning that observing and learning from the posts of others and their responses generates user confidence in the expertise, integrity, and benevolence of other members. It also reinforces knowledge efficacy. Over time, we predict the social capital that this generates increases the desire to reciprocate and contribute to the community through the provision of information.

Support for this is provided by Kuem et al. (2020), who found that Instagram community engagement positively influences active contribution behaviors. Cheung et al. (2015) found that the posts and member recommendations in online social shopping communities influence subsequent customer information contribution behavior, with the latter exerting the stronger effect. This confirms that positive feedback and the advice of other online community members reinforce learning and drive information contribution behaviors. Similarly, Chan and Li (2010) showed that interactivity in a virtual community stimulates the norm of reciprocity and voluntary behaviors. This is consistent with work (Rodgers & Chen, 2005) showing that OHC member orientation tends to progress over time from an information-seeking orientation to one that supports other members through providing information. We thus propose:

H4b: OHC engagement strongly influences knowledge contribution.

3.4 The Propensity to Trust

Researchers such as Rotter (1967) have conceptualized trust as a personality characteristic that influences an individual's likelihood of trusting others. This has alternately been described as a trust propensity (Mayer et al., 1995) or as dispositional trust (Kramer, 1999) and indicates a general willingness to trust others across a broad range of trust situations and trust targets (McKnight et al., 1998). The propensity to trust influences the amount and level of trust that a person has for another party in the absence of available or experiential information on which to base a judgment (Rotter, 1971, 1980). Because of this, the propensity to trust is particularly important in the early stages of relationships involving interpersonal interactions with unfamiliar actors when there are insufficient situational cues or information about the trustee available (Bigley & Pearce, 1998; Colquitt et al., 2014; McKnight et al., 1998). Moreover, the propensity to trust retains its impact and can continue to influence trusting beliefs even after information about the trustee becomes available because it serves as filter or lens through which the behavior of others is then viewed (Colquitt et al., 2007).

Research has shown that dispositional trust influences trust beliefs in relation to web vendors (e.g., Chen et al., 2015; Gefen, 2000; Kim et al., 2009). Similar outcomes are evident in nontransactional contexts as well. For example, Tait and Jeske (2015) found that the propensity to trust predicts the disclosure of potentially sensitive and identifying information in an online information-sharing context. The propensity to trust also exerts a significant influence on risk-related beliefs and the intention to adopt health information from online health infomediaries (Song & Zahedi, 2007). Similarly, Heldman and Enste (2018) found that dispositional trust determines the level of trust placed in the recipient of private data, especially when the person is unfamiliar with this recipient. Thus, we propose:

H5a: The propensity to trust is positively related to OHC knowledge adoption.

H5b: The propensity to trust is positively related to OHC engagement.

H5c: The propensity to trust is positively related to OHC knowledge contribution.

4 Methodology

This study is aligned with the pragmatic philosophical paradigm, which encourages practical and applied action (Teddlie & Tashakkori, 2008). In order to provide an in-depth examination of the relationships between different constructs, specifically the relationship between trust antecedents, engagement and trust responses, the most appropriate method was determined to be a quantitative survey.

4.1 Data Collection

To sample from the target population of participants of OHCs, we surveyed members of OHCs on Facebook Brazil. We identified six OHC types: pregnancy/breast-feeding/motherhood (PBM), nutrition/alimentation/ dietary (NAD), beauty/esthetics (BES), disease treatment (DTR), fitness (FIT), and animal care (ANC). Respondents were asked to identify one of these online communities in which they participated and then to answer the remaining questions with regard to that community. Invitations were published in 10 OHCs, with a total of 813,223 registered members, after securing authorization from group managers. To encourage respondent participation, nine raffles of USD 20 were announced. Each raffle targeted different groups such as moderators, managers, and participants. We received 602 responses. After eliminating those with high levels of missing data, we were left with 410 valid responses. As a preliminary validity test, we checked for alterations in the mean of the responses possibly associated with the time spent answering the questionnaire, without finding relevant differences. The majority of respondents were female 93.2% (n = 382); almost half were between 26-35 years old (46.6%); 58.0% were married and 56.8% were educated to at least college level. The majority (74.2%) had more than one year of experience using online groups on Facebook and were active participants. Most (81.2%) visited online health groups at least once a day, participating in online health groups with similar themes (79%). Almost half (48.0%) considered themselves to be active participants, regularly contributing through posting questions, responding to questions, and "liking" others' posts. In order to ensure that participants had enough knowledge and experience using OHCs to be able to assess information credibility, community support, and community responsiveness, respondents with low participation frequency were excluded from the study. This was achieved by retaining only respondents who self-reported accessing the online health group "once a day" or "once a week" (n = 27 respondents were removed). Also, only communities with a sample size of at least 30 were retained for the sake of statistical representativeness. As a consequence, we additionally removed "fitness" (n = 13), and "animal care" (n = 12), resulting in a final sample of 358 responses across the four communities. Table 1 shows the sample distribution based on the community type, frequency of use, and user experience. The nature of our data collection, where no real information about the population is available, precludes a full assessment of nonresponse bias. However, we followed the procedures recommended by Armstrong and Overton (1977) to assess the likelihood of nonresponse bias. We compared the earliest and latest responses received, based on the assumption that those who respond less readily are likely to be more similar to nonrespondents than those who respond immediately. We assessed the differences in the means of each of the 40 items that make up our measures between the first and last 10% of responses received and observed only two significant differences (Knowledge Contribution Item 2 and Esteem Support 2). The limited observed differences suggest sufficient similarity between early and late responders, thus diminishing the risk of nonresponse bias as an alternative explanation for our findings.

4.2 Measures

We measured information credibility using items from Lederman et al. (2014). The community support construct combined items from previous research, which measured four dimensions: emotional, informational, esteem, and network support (Chiu et al., 2015; Schaefer et al., 1981). Although these researchers had proposed tangible support as an additional dimension, it was not considered relevant in this study, as our virtual context provides no physical interaction between participants. Community responsiveness items were drawn from Wagner et al. (2014). Knowledge adoption was measured using items adopted from Chou et al. (2015), while knowledge contribution was measured using items from Meng and Agarwal (2007) and Zhao et al. (2013a). Engagement was assessed by adapting items from Webster and Ahuja (2006). We dropped one item (ENG 5) because it originally referred to "how fun" the respondent feels the experience of using the system is, which we found inappropriate for the context of online health communities. The measures were translated into Portuguese and two pretests were conducted in order to retain meaning and idiomatic equivalence (Cha et al., 2007). In the first pretest, expert researchers in the field were invited to respond to the questionnaire and provide feedback to improve the items. For the second pretest, the process was repeated with the moderators and group managers of each OHC. During this process, we examined the validity of the scales based on statistical procedures proposed by MacKenzie et al. (2011). The research participants were asked to answer the questions using a 5-point Likert scale ranging from 1 = "strongly disagree" to 5 = "strongly agree." Overall, no significant changes to items were required, but some were slightly adjusted in order to maintain the meaning and to ensure compliance with Portuguese grammatical requirements. Appendix 1 shows the items used.

Table 1. Sample Distribution by Community Type, Frequency of Use, and User Experience

Frequency of use	Experience	PBM: pregnancy/ breast-feeding/ motherhood	NAD: nutrition/ alimentation/dietary	BES: beauty/ esthetics	DTR: disease treatment	Total
Once a day		122	104	61	23	310
	1 to 6M	31	25	27	3	86
	6M to 2Y	61	43	17	7	128
	2+ Y	30	36	17	13	96
Once a week		9	23	8	8	48
	1 to 6M	2	8	4		14
	6M to 2Y	5	7	2	4	18
	2+ Y	2	8	2	4	16
Total		131	127	69	31	358

4.3 Data Analysis

The model was tested using partial least squares (PLS) structural equation modeling (SEM) as implemented in SmartPLS (Ringle et al., 2015). PLS-SEM is appropriate when the objective is to identify key driver constructs in a relatively complex model that deals with multiple latent variables and relationships, without being subject to rigorous distributional assumptions (Hair et al., 2017b). Power analysis using GPower (Buchner et al., 2014), indicated that our sample was more than sufficient to detect a medium effect size of f2 = 0.15 (Cohen, 1988) with 90% power.

5 Results

5.1 Measurement Model

Table 2 shows the individual items and cross-loadings. All but one load at greater than 0.71 on their intended construct, meaning that the item loading accounts for more than 50% of the overlapping variance, which is considered excellent (MacKenzie et al., 2011). We considered the marginal value of ENG2 ($\lambda = 0.67$) to be acceptable, as it does not pose any threat to the other measures of reliability and validity of the construct. Following the rule of thumb in Tabachnick and Fidell (2014) and Comrey and Lee (2016), we found that the majority of the cross-loadings are below the value of 0.32 (10% of overlapping variance), while scattered occurrences are under 0.45 (20% of overlapping variance), a threshold that is considered fair enough to show any notable interconstruct confounding effects. We also focused on the few occurrences where values were above 0.45 but below 0.55 (30% of overlapping variance), such as in relation to the *information support* latent variable (items IS01, IS02, and IS03). We then performed a post hoc analysis with the structural model by eliminating the entire construct to evaluate the potential effect on the stability of the structural model results (which will be presented in the subsequent sections) and found no substantial differences. However, we decided to maintain the construct since it is conceptually linked to the *community support* construct. The average variance extracted (AVE) of all constructs (Table 3) are above the threshold of 0.5 (Fornell & Lacker, 1981). Cronbach's alpha (CA) and composite reliability (CR) values were all above 0.79, indicating satisfactory reliability. Finally, the square root of the AVE for each construct is higher than the correlations with the other constructs, thus providing evidence of discriminant validity. Variance inflation factor (VIF) values were all below 2 (the highest was 1.68), indicating that multicollinearity did not exert a biasing influence on the results (Hair et al., 2017b).

In any data collection with a single instrument at a single period in time, common method bias (CMB) is a potential alternative explanation for the results. To mitigate this risk, we first undertook procedural remedies (Podsakoff et al., 2003) through careful construction of the survey to deal with ambiguity, conciseness, uniqueness of content, and lack of focus. We then empirically assessed the potential concern of CMB using two procedures. First, we performed the Harman's single-factor test (Podsakoff et al., 2003). The unrotated factor solution did not converge on a single factor and the largest covariance explained by any factor was 19.5%. Second, as suggested by Kock (2015), we assessed CMB in our structural model using lateral multicollinearity assessment (Kock & Lynn, 2012). All the variance inflation factors (VIF) were below the recommended threshold of 3.3, with the highest being 1.21. Given our procedural remedies and the lack of evidence in the empirical assessments, we do not consider CMB to be a significant threat.

5.2 Hypothesis Testing

The results provide partial support for our hypotheses. Consistent with H1a, information credibility showed a positive influence on engagement ($\beta = 0.15$, $p < 0.001$). Similarly, the data showed a positive relationship between information credibility and knowledge adoption ($\beta = 0.22$, $p < 0.001$), thus confirming H1b. However, the relationship between information credibility and knowledge contribution was not significant ($\beta = -0.07$, ns), rejecting H1c.

Table 2. Loadings and Cross-Loadings

	ICred	CResp	Eng	KAdop	KCon	PTrus	EmoS	EsteeS	InfoS	NetS
IC01	0.81	0.36	0.38	0.43	0.09	0.13	0.29	0.31	0.29	0.17
IC02	0.79	0.32	0.33	0.36	0.10	0.21	0.31	0.30	0.32	0.18
IC03	0.84	0.24	0.28	0.34	0.13	0.08	0.27	0.26	0.23	0.11
IC04	0.75	0.18	0.24	0.28	0.12	0.12	0.16	0.24	0.15	0.15
IC05	0.78	0.30	0.32	0.35	0.07	0.18	0.19	0.23	0.29	0.18
IC06	0.74	0.30	0.32	0.39	0.17	0.16	0.29	0.30	0.31	0.18
R01	0.30	0.77	0.34	0.43	0.11	0.25	0.18	0.20	0.29	0.10
R02	0.30	0.84	0.36	0.41	0.13	0.16	0.18	0.21	0.36	0.13
R03	0.25	0.72	0.46	0.38	0.15	0.25	0.33	0.29	0.50	0.30
R04	0.32	0.82	0.39	0.39	0.16	0.25	0.18	0.24	0.37	0.15
ENG01	0.31	0.39	0.74	0.35	0.33	0.28	0.34	0.40	0.42	0.41
ENG02	0.25	0.37	0.67	0.32	0.13	0.15	0.25	0.23	0.35	0.23
ENG03	0.34	0.37	0.77	0.43	0.11	0.26	0.26	0.27	0.45	0.30
ENG04	0.29	0.30	0.72	0.34	0.18	0.19	0.26	0.29	0.29	0.24
ENG06	0.27	0.41	0.73	0.45	0.19	0.21	0.24	0.21	0.40	0.23
ENG07	0.34	0.35	0.80	0.43	0.23	0.28	0.34	0.35	0.40	0.29
KA01	0.37	0.45	0.51	0.82	0.18	0.28	0.29	0.26	0.40	0.25
KA02	0.38	0.41	0.39	0.77	0.09	0.28	0.16	0.24	0.27	0.15
KA03	0.38	0.44	0.44	0.84	0.15	0.27	0.25	0.26	0.42	0.24
KA04	0.33	0.27	0.28	0.71	0.14	0.25	0.17	0.18	0.24	0.19
KC01	0.12	0.17	0.21	0.18	0.82	0.14	0.31	0.28	0.31	0.29
KC02	0.06	0.11	0.25	0.11	0.91	0.15	0.33	0.37	0.29	0.35
KC03	0.17	0.19	0.25	0.16	0.86	0.15	0.26	0.36	0.25	0.31
KC04	0.16	0.16	0.23	0.19	0.89	0.19	0.33	0.40	0.28	0.35
DT01	0.16	0.20	0.21	0.32	0.10	0.81	0.16	0.17	0.19	0.07
DT02	0.18	0.26	0.33	0.33	0.22	0.81	0.21	0.27	0.26	0.23
DT03	0.11	0.22	0.23	0.21	0.13	0.78	0.18	0.16	0.27	0.17
DT04	0.18	0.25	0.23	0.24	0.14	0.82	0.16	0.19	0.23	0.12
DT05	0.13	0.22	0.23	0.25	0.10	0.78	0.17	0.16	0.27	0.17
ES01	0.29	0.28	0.38	0.27	0.30	0.20	0.94	0.62	0.51	0.45
ES02	0.33	0.24	0.34	0.26	0.36	0.21	0.94	0.66	0.47	0.43
ETS1	0.31	0.24	0.35	0.28	0.39	0.25	0.64	0.93	0.36	0.40
ETS2	0.33	0.28	0.40	0.27	0.37	0.24	0.62	0.93	0.38	0.39
ETS3	0.34	0.32	0.36	0.30	0.36	0.20	0.64	0.91	0.40	0.45
IS01	0.31	0.45	0.50	0.40	0.30	0.29	0.51	0.38	0.92	0.41
IS02	0.33	0.46	0.51	0.41	0.29	0.28	0.45	0.40	0.93	0.44
IS03	0.29	0.40	0.42	0.37	0.29	0.25	0.45	0.34	0.87	0.42
NS1	0.11	0.07	0.19	0.13	0.30	0.19	0.21	0.26	0.28	0.74
NS2	0.16	0.24	0.36	0.30	0.22	0.17	0.43	0.35	0.48	0.80
NS3	0.20	0.17	0.33	0.16	0.36	0.10	0.41	0.41	0.30	0.76

Note: ICred: information credibility; CResp: community responsiveness; Eng: engagement; KAdop: knowledge adoption; KCon: knowledge contribution; Ptrus: propensity to trust; EmoS: emotional support; EsteeS: esteem support; InfoS: information support; NetS: network support

Table 3. Reliability, Convergent Validity, and Discriminant Validity of the Constructs

	CA	CR	AVE	ICred	CResp	Eng	KAdop	KCon	Ptrus	EmoS	EsteeS	InfoS	NetS
ICred	0.87	0.91	0.61	0.78									
CResp	0.79	0.87	0.62	0.37	0.79								
Eng	0.83	0.88	0.55	0.41	0.49	0.74							
KAdop	0.79	0.86	0.62	0.46	0.51	0.53	0.78						
KCon	0.89	0.93	0.76	0.14	0.18	0.27	0.18	0.87					
PTrus	0.86	0.90	0.64	0.19	0.29	0.31	0.34	0.18	0.80				
EmoS	0.86	0.94	0.88	0.33	0.28	0.38	0.29	0.35	0.22	0.94			
EsteeS	0.92	0.95	0.86	0.35	0.30	0.40	0.30	0.40	0.25	0.68	0.93		
InfoS	0.89	0.93	0.82	0.34	0.48	0.53	0.43	0.32	0.30	0.52	0.41	0.90	
NetS	0.66	0.81	0.59	0.21	0.22	0.39	0.27	0.38	0.19	0.47	0.45	0.47	0.77

Note: CA: Cronbach's alpha; CR: composite reliability; AVE: average variance extracted.
ICred: information credibility; CResp: community responsiveness; Eng: engagement; KAdop: knowledge adoption; KCon: knowledge contribution; Ptrus: propensity to trust; EmoS: emotional support; EsteeS: esteem support; InfoS: information support; NetS: network support.
Diagonals are the square-rooted AVE, other cells are correlations

Community support was found to positively influence engagement ($\beta = 0.34$, $p < 0.001$) and knowledge contribution ($\beta = 0.46$, $p < 0.001$) but not knowledge adoption ($\beta = 0.06$, ns), thus supporting H2a and H2c but not H2b. Similarly, the positive influence of community responsiveness on engagement ($\beta = 0.27$, $p < 0.001$) and knowledge adoption ($\beta = 0.27$, $p < 0.001$) is supported by the data, thereby confirming H3a and H3b, but the relationship with knowledge contribution ($\beta = -0.02$, ns) does not support H3c. With regard to the influence of engagement, the data show that engagement influences knowledge adoption ($\beta = 0.24$, $p < 0.001$) but does not exert any significant influence on knowledge contribution ($\beta = 0.05$, ns), thus supporting H4a but not H4b. The propensity to trust was found to exert a positive influence on engagement ($\beta = 0.10$, $p < 0.001$) and knowledge adoption ($\beta = 0.15$, $p < 0.001$), offering support to H5a and H5b. However, no effect was observed on knowledge contribution ($\beta = 0.04$, ns); thus H5c is not supported.

In summary, our findings indicate that knowledge adoption is influenced by information credibility, community responsiveness, engagement, and the propensity to trust, each of which exerts a similar effect. Community support influences knowledge adoption indirectly through its effect on engagement. In the case of knowledge contribution, the source of influence is more bounded with community support exerting a strong influence on this behavioral trust response. As shown in Figure 2, these findings support many of the proposed relationships and explain 41% of the variance in engagement in OHCs, 45.2% of the variance in knowledge adoption, and 23.8% of the variance in knowledge contribution within this context.

5.2.1 Mediation Analysis of the Role of Engagement

We examined the importance of engagement as a mediator variable in the model following the procedures of Hair et al. (2017b). After confirming that our measurement model is reliable and valid, a crucial prerequisite to determining mediation effects, we estimated the direct and indirect effects by bootstrapping with 5000 subsamples the complete model. This technique implements the method of Preacher and Hayes (2004) and others (Hayes, 2013; Zhao et al., 2010) in the context of PLS-SEM. Following Zhao et al. (2010) and Hair et al. (2017b) we subsequently calculated the mean and standard errors of the paths in the model and determined the multiple mediation roles of engagement revealed by the significance of the corresponding direct and indirect effects paths, as shown in Table 4.

The results demonstrate that, in relation to knowledge adoption, engagement partially mediates information credibility and community responsiveness, while fully mediating community support. These results additionally clarify the importance of user engagement in OHCs. The indirect effect of the community responsiveness on knowledge adoption represents about 20% of the total effect. We further explore the mediating role of engagement in our post hoc tests below.

5.3 Post Hoc Tests

Following our assessment of the formal hypotheses we conducted post hoc tests to explore whether community type or user experience influenced the relationships in our model. We conducted a multigroup analysis (MGA) in PLS. We assessed measurement equivalence using the measurement invariance of composite models (MICOM) procedure (Henseler et al., 2016), which assessed configurational and compositional invariances across the groups.

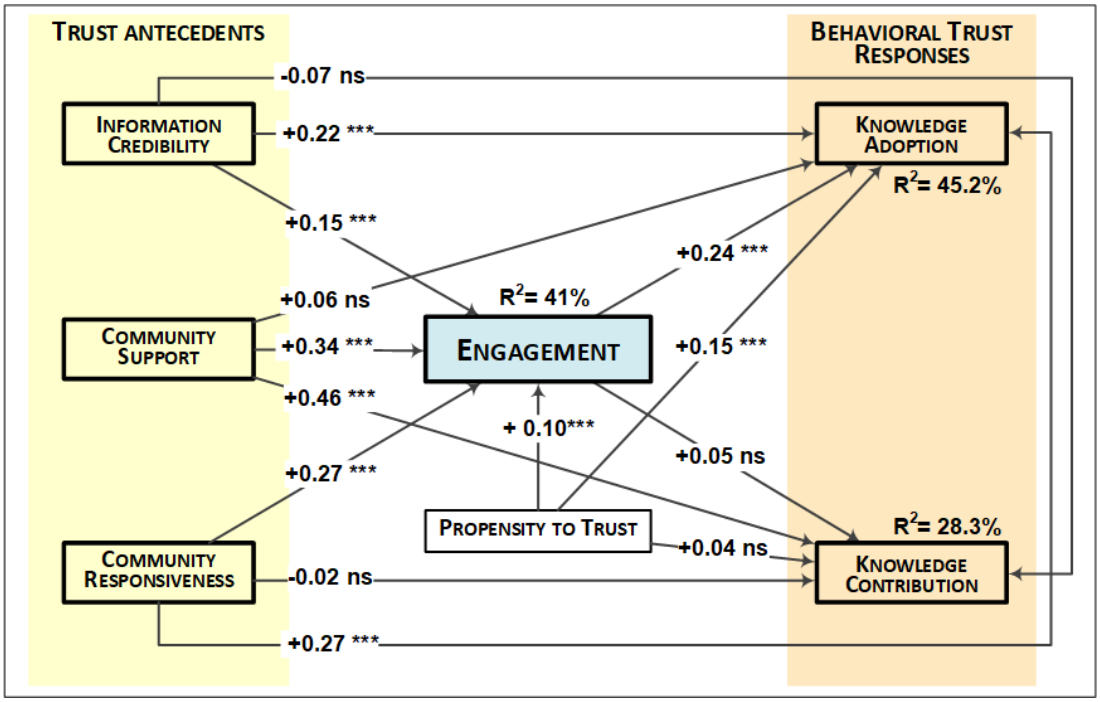

Figure 2. Path coefficients and significances

Table 4. Mediating Role of Engagement

Antecedent	Type of effect	Knowledge adoption		Knowledge contribution	
Information credibility	Direct	0.223 ***	Direct and complementary partial mediation	-0.066 ns	No effect
	Indirect	0.038 *		0.007 ns	
Community support	Direct	0.062 ns	Full mediation	0.456 ***	Direct-only
	Indirect	0.083 ***		0.016 ns	
Community responsiveness	Direct	0.274 ***	Direct and complementary partial mediation	-0.029 ns	No effect
	Indirect	0.066 ***		0.013 ns	

5.3.1 Community Type

Our analysis of community type was restricted to the two largest communities to ensure adequate sample sizes. Table 5 shows the MGA results for the nutrition/ alimentation/dietary (NAD) (n = 127) and pregnancy/ breast-feeding/motherhood (PBM) (n = 131) groups. We found partial measurement invariance between the two groups for all latent variables in the model, which allowed for path coefficients comparisons by means of a multigroup analysis. The specific differences between groups paths (Δ) are discussed below.

The results provide interesting insights regarding commonalities and distinctions. First, community support influences engagement in both types of communities, with the effect on PBM (β = 0.47, p < 0.001) being stronger ($\Delta\beta_{PBM}$, β_{NAD} = 0.27, p < 0.03) than NAD (β = 0.20, p < 0.001). Other factors contribute to engagement in both cases. In NAD, engagement also depends on information credibility (β = 0.34, p < 0.001) and community responsiveness (β = 0.20, p < 0.001), while in PBM it depends on the propensity to trust (β = 0.18, p < 0.05). For both communities, engagement influences knowledge adoption (β_{NAD} = 0.23, p < 0.05; β_{PBM} = 0.30, p < 0.001, but does not exert a significant influence on knowledge contribution. In addition to the influence of engagement, information credibility also influences knowledge adoption to a similar degree for both types of community (β_{NAD} = 0.24, p < 0.001; β_{PBM} = 0.26, p < 0.001). However, interesting distinctions emerge because knowledge adoption in NAD strongly depends on community responsiveness (β_{NAD} = 0.32, p < 0.001; $\Delta\beta_{NAD}$, β_{PBM} = 0.23, p <0.06), while in PBM it is dependent on community support (β_{PBM} = 0.23, p < 0.05; $\Delta\beta_{NAD}$, β_{PBM} = -0.21, p <0.13). Moreover, although knowledge contribution is dependent on the effect of community support for both community types, in the case of NAD it is marginally important (β = 0.20, p < 0.10), whereas for PBM it exerts a much stronger effect (β = 0.78, p < 0.001; $\Delta_{\beta NAD}$, β_{PBM} = -0.57, p <0.00). Finally, the propensity to trust plays a marginal role in influencing knowledge contribution in both groups (β = 0.14) with no statistical difference observed between the two groups (p <0.99). Further results are shown in Appendix 2.

Table 5. Effects of Community Types

	Engagement				Knowledge contribution				Knowledge adoption			
	NAD		PBM		NAD		PBM		NAD		PBM	
Information credibility	0.34	***	-0.01	ns	-0.03	ns	-0.18	+	0.24	***	0.26	***
	H1a supported		H1a not supported		H1c not supported		H1c not supported		H1b supported		H1b supported	
Community support	0.20	***	0.47	***	0.20	+	0.78	***	0.02	ns	0.23	*
	H2a supported		H2a supported		H2c supported		H2c supported		H2b not supported		H2b supported	
Community responsiveness	0.30	***	0.12	ns	-0.08	ns	-0.14	ns	0.32	***	0.09	ns
	H3a supported		H3a not supported		H3c not supported		H3c not supported		H3b supported		H3b not supported	
Propensity to trust	0.09	ns	0.18	*	0.14	ns	0.14	+	0.07	ns	0.09	ns
	H5b not supported		H5b supported		H5c not supported		H5c supported		H5b not supported		H5b not supported	
Engagement					0.16	ns	-0.06	ns	0.23	*	0.30	***
					H4b not supported		H4b not supported		H4a supported		H4a supported	
R^2	48.5%		40.2%		23.0%		43.5%		48.4%		55.6%	

Note: NAD : nutrition/alimentation/dietary; PBM: pregnancy/breast-feeding/motherhood. Significances: *** 0.1%; ** 1%; * 5%; + 10%. Shaded areas detach the supported hypotheses. *n*(NAD) = 127*; n(*PBM)= 131

5.3.2 Mediating Role of Engagement by Community Type

Examining the mediating role of engagement by community type (Table 6) also highlights the important role of context, showing that the effect of engagement differs according to community type, particularly in relation to the outcome of knowledge adoption. For example, engagement partly mediates the effect of information credibility on knowledge adoption for both NAD and PBM communities. However, while it fully mediates the effect of community support on knowledge adoption in the case of PBM, it has no effect in the case of NAD. In addition, when the mediating effect of community responsiveness is examined, the opposite outcome applies, with engagement partly mediating in the case of NAD but not in the case of the PBM community. This important distinction in outcomes confirms that the mediating effect of engagement on knowledge adoption differs according to the nature of community type. However, engagement does not mediate the effect of community support on knowledge contribution in either community. Experience

We assessed differences in three levels of online community experience (1-6 months, 6 months to 2 years, and more than 2 years). To avoid confounding with community type, before performing group analyses, we compared the two types of OHCs—NAD (nutrition/alimentation/dietary) and PBM (pregnancy/ breast-feeding/motherhood) and found that no differences existed in distributions of users based on experience ($\chi 2$= 2.88, df = 2, *p*-value = 0.236), indicating no significant cross-effects between experience and community type. Following this, we performed all the steps of multigroup invariance analysis to ensure that we could compare the structural paths of the three experience levels. Since we were interested in comparing three user-experience levels, we employed the sequence of three pairwise comparisons with the Bonferroni correction to avoid Type I error inflation (Hair et al., 2018). We found configurational and compositional invariance across the groups. Additionally, we tested for the equality of the composite mean values and variances and found no statistical evidence of differences.

The analysis of user experience (Table 7) provides interesting insights regarding the mechanics of engagement, knowledge adoption, and knowledge contribution in OHCs. The findings show that engagement is influenced by community support (1-6M: $\beta_{1\text{-}6M} = 0.46$, $p < 0.001$; 6M-2Y: $\beta_{6M\text{-}2Y} = 0.38$, $p < 0.001$ and 2+Y ($\beta_{2+Y} = 0.34$, $p < 0.001$), irrespective of the length of user experience in online health communities (higher intergroup path coefficient difference: $\Delta\beta_{1\text{-}6M},\beta_{2+Y} = 0.11$, $p > 0.46$). However, they also speak to the changing nature of the trust development process. For example, although significant only at p <0.10, the results show that in the early stages of experience, the propensity to trust exerts an influence on engagement ($\beta_{1\text{-}6M} = 0.18$; $p <$ 0.10) that lessens as the user gains experience. This indicates an experience-dependent repertoire of factors that illustrates the progressive nature of engagement in online communities.

Table 6. Mediating Role of Engagement by Community Type

Antecedent	Type of effect	Knowledge adoption		Knowledge contribution	
NAD community					
Information credibility	Direct	0.265 ***	Direct and complementary partial mediation	-0.013 ns	No effect
	Indirect	0.102 *		0.057 ns	
Community support	Direct	-0.016 ns	No effect	0.241 *	Direct only
	Indirect	0.05 ns		0.029 ns	
Community responsiveness	Direct	0.266 ***	Direct and complementary partial mediation	-0.07 ns	No effect
	Indirect	0.070 *		0.044 ns	
PBM community					
Information credibility	Direct	0.273 ***	Direct-only	-0.173 ns	No effect
	Indirect	0.001 ns		0.000 ns	
Community support	Direct	0.221 ns	Full mediation	0.779 ***	Direct only
	Indirect	0.150 ***		-0.039 ns	
Community responsiveness	Direct	0.084 ns	No effect	-0.133 ns	No effect
	Indirect	0.035 ns		-0.009 ns	

Table 7. Effects of Users' Experience

	Engagement			Knowledge contribution			Knowledge Adoption		
	1-6M	**6M-2Y**	**2+Y**	**1-6M**	**6M-2Y**	**2+Y**	**1-6M**	**6M-2Y**	**2+Y**
Information credibility	0.12 ns	0.05 ns	0.30 ***	-0.14 ns	-0.22 +	0.05 Ns	0.26 *	0.38 ***	0.29 *
	H1a not supported	H1a not supported	H1a supported	H1c not supported	H1c not supported	H1c not supported	H1b supported	H1b supported	H1b supported
Community support	0.46 ***	0.38 ***	0.34 ***	0.22 ns	0.52 ***	0.66 ***	0.27 +	0.14 ns	-0.09 ns
	H2a supported	H2a supported	H2a supported	H2c not supported	H2c supported	H2c Supported	H2b supported	H2b not supported	H2b not supported
Community responsiveness	0.14 ns	0.20 *	0.25 *	-0.08 ns	0.04 ns	-0.21 Ns	0.03 ns	0.15 ns	0.39 ***
	H3a not supported	H3a supported	H3a supported	H3c not supported	H3c not supported	H3c not supported	H3b not supported	H3b not supported	H3b supported
Propensity to trust	0.18 +	0.08 ns	0.06 ns	0.18 +	0.16 ns	-0.16 Ns	0.23 *	-0.06 ns	0.24 *
	H5b supported	H5b not supported	H5b not supported	H5c supported	H5c not supported	H5c not supported	H5b supported	H5b not supported	H5b supported
Engagement				0.32 *	0.02 ns	0.02 Ns	0.22 +	0.35 ***	0.16 ns
				H4b supported	H4b not supported	H4b not supported	H4a supported	H4a supported	H4a not supported
R^2	48.3%	34.1%	52.3%	40.4%	32.3%	32.2%	56.6%	52.0%	52.6%

Note: Significances: *** 0.1%; ** 1%; * 5%; + 10%. Experiences: 1-6M = one to 6 months; 6M-2Y = six months to two years; 2+Y = more than two years. Shaded areas detach the supported hypotheses. n(1-6M) = 66; n(6M-2Y) = 116; n(2+Y) = 76

When trust responses are examined in the context of the spectrum of user experience (Table 8), it is evident that knowledge adoption is consistently influenced by information credibility ($\beta_{1\text{-}6M} = 0.26$, $p < 0.05$; $\beta_{6M\text{-}2Y} = 0.38$, $p < 0.001$; $\beta_{2+Y} = 0.29$, $p < 0.05$). However, the relationship between other factors and knowledge adoption is more variable as the user acquires greater experience of OHCs. For example, engagement shows an influence on knowledge adoption ($\beta_{1\text{-}6M} = 0.22$; $p < 0.10$ and $\beta_{2+Y} = 0.35$; $p < 0.001$) in the early stages of user experience, as does community support ($\Delta\beta_{1\text{-}6M}$,$\beta_{2+Y} = 0.36$, $p < 0.04$). However, after this initial period, community responsiveness emerges as the dominant factor influencing knowledge adoption ($\Delta\beta_{2+Y}$, $\beta_{1\text{-}6M} = 0.36$, $p < 0.02$).

A similar change in influence applies to knowledge contribution. In a context of limited experience, it is initially influenced by engagement ($\Delta\beta_{1\text{-}6M}$, $\beta_{2+Y} = 0.30$, $p < 0.06$) and the propensity to trust ($\Delta\beta_{1\text{-}6M}$, $\beta_{2+Y} = 0.38$, $p < 0.06$). However, as the user's experience increases, the influence of community support also increases until it becomes the most influential factor ($\Delta\beta_{1\text{-}6M}$, $\beta_{2+Y} = 0.45$, $p < 0.07$). Figures 3, 4, and 5 illustrate how the evolution of user experience influences engagement, knowledge adoption, and knowledge contribution respectively.

Table 8. Mediating Role of Engagement by Users' Experience

Antecedent	Type of effect	Knowledge adoption		Knowledge contribution	
1-6M					
Information credibility	Direct	0.260 *	Direct-only	-0.097 ns	No effect
	Indirect	0.040 ns		0.041 ns	
Community support	Direct	0.247 *	Direct and complementary partial mediation	0.280 +	Direct and complementary partial mediation
	Indirect	0.136 *		0.139 *	
Community responsiveness	Direct	0.039 ns	No effect	-0.113 ns	No effect
	Indirect	0.029 ns		0.031 ns	
6M-2Y					
Information credibility	Direct	0.413 *	Direct-only	-0.170 +	Direct-only
	Indirect	0.025 ns		0.002 ns	
Community support	Direct	0.107 ns	Full mediation	0.524 ***	Direct-only
	Indirect	0.120 *		0.016 ns	
Community responsiveness	Direct	0.093 ns	No effect	0.043 ns	No effect
	Indirect	0.063 ns		0.009 ns	
2+Y					
Information credibility	Direct	0.296 **	Direct-only	-0.058 ns	No effect
	Indirect	0.050 ns		0.029 ns	
Community support	Direct	-0.065 ns	No effect	-0.065 ns	No effect
	Indirect	0.045 ns		0.015 ns	
Community responsiveness	Direct	0.378 ***	Direct-only	0.378 ***	Direct-only
	Indirect	0.046 ns		0.023 ns	

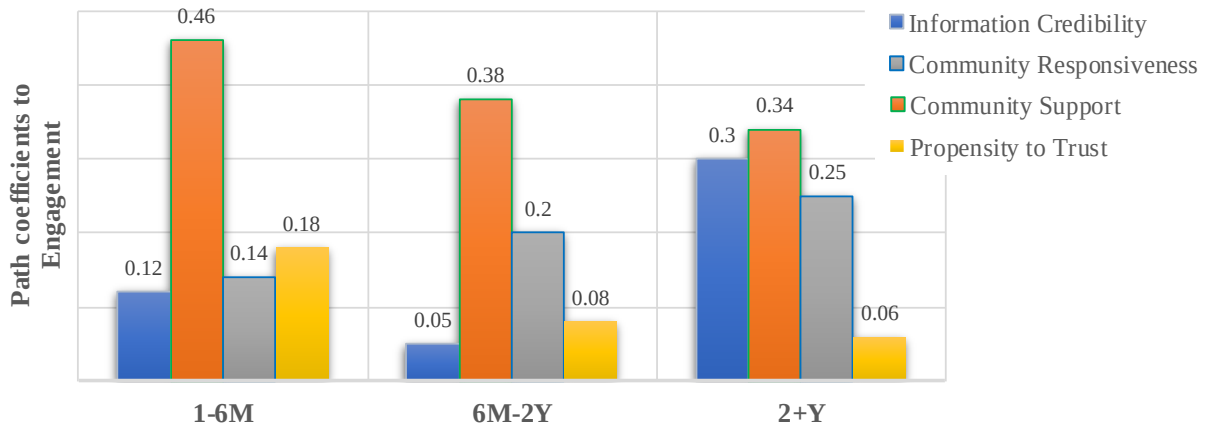

Figure 3. Influence of user experience evolution on Engagement

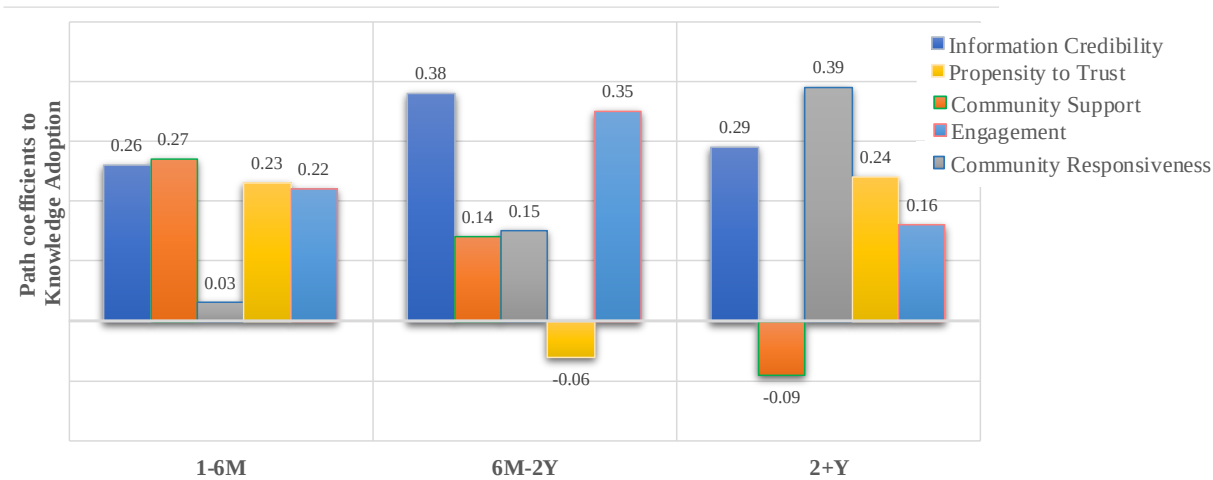

Figure 4. Influence of User Experience Evolution on Knowledge Adoption

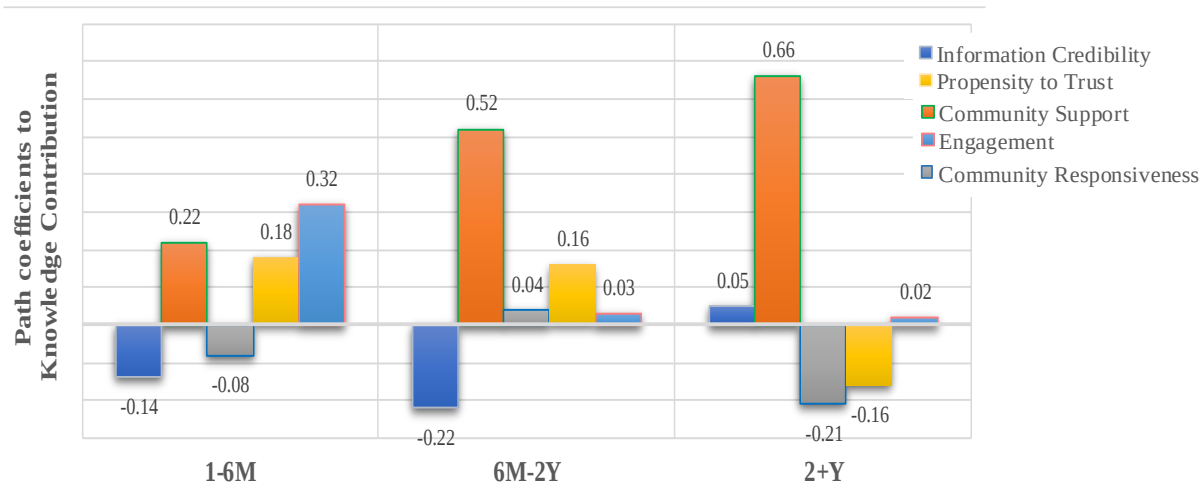

Figure 5. Influence of User Experience Evolution on Knowledge Contribution

5.3.3 Mediating Role of Engagement by User Experience

Further assessment of the mediating role of engagement according to the user's level of experience with OHCs supports the overall finding that engagement is particularly relevant in the initial and medium stages of experience, particularly in relation to the outcome of knowledge adoption. The effect of community support on both knowledge adoption and knowledge contribution is partly mediated by engagement during the early (1-6 months) stage of experience. As experience increases (6 months to 2 years), the effect of community support on knowledge adoption is fully mediated by engagement, while the effect on knowledge contribution is not. For users with the greatest amount of experience, engagement no longer mediates the effect of community support. No mediation is present for information credibility and community responsiveness. These variations in effect are important, as they reveal that the level of users' experience is an important consideration when seeking to understand the mediating role of engagement on the influence of community support in the OHC context.

6 Discussion

This study examines the factors that influence trust and engagement in OHCs. It does so by leveraging social capital theory and social exchange theory to examine the relationship between trust and engagement, as reflected in trust antecedents that predict engagement and trust responses that result from that engagement. This study extends theory in a number of important ways, contributing significantly to the IS literature by providing a more complete understanding of the relationship between trust and engagement in the OHC context, as well as illustrating the need for incorporating contextual influence when examining this relationship.

6.1 Contributions

First, it shows that the key trust responses (knowledge adoption and knowledge contribution) are influenced by different community attributes. Knowledge contribution in OHCs is directly influenced by perceived community support, a factor that relates to whether community members offer information and advice that helps individuals cope with their health situation and health-related decision-making. Previous research has pointed to a diverse range of possible factors that can influence knowledge contribution in online social communities, ranging from IT-based features and identity verification (Ma & Agarwal, 2007); performance expectancy, self-efficacy and professional experience (Tseng et al., 2014; Wang & Lai, 2006); and the influence of self-presentation, peer recognition, and social learning (Jin et al., 2015) to the rewards associated with altruism and fulfillment (Lin & Huang, 2013), social presence and identification (Shen et al., 2010), and even egoistic motives (Yu et al., 2011). Moreover, previous research has conceptualized knowledge contribution as being dependent on interconnected prior variables, including member satisfaction (Chou, 2020; Ma & Agarwal, 2007). In contrast, our research shows that community support is the dominant/singular driver of knowledge contribution in the OHC context and that its influence is direct and independent of other variables. Adding to the richness of the contribution is the fact that because we conceptualized community support as a second-order construct comprising four support subdimensions—emotional, esteem, information, and network support, our findings also clarify the exact nature of that support. This advances insight into how support can be implemented in an online health context, something that is of particular importance to the sustainability of these communities. On the other hand, our findings show that knowledge adoption in OHCs is influenced directly by information credibility, and community responsiveness and indirectly by community support. This extends the

work of Fan and Lederman (2018), which focuses on the influence of information credibility (and contributor attributes) on knowledge adoption in OHCs by showing that community responsiveness and support are equally important considerations for understanding the formation of this trust outcome.

A second contribution relates to the centrality of engagement to knowledge adoption as part of the trust formation pathway. Our findings show that engagement in OHCs is driven by information credibility, community support and community responsiveness. However, although our findings show that engagement influences knowledge adoption, it does not influence knowledge contribution behavior. This may indicate that the privacy concerns of OHC members are distinctively stronger than would be the case for members of more general virtual communities and that additional trust generation mechanisms are required to ensure that increased engagement translates into knowledge contribution. The fact that community support is the only attribute that influenced knowledge contribution points to the likely nature of such mechanisms. This contrasting finding places a cautionary pause on the assumption that increased engagement in virtual communities will automatically motivate member cooperation (Porter et al., 2011). In our OHC context, it did not.

An associated contribution relates to the direction of the trust-engagement relationship, an issue that has long been a matter of contention in the academic community and the focus of calls (Islam & Rahman, 2016) for empirical work to determine whether trust is an antecedent or consequent of engagement. In conceptualizing trust in terms of both distinct trust antecedents and also the trust responses that arise from engagement, this study progresses beyond the limited binary perspectives that tend to characterize such discussions, affording much-needed insight into the cyclical nature of that relationship in the OHC context. The findings confirm that trust antecedents influence engagement and that a positive and direct relationship exists between engagement and one specific trust response, that of knowledge adoption. Our findings build on the work of Kang et al. (2016) which indicated a positive relationship between engagement and trust in a general online community, but we deepen that insight by showing the precise pathway and behavioral expression of that trust response, as well as the limits of this relationship in the OHC context.

A third contribution relates to the importance of context. The study sample was predominantly composed of women respondents, a reflection of the fact that participants of online health support communities are more likely to be women (Ginossar, 2008); further, women are the population of interest in the context of the specific online communities examined in this study. For this reason, our finding of the importance of community support as a driver of knowledge contribution should be evaluated in relation to the study context (OHCs) and the nature of the respondent sample, both of which are interconnected. For example, research shows that women place particular value on community support in the virtual community context (Klemm et al., 1999; Sun et al., 2020). This may be due to gender-based socialization (Meyers-Levy & Loken, 2015; Reevy & Maslach, 2001), the greater emphasis that women have been shown to place on cues (Porter et al., 2012; Riedl et al., 2010; Rowley et al., 2017), and/or the fact that women's perception of risk and severity of consequences is stronger than that of men (Garbarino & Strahilevitz, 2004). Since community support is a multidimensional construct that is strongly aligned to trust components of perceived ability, benevolence, and integrity, all of which reduce perceived risk, the fact that it should emerge as the predominant influence on knowledge contribution (a risk behavior) for the study sample is therefore not entirely surprising. In light of this fact, the study findings progress the understanding of the factors that influence trust formation, engagement, and trust outcomes in OHCs that are particularly relevant for women.

Nonetheless, it is interesting that engagement did not produce a stronger effect in relation to knowledge contribution for this sample. The explanation may lie in the fact that other factors specific to this sample may be inhibiting knowledge contribution. For example, Amichai-Hamburger et al. (2016) identified a number of psychological factors that may potentially influence individuals' lack of participation in online community discussions. These include individual differences, such as the need for gratification, personality dispositions, lack of time available, and self-efficacy, in addition to social group processes and technological issues. Additional issues such as introversion and social inhibition have also been shown to inhibit knowledge contribution. For example, Nonnecke and Preece (2001) found that nearly 30% of respondents were shy about posting and Rafaeli et al. (2004) found that those with high introversion scores tend not to actively engage in online groups. Confidence in having valuable information to contribute may also explain this outcome; Ray et al. (2014) found that the contributions of the most knowledgeable online community members do not derive purely from engagement but also from a competing sense of knowledge self-efficacy. Similarly, Preece et al. (2004) found that nearly one quarter of respondents explained their lack of participation in the online community in terms of having no knowledge to offer.

Our post hoc assessments of differences across community types further reinforce the sensitivity of trust responses to context, with different antecedents showing greater importance in the different types of communities. For example, in this study, we compared

two types of communities. The nutrition/ alimentation/ dietary (NAD) community places particular value on structured, precise, and timely information, while the pregnancy/breast-feeding/motherhood (PBM) community values experiential knowledge. We thus consider the former a more transactional type of community and the latter more relational. The study findings show that information credibility and engagement influence knowledge adoption for both types of communities, but they also show that in the case of NAD, community responsiveness directly affects knowledge adoption. In the case of this community type, structured, transactional aspects of community evaluation, such as information credibility and community responsiveness, influence the engagement decision. On the other hand, in the case of PBM, knowledge adoption is directly influenced by community support. Similarly, for this latter type of community, the decision to engage is influenced by less structured but more relational assessments, such as the evaluation of the community support level. Although the findings show that the strength of community support influences knowledge contribution outcomes for both communities, the behavioral response is stronger in the relational community than in the transactional community. These findings provide a particularly important contribution to the body of knowledge because they show that user engagement and active participation in OHCs, as manifested through the adoption or contribution of knowledge, are influenced by an assessment of the adequacy of specific types (transactional or relational) of information, which vary according to different types of health communities.

A related contextual issue is the influence of user experience on engagement in OHCs. The findings of this study show this to be an evolving and phased dynamic with engagement, knowledge contribution, and adoption outcomes shifting according to increased user experience levels. For example, the findings show that in the initial phase of exposure to the OHC, the user's propensity to trust influences their decision to engage with the community, as manifested through knowledge contribution and adoption responses. However, as the user's experience with the community increases, that influence diminishes while the effect of community responsiveness on engagement grows. As the user's experience further increases, there is a shift toward a more informational, transactional perspective. In this more mature phase, it is utilitarian evaluations of community knowledge, such as information credibility and community responsiveness, that primarily sustain knowledge adoption. The motivation for contributing knowledge also changes in line with increasing levels of experience, becoming entirely sustained by community support.

Our analysis of the mediating role of engagement by community type and user experience further reinforces the importance of context in understanding trust and engagement in the context of OHCs. The different forms of mediation between the PBM and NAD communities and across levels of user experience show the complexities of the influence of context. In doing so, we highlight the need for other scholars interested in understanding engagement in online communities to further theorize community types and experience levels in order to provide more granular insight into how the characteristics of their context influence user engagement and, in turn, shape behavioral outcomes.

6.2 Implications for Practitioners

The insights from our research provide practical guidance for social media practitioners interested in increasing participation and engagement in online communities, particularly communities that provide information or advice on sensitive issues, such as health information. First, the results clearly suggest that online community administrators should employ organizational mechanisms to increase user trust in the information provided by participants. This can be achieved through the inclusion of design features that allow participants to rate answers in terms of their helpfulness, thereby guiding users of the community to information that has been deemed credible by and useful to other users. Second, helpful answers should be made easily accessible to users through the provision of search options and Q&A design features. Utilizing design features that increase the speed of access to relevant, and helpful answers will in turn increase the perception of community support and responsiveness for users. The resultant increased engagement will strengthen the likelihood of users not only using that information but also contributing their own experiences, strengthening the norm of reciprocity that will increase the perception of community support and responsiveness. Similarly, the provision of design features that enable users to interact with community members who share similar backgrounds and experiences will influence their readiness to use the information provided and share information with others. The implications of the study findings have the potential to improve user engagement and result in more trusted and successful OHCs. As the mechanisms by which users adopt knowledge vary according to community type, moderators should tailor how knowledge is structured in a way that reflects the needs of their end users. In OHCs where the availability of precise, structured, and timely information is of the highest importance, this could be achieved through online community designers providing easily accessible drop-down search lists based on frequent word tags, which also show the date of provision of the response. However, in communities where social relationships are valued as much if not more than just factual information, website designers should provide links to "my experience testimonials" that are accessible on the basis of the type of information required.

6.3 Limitations and Future Research

This study provides insights that increase our understanding of the relationship between trust and engagement in OHCs, but as is the case with all studies, it also contains limitations. First, our results are based on a sample of respondents who are users of OHC websites in Brazil. Previous research has called for greater attention to the need for research in countries other than the US, UK, and Australia (Fan & Lederman, 2018). Our work thus addresses an important gap in the literature. Nonetheless, our sample also bounds the findings to some extent. While it is unlikely that national culture would fundamentally alter the dynamics that underpin the trust and engagement relationship, it is possible that culture may influence some aspects of trust formation. For example, a comparative analysis of the trust-based drivers of health disclosure (Lin et al., 2016) found evidence of different cultural emphases, and previous research by Gefen and Heart (2006) showed differences in trust formation and trust outcomes in individualist and collectivist cultures, albeit in an online transaction context. Consequently, it is possible that perceived information credibility may exert a higher trust formative influence on people from individualist cultures, whereas people from collectivist cultures may place greater weight on community responsiveness and knowledge contribution. Future research to test the generalizability of the study results by applying this framework to other national cultures can determine whether that is in fact the case.

A second point worth noting is that our sample was predominantly comprised of women. Gender-related behavior is contextually influenced (Deaux & Major, 1987), and the OHCs (breastfeeding/pregnancy/motherhood; beauty/aesthetics; and nutrition/diet) that form the contextual backdrop to this study are normatively skewed toward women, thus making women the predominant population of interest. Because these types of health information are typically of greatest interest to women, our sample is relevant for the context of our study and provides important insight into the specific factors influencing trust formation, engagement, and trust outcomes in OHCs, which are particularly important for those respondents. It does, however, bound the research findings, and future studies using more normatively neutral community types would enable greater opportunity for gender-based comparison. Similarly, while in this study we measure gender as a biological construct, future studies that include the effect of social, psychological, or cultural constructs of gender-orientation could improve the understanding of gender differences in relation to online trust formation and engagement. For example, Hupfer and Detlor (2006) demonstrated the value of measuring specific self-concept traits that are associated with gender identity in relation to predicting web shopping site design preferences, rather than assuming their existence as a consequence of biological sex.

Third, we focused on OHCs, which are characterized by the need for timely and accurate advice and where inaccurate information can result in very serious consequences for community members. In such a significant environment, the emotional, information, and network support provided by an online community may explain the strength of influence on knowledge adoption and knowledge contribution behaviors. Future research conducted in different (nonhealth) contexts would be beneficial in determining whether the strength of the relationships between trust antecedents, engagement, and trust outcomes remains the same, regardless of context type.

Finally, in light of the finding that the mechanisms by which users adopt knowledge vary according to community type, future research could focus on chronic and acute health conditions to determine the role of medical conditions on knowledge adoption and knowledge contribution outcomes. Examinations of responsiveness that include an explicit recognition of different valences and measure their influence on engagement in OHCs also represent a valuable avenue for future research.

7 Conclusion

OHCs have the potential to positively impact healthcare outcomes through user value co-creation, but the way in which that value is achieved has received limited attention to date. This study empirically examines the factors that influence how individuals engage and co-create value in OHCs. It extends existing theory through the inclusion and empirical testing of new variables that have received little attention as antecedents of trust in the OHC context: online community support and online community responsiveness. It also extends insight into trust formation by examining the predictive influence of these constructs on different trust responses as evidenced through engagement, knowledge adoption, and knowledge contribution. In doing so, it illustrates that different community attributes drive the formation of knowledge adoption and knowledge contribution responses in OHCs, and also reveals the different influence of engagement as a formation pathway for both of those responses. Finally, conceptualizing trust in terms of distinct trust antecedents and trust outcomes provides more granular insight into the cyclical relationship between trust and engagement. Our findings contribute both to the trust and engagement literatures and to social media research knowledge. From a practitioner perspective, the study findings can serve as a guide for moderators and managers seeking to develop trusted and impactful OHCs.

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Appendix A: Construct Measures and Sources

Construct	Drawn from	Item	Portuguese	English
Perceived information credibility	Lederman et al. (2014)	IC02	Os argumentos eram consistentes com a opinião da maioria da comunidade	The messages reflect the view of the majority of this community
		IC03	A discussão foi suportada por fontes sérias e confiáveis	The arguments in the posts are serious and convincing
		IC04	A discussão foi suportada por informações científicas	Discussions are supported by scientific information
		IC05	A informação da postagem era coerente com fontes externas (sites, revistas, livros, etc)	The information posted is consistent with external sources (websites, magazines, books etc.)
		IC06	A informação da postagem era coerente com o que eu já tinha de conhecimento sobre o assunto	The information posted is consistent with what I already knew about the subject or issue
		IC07	A postagem era isenta de interesse comercial	The information posted is independent from commercial interest.
Community responsiveness	Wagner et al. (2014)	R01	As postagens dos membros são respondidas rapidamente.	Posts of members are quickly answered
		R02	Em geral, as postagens com dúvidas são respondidas.	In general, posts with questions are answered
		R03	Em geral, os participantes da comunidade tentam dar um conselho ou suporte àqueles que necessitam.	In general, community participants try to give advice or support to those in need
		R04	Em geral, todas as postagens são respondidas.	In general, all posts are answered
Engagement	Webster & Ahuja (2006) and Webster & Ho (1997)	ENG1	A Comunidade...Me mantém totalmente concentrado	The Community keeps me fully immersed
		ENG2	A Comunidade...Prende minha atenção	The Community holds my attention
		ENG3	A Comunidade...Aguça minha curiosidade	The Community excites my curiosity
		ENG4	A Comunidade...Desperta minha imaginação	The Community stimulates my imagination
		ENG5	A Comunidade...É divertida	The Community is fun
		ENG6	A Comunidade...É interessante	The Community is intrinsically interesting
		ENG7	A Comunidade...É envolvente	The Community is engaging
Knowledge adoption	Chou et al. (2015)	KA01	Em geral o conhecimento disponível é útil	In general, the knowledge posted is useful
		KA02	Em geral concordo com as explicações postadas	I usually agree with the explanations posted
		KA03	As explicações disponíveis contribuem para o meu conhecimento sobre o tema da comunidade	The knowledge available largely contributes to my understanding of the topic I am interested in
		KA04	Em geral eu sigo as orientações das postagens, pensando ou agindo como sugerido	In general, I follow the poster's recommendations, thinking or acting as suggested
Knowledge contribution	Ma & Agarwal (2007) Zhao (2013a).	KC01	Costumo ajudar pessoas que precisam de ajuda e informações	I often help other people in this online support group who need help and information
		KC02	Tenho uma ativa participação (Ex respondendo dúvidas, participando de discussões etc)	I take an active part in this online support group (responding and participating in discussions)
		KC03	Tenho contribuído para ampliar seu conhecimento (Ex inserindo arquivos/informações)	I have contributed knowledge to this online health group (e.g. providing information)

		KC04	Tenho contribuído para o conhecimento dos membros de modo a ajudá-los em novas possibilidade	I have contributed to the knowledge of other members to help them develop new insights
Disposition to trust	Gefen (2000) Ridings et al. (2002)	DT01	Eu geralmente confio nas pessoas	I generally trust other people
		DT02	Eu costumo contar com as pessoas	I tend to count upon other people
		DT03	Eu geralmente tenho fé na humanidade	I generally have faith in humanity
		DT04	Eu sinto que as pessoas em geral são de confiança	I feel that people are generally reliable
		DT05	Eu geralmente confio nas pessoas, a menos que elas me deem razão para não confiar	I generally trust people unless they give me reason not to
Community support: Emotional support	Chiu et al. (2015)	ES01	Me encorajam a enfrentar a dificuldade / problema	Members normally encourage me to face difficulties/ problems
		ES02	Me ouvem sobre meus sentimentos sobre a dificuldade/problema enfrentado	Members are supportive of my feelings about the difficulty/ problem faced.
Community support: Esteem support		ETS01	Elogiam a minha capacidade de lidar com os meus problemas	Members usually compliment my ability to deal with my problems
		ETS2	Concordam com a forma como lidei com problemas	Members generally agree with how I handled problems
		ETS3	Fazem comentários construtivos sobre minha habilidade para lidar com problemas	Members make positive comments about my ability to deal with problems
Community support: Informational support		IS01	Me oferecem sugestões e conselhos para a solução de um problema / questão	Members usually offer advice and suggestions for solving a problem/ issue
		IS02	Me dão informações para me ajudar a superar um problema / questão	Members give me information to help me deal with the problem / issue
		IS03	Me contam o que fizeram quando passaram por situação similar a minha (problema / questão)	Members tell me what they did in a similar situation (problem/issue)
Community support: Network support		NS1	Há alguns membros com quem partilho valores ou interesses comuns	I share common values or interests with some members
		NS2	Há alguns membros que enfrentaram (enfrentam) alguns dos mesmos problemas que eu enfrentei (estou enfrentando)	There are some members who have faced (face) some of the same problems as me
		NS3	Há alguém na comunidade que posso partilhar alegrias e tristezas	There are people in the community with whom I can share joys and sorrows

Appendix B: Results

Table B1. Compositional Invariance and Equality of Means and Variances (NAD x PBM)

	Compositional	Equality of mean		Equality of variance	
Latent	**Permutation *p*-values**	**Mean difference NAD-PBM**	**Mean difference *p*-values**	**Variance difference NAD-PBM**	**Variance difference *p*-values**
1_Icred	0,09	0.41		-0.30	0.13
2_CResp	0,67	-0.12	0.34	-0.14	0.56
3_CSup	0,99	-0.37	0.00	0.17	0.49
4_Eng	0,85	-0.35	0.00	0.04	0.82
5_KAdop	0,84	0.15	0.24	-0.05	0.80
6_KCon	0,51	-0.50		0.35	0.07
7_PTrust	0,85	-0.01	0.93	-0.06	0.81

Table B2. Multigroup Analysis (NAD x PBM)

Path	**Path coefficients-diff (NAD-PBM)**	***p*-value**
1_ICred → 4_Eng	0.35	0.00
1_ICred → 5_KAdop	-0.02	0.84
1_ICred → 6_KCon	0.15	0.37
2_CResp → 4_Eng	0.18	0.13
2_CResp → 5_KAdop	0.23	0.06
2_CResp → 6_KCon	0.06	0.72
3_CSup → 4_Eng	-0.27	0.03
3_CSup → 5_KAdop	-0.21	0.13
3_CSup → 6_KCon	-0.57	0.00
4_Eng → 5_KAdop	-0.08	0.59
4_Eng → 6_KCon	0.23	0.11
7_PTrust → 4_Eng	-0.10	0.33
7_PTrust → 5_KAdop	-0.02	0.87
7_PTrust → 6_KCon	0.00	0.99

Table B3. Compositional Invariance and Equality of Mean values and Variances (USER EXP)

USER EXP_1_6M × USER EXP_6M_2Y		**Equality of means**		**Equality of variances**	
	Compositional *p*-values	**Mean diff**	**Mean diff *p*-values**	**Variance diff**	**Variance diff *p*-values**
1_Icred	0.08	-0.03	0.86	0.08	0.76
2_Cresp	0.12	0.20	0.20	0.14	0.63
3_Csup	0.82	0.12	0.47	0.07	0.74
4_Eng	0.65	0.16	0.28	-0.24	0.32
5_Kadop	0.14	0.05	0.73	-0.13	0.59
6_Kcon	0.46	0.05	0.74	-0.02	0.93
7_Ptrust	0.43	0.15	0.36	0.19	0.50
USER_EXP_2Y+ × USER_EXP_1_6		**Equality of means**		**Equality of variances**	
	Compositional *p*-values	**Mean diff**	**Mean diff *p*-values**	**Variance diff**	**Variance diff *p*-values**
1_Icred	0.1	0.08	0.64	0.14	0.57
2_Cresp	0.97	0.19	0.25	-0.25	0.47
3_Csup	0.87	0.00	0.97	-0.04	0.94
4_Eng	0.27	-0.05	0.80	0.12	0.63
5_Kadop	0.58	0.18	0.29	0.20	0.40
6_Kcon	0.51	-0.02	0.88	0.04	0.86
7_Ptrust	0.6	-0.12	0.48	-0.22	0.52

USER_EXP_2Y+ × USER_EXP_6M_2Y		Equality of means		Equality of variances	
	Compositional *p*-values	Mean diff	Mean diff *p*-values	Variance diff	Variance diff *p*-values
1_ICred	0.15	0.07	0.63	0.21	0.39
2_CResp	0.11	0.39	0.01	-0.07	0.76
3_CSup	0.42	0.12	0.42	0.03	0.95
4_Eng	0.48	0.12	0.43	-0.12	0.61
5_KAdop	0.06	0.23	0.12	0.05	0.81
6_KCon	0.79	0.03	0.85	0.01	0.99
7_PTrust	0.7	0.03	0.83	-0.03	0.91

Table B4. Multigroup Analysis (USER EXP)

	USER_EXP_1_6M × USER_EXP_6M_2Y		USER_EXP_1_6M × USER_EXP_2Y+		USER_EXP_6M_2Y × USER_EXP_2Y+	
	Path coefficients-diff	*p*-value	Path coefficients-diff	*p*-value	Path coefficients-diff	*p*-value
1_ICred → 4_Eng	0.07	0.63	-0.18	0.29	-0.24	0.12
1_ICred → 5_KAdop	-0.12	0.44	-0.02	0.88	0.09	0.51
1_ICred → 6_KCon	0.08	0.68	-0.09	0.71	-0.17	0.41
2_CResp → 4_Eng	-0.06	0.74	-0.11	0.51	-0.05	0.71
2_CResp → 5_KAdop	-0.11	0.44	-0.36	0.02	-0.25	0.06
2_CResp → 6_KCon	-0.12	0.50	0.12	0.55	0.24	0.19
3_CSup → 4_Eng	0.08	0.62	0.11	0.46	0.04	0.78
3_CSup → 5_KAdop	0.13	0.48	0.36	0.04	0.23	0.12
3_CSup → 6_KCon	-0.30	0.13	-0.45	0.07	-0.14	0.47
4_Eng → 5_KAdop	-0.08	0.61	0.07	0.78	0.15	0.42
4_Eng → 6_KCon	0.30	0.06	0.30	0.17	-0.00	1.00
7_PTrust → 4_Eng	0.10	0.47	0.13	0.42	0.03	0.85
7_PTrust → 5_KAdop	0.28	0.05	-0.02	0.89	-0.30	0.05
7_PTrust → 6_KCon	0.06	0.77	0.38	0.06	0.32	0.12

About the Authors

Regina Connolly is professor of information systems at Dublin City University Business School, Ireland. Her research focuses on digital transformation, with a particular emphasis on issues related to trust and inclusion. Examples include the human resource implications of mandatory technologies on employees and their relationship with the organization, from an information privacy perspective. Her work has been published in journals such as *MIS Quarterly, European Journal of Information Systems, Journal of Information Technology, Information Systems Journal*, and *Government Information Quarterly*, among others. She is a lead partner in research projects that have received over €24 million in EU Horizon 2020 funding to date and is an Investigator with LERO, the Irish Software Research Centre.

Otavio P. Sanchez is an associate professor of information systems and quantitative research methods at the Sao Paulo School of Business Administration at Fundação Getulio Vargas – FGV EAESP Brazil, where he leads the PhD information systems major. Otavio completed his PhD at FGV-EAESP in 2006, and his research interests include behavioral Information Systems, IT strategy, cybersecurity and privacy, and analytics. His research has appeared in *Communications of the ACM, Information Systems Frontiers,* and the *International Journal of Project Management,* and in the proceedings of the International Conference on Information Systems, Hawaii International Conference on Systems Sciences, and the European Conference on Information Systems. He has served as a senior editor at *AIS Transactions on Replication Research* (2020-present).

Deborah (Debbie) Compeau is Senior associate dean for Faculty Affairs and Research and the Hubman Distinguished Professor of Information Systems in the Carson College of Business at Washington State University. Her research focuses on the interaction between people and information technologies (IT) in organizations. Her specific interests include information technology self-efficacy, user training and learning, and the adoption and implementation of IT. Recent projects have focused on the adoption of IT in healthcare settings. She has served in an editorial capacity at several IS journals including *Information Systems Research* (AE: 2000-2002), *MIS Quarterly* (AE/SE: 1998-2005), *The Data Base for Advances in Information Systems* (pre-eminent editorial board: 2014-present) and *AIS Transactions on Replication Research* (SE: 2017-present).

Fabiana Tacco holds a PhD in business administration (information systems specialism) obtained from Fundação Getulio Vargas – FGV EAESP Brazil. Fabiana received her master's degree and BSc in business administration from Universidade Metodista de São Paulo, Sao Paulo, Brazil. She also holds two postgraduate degrees, one in teaching in higher education and the other in the development and management of distance learning. Her teaching experience comprises more than six years as an assistant professor for management courses at a leading university in Brazil. Her research focuses on trust development in online health communities.