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Pregnant women’s coping strategies, participation roles and social support in the online community during the COVID-19

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ABSTRACT

Pregnant women are experiencing enormous physical changes and suffering pregnancy-related losses, which may lead to depression symptoms during pregnancy. Given that the onslaught of COVID-19 had exacerbated pregnant women’s anxiety because of disruptions in antenatal care and concerns regarding safe delivery, it is worth exploring how they obtain social support to cope with stress during COVID-19. Although many works have explored the impact of coping resources that people have on coping strategies, few studies have been done on the relationship between people’s coping strategies and their acquisition of coping resources such as social support. To fill this gap, based on the stress and coping theory (SCT) and social penetration theory (SPT), this study investigates the impacts of pregnant women’s different coping strategies on the acquisition of social support and the moderating role of the adverse impacts of COVID-19 and their online participation roles (support providers vs. support seekers) using the data of 814 pregnant women’s online behavior from a parenting community in China\textsuperscript{1}. Our study indicates that both women’s superficial level disclosure and personal level disclosure positively affect online social support received. Moreover, self-disclosure about the adverse impacts of COVID-19 negatively moderates the relationship between personal level disclosure and social support received. Participation role positively moderates the relationship between personal level disclosure and social support received, but negatively moderates the relationship between superficial level disclosure and social support received. This paper makes theoretical contributions to the literature of SCT, SPT and the literature about social support in online communities.

1. Introduction

Research on experiences of COVID-19 in the general population shows that respondents’ levels of anxiety and depression are higher than historical standards (Lebel, MacKinnon, Bagshawe, Tomfohr-Madsen, & Giesbrecht, 2020), especially vulnerable groups such as pregnant women will have worse mental health outcomes than before (Wu, Zhang, Liu, Duan, & Huang, 2020). The emergence of COVID-19 has brought challenges to pregnant women around the world, including interruption of prenatal examination, increased...
anxiety during pregnancy and concerns about safe delivery (Khalil et al., 2021). Because the immune system of pregnant women is naturally suppressed, they are more susceptible to infections and are generally considered to have a higher risk of serious complications (Kourtis, Read, & Jamieson, 2014). Moreover, due to increased concerns about vertical transmission to the fetus, pregnant women may be more prone to anxiety (Wu et al., 2020).

After the Chinese government announced the human-to-human transmission of the COVID-19, global concern and uncertainty increased sharply (Wu et al., 2020). Using social media to collect information during COVID-19 is an important coping strategy (Boivin et al., 2020). Social media sites are now used by more than half of the world’s population in their daily lives (Chaaffey, 2021), have changed the way of information sharing and social interacting (Naranjo-Zolotov, Turel, Oliveira, & Lascano, 2021) and encouraged the creation and exchange of user-generated content (Wang, Wang, Yao, Li, & Wang, 2020). Online communities have become an important form of human organization driven by the widespread use of social media (Johnson, Safadi, & Faraj, 2015). People with common interests can share their knowledge in online communities and participate in interactive activities to exchange desired benefits (Meng, Zhang, Liu, & Ren, 2021; Sun, Fang, & Lim, 2014), which make online platforms play an increasingly important role in disseminating social knowledge through integrating social interaction functions and diversified digital content, especially during the COVID-19 (Merchant & Lurie, 2020). People can alleviate uncertainty by seeking health information online in two key ways: (1) online health information can provide more details about their specific health condition (Liu, Ren, Shi, Li, & Zhang, 2020), and (2) online communities can provide social support that from other people with the same condition (Zhao et al., 2021). The American Psychological Association has noted the importance of social support as a response to COVID-19 (Association, 2020).

The growing literature contributes to our understanding of people obtaining social support in online communities (Yao, Tang, Fan, & Luan, 2021), self-disclosure is considered as an important method to access social support (Taniguchi & Thompson, 2021). The social penetration theory (SPT) believes that the relationship between people will develop as the intimacy of disclosed information (i.e. the depth of self-disclosure) increases (Altman & Taylor, 1973). These interpersonal relationships are an important resource of social support and it is generally believed that having social connections is equivalent to getting social support from them (Folkman, 1984). Literature about self-disclosure believes that a person should disclose his/her difficulties and corresponding needs to others when obtaining social support (Valerian J Derlega, 1984).

The purpose of this study is to examine how pregnant women in different roles in the online community conduct online self-disclosure to obtain social support during the COVID-19 based on the stress and coping theory (SCT) and social penetration theory (SPT). The SCT believes that when people cope with stress, they first appraise the stressors. Pregnant women face two stressors during the COVID-19: daily hassles (Coburn, Gonzalez, Luecken, & Crnic, 2016; Huizink, de Medina, Mulder, Visser, & Buitelaar, 2003) and the adverse impacts of the COVID-19 on themselves and their families. Therefore, this study involves three self-disclosure categories: (1) the daily difficulties faced by pregnant women, (2) the difficulties caused by the COVID-19 faced by pregnant women, and (3) the help pregnant women need to solve difficulties. According to the definition of the coping strategy of SCT, self-disclosure can be regarded as a coping strategy when people disclose their difficulties and need to obtain social support. Therefore, we regard these three self-disclosure categories as three different coping strategies to explore their impact on the access to coping resources (social support) and use the SPT to explain the impact of self-disclosure on social support.

However, to the best of our knowledge, the possible impact of coping strategy on access to coping resources has not been examined. Although prior studies explore the relevance of coping strategies and coping resources, they mainly focus on coping resources that people have but ignore people’s coping resources acquisition (Cheng, Yang, Inder, & Chan, 2020). More research needs to be conducted to understand the mechanisms behind people’s coping resources acquisition. The current study intends to bridge the coping strategy and coping resources acquisition by considering pregnant women’s role (support providers vs. support seekers) in the online community and the adverse impacts of COVID-19 on them. Thus, we propose the following research questions:

RQ1: How pregnant women’s self-disclosure affects their access to online social support?
RQ2: Does a pregnant woman’s participatory role in the online community affect the relationship between online self-disclosure and social support received, and if so, how?
RQ3: Does a pregnant woman’s disclosure about the adverse impact of COVID-19 affect the relationship between online self-disclosure and social support received, and if so, how?

Our research distinguishes itself from previous studies in three ways. Firstly, while most previous studies on stress coping focus on resources that people have, very little is known about what determines people’s coping resources acquisition in an online community. Our research aims to develop a more thorough understanding of women’s coping process during the COVID-19 by focusing on coping resources acquisition. Secondly, by combining SCT, SPT, and the context of the COVID-19, we divide the online self-disclosure of pregnant women into three categories and regard them as three coping strategies to explore their relationship with social support acquisition. Thirdly, this research distinguishes the roles of pregnant women (social support providers vs. social support seekers) in the online community to examine the relation behind their coping strategies and coping resource acquisition with different roles. Our findings highlight the need to consider not only the social support seekers but also providers in studying online social support acquisition, as the relationship between coping strategies and coping resource acquisition is affected by the role of online community’s members.
2. Literature review

2.1. Stress and coping theory and stress coping

Stress and coping theory (SCT) provides a framework that emphasizes the two important processes when coping with stress: appraisal and coping, SCT can be used to formulate and test hypotheses about pregnant women’s stress coping process. When defining stress, SCT emphasizes the relationship between the individual and the environment, specifically, taking into account the characteristics of the individual and the nature of environmental events (Folkman, 1984). Folkman asserted that psychological stress is a special relationship between people and the environment, which is appraised by them as exceeding or taxing their resources and endangering their well-being. The relationship between a person and the environment is considered stressful depending on his/her cognitive appraisal of the stressor. Folkman has identified three forms of stressful appraisal: (1) harm/loss refers to damage people have already sustained, (2) threat refers to anticipated losses or harms, and (3) challenge refers to events that may be mastered or acquired (Folkman, 1984). Therefore, for studying the stress coping process of pregnant women during COVID-19, it is necessary to consider the effect of adverse impacts of COVID-19 on them. In this study, pregnant women first conduct a stressful appraisal on stressors, and then disclose these appraisals online as coping strategies for obtaining coping resources (i.e. social support) to cope with stressors.

People may encounter a variety of stressors, this study mainly considers two stressors faced by pregnant women during the COVID-19: adverse impact of daily life and daily hassles. The COVID-19 is a rare and broad-scale stressor. Its threat to people’s health and profound impact on daily life, coupled with the uncontrollability of sudden outbreaks, make it become an excellent context for studying stress reactivity (Fassett-Carman, DiDomenico, von Steiger, & Snyder, 2020). Daily hassles are the little things that can irritate and distress pregnant women, such as quarrels with the husband and physical symptoms during pregnancy. Although daily hassles are far less dramatic than major changes in life such as divorce or bereavement, they were more strongly associated with outcomes of adaptation and health (Sarid et al., 2018). Pregnant women will make corresponding stressfull appraisals for these two stressors, and the stressful appraisal belongs to the type of harm/loss in this research context. We regard the adverse impacts of COVID-19 on pregnant women as the stressful appraisal of COVID-19, including family conflicts (Y. Wu et al., 2020) and economic pressure caused by COVID-19 (Ikeda, Igarashi, Odani, Murakami, & Tabuchi, 2021), worries about prenatal examination (Moyer, Compton, Kaselitz, & Muzik, 2020) and home quarantine (Ferreira, Pereira, da Fe Bras, & Ilchuk, 2021). We also summarize the stressful appraisal of daily hassles as the damage that women have already sustained about bad mood (Congdon, Adler, Epel, Laraia, & Bush, 2016), the second child (Lu et al., 2020), physical symptoms (Yanikkerem, Ay, Mutlu, & Goker, 2013), prenatal examination results (Tseng, Hsu, Liu, & Chen, 2008), gender expectation (Liao et al., 2020), relationship with husband (Martini et al., 2015), relationship with parents-in-law (Lau, 2011) and economic status (Fisher et al., 2013) during pregnant.

2.2. Social penetration theory and self-disclosure

Social penetration theory (SPT) is a theory on communication and psychology and describes the process of a relationship moving from superficial to more intimate (Altman & Taylor, 1973). The most important interaction to develop a relationship is self-disclosure, which is conceptualized as “any message about the self that a person communicates to another” (Lawrence, R., Wheless, & Grotz, 1976). Although self-disclosure is not the same as having an intimate relationship, it helps to develop and maintain an intimate relationship (V. J. Derlega, Metts, Petronio, & Margulis, 1993). People increase intimacy with others through disclosing their thoughts, feelings, and experiences to others, which allows others to know who they are and what their needs are (Valerian J Derlega, 1984).

The breadth and depth of self-disclosure are crucial to social penetration. Breadth refers to the number of topics discussed such as hobbies, favorite movies, family or educational background. Depth refers to the degree of intimacy of information exchanged, for example, discussing a range of feelings associated with bad experiences encountered instead of nonintimate facts is a highly intimate information exchange. Social penetration can occur in different contexts, including romantic relationships (Taylor & Altman, 1975), friendships, social groups, and work relationships (Emmerich, Knoll, & Rigotti, 2020; Hwang, Han, & Kim, 2015; Mangus, Bock, Jones, & Folse, 2020). SPT has also been applied to computer-mediated communication environments, such as online dating (Gibbs, Ellison, & Heino, 2006) and online communities (Malloch & Zhang, 2019).

2.3. Social support and participation in the online community

Participation is an important action mechanism for behavior change and symptom reduction in Internet-based interventions (Friedman, Trail, Vaughan, & Tanielian, 2018). There are many definitions of participation, from the members’ frequency of communication to their intensity of engagement in a community (Ellison, Steinfield, & Lampe, 2007; Nambisan, 2011). Many previous studies classified the ways that members participate in the online community into posting and lurking (Batenburg, 2006). Other studies divide the ways users participate in online communities into three types: (1) initiating communication by asking questions, (2) responding to other members’ inquiries, or (3) simply observing/reading other members’ posts (Feldhege, Moessner, & Bauer, 2020; Walsh & Al Achkar, 2021).

People will benefit from participating in online communities/support groups (S. Q. Chen, Guo, Wu, & Ju, 2020), specifically, they may shift their attention from focusing on their difficulties to being considerate of others and helping others (Vaala, Lee, Hood, & Mulvaney, 2018). Online communities can easily and cheaply support loose social ties (Kumi & Sabherwal, 2018) that enable users to form and maintain a larger and diffuse social network from which potentially obtain resources. The 2006 Pew Internet Survey reported
that online users are more likely to own a larger network of close ties than non-Internet users, and online users are more likely to receive help from core network members than non-users (Jeffrey Boase, 2006). Lots of scholars associate the degree of participation with the degree of benefits that individuals can obtain from the community, as the scope and depth of benefits grow with the intensity of the relationships between members increase (Petrovic & Petric, 2014). Numerous researches have demonstrated that active posters were more likely to obtain social support compared with lurkers, they were also more satisfied with other members and health information in the community (Mo & Coulson, 2010).

2.4. Prenatal depression and social support

Prenatal depression is the most common mental disorder during pregnancy (Dadi, Miller, Bisetegn, & Mwanri, 2020). Prenatal depression is associated with growth delay and overactivity in the fetus, as well as low birthweight, prematurity, less responsiveness to stimulation and disorganized sleep in the neonate. Babies of depressed mothers have difficult temperaments, emotional and behavioral problems in childhood and adolescence, and chronic illnesses in adulthood (Monk, Lugo-Candelas, & Trumpf, 2019; Tuovinen et al., 2021). Women with prenatal depression reported poorer health and function than non-depressed women, health problems and limited functional status in daily living were also found among them (Orr, Blazer, James, & Reiter, 2007). Changes in the immune system caused by prenatal depression are thought to damage the communication between the endocrine system, central nervous system and immune system, making women with prenatal stress more vulnerable to these problems (Kohman, Tarr, Day, McLinden, & Boehm, 2008). Numerous studies have shown the crucial of focusing on the antenatal period and developing preventive and therapeutic interventions.

Social support can help pregnant women cope with negative emotions and stress related to pregnancy and prepare actively for delivery and the postpartum period (Jeong et al., 2013). Social support is the extent to which an individual’s basic social needs such as esteem, affection, approval, belonging, and security are met through interactions with others (Thoits, 1982). Social support is generally identified in four categories: (1) informational support (e.g., providing detailed information can solve the problem); (2) emotional support (e.g., show empathetic, caring, etc.); (3) companionship and (4) instrumental support (e.g., offering money or services) (Berkman, Glass, Brissette, & Seeman, 2000). Among these, informational and emotional supports are the two most common types of social support in online communities (L. T. Chen, Baird, & Straub, 2019) thus are included in our study. For example, in online communities, the information about the process of prenatal examination or delivery provided by others for pregnant women is informational support. Correspondingly, others showing understanding and caring for pregnant women’s emotions or experiences is emotional support.

Pregnancy is a transition process for women, a pregnant woman may face changes and uncertainties alone during the transition process except for joy. Personal, community or social conditions may promote or hinder the transition process and outcomes (Meleis, Sawyer, Im, Messias, & Schumacher, 2000). Women may also suffer other pregnancy-related losses, such as reduced careers and social contacts. If a woman does not receive enough support from her partner, family or friends, she will feel burdened and emotional instability due to the increased physical load, continued fatigue, and decreased energy level associated with pregnancy (Tseng et al., 2008). Compared with women who have no available support network, women who experience stressful events but have sufficient social support are less likely to suffer from negative emotional distress (Khan et al., 2021). Perceived social support also acts as a buffer of stressors through adaptive appraisal. If people believe that they will obtain social support when they need it, they will have better adaptational outcomes (Folkman, 1984).

Fig. 1. Conceptual model.
3. Research model and hypotheses

The conceptual model is shown in Fig. 1.

3.1. Self-disclosure as an antecedence of social support

Self-disclosure is an important way to obtain social support (Valerian J. Derlega, 1984). People would formulate different self-disclosure strategies based on different contexts, and the disclosure strategy they choose would influence the outcomes (Barrett-Bojin & Shahar, 2011; Gieselmann & Pietrowsky, 2016), such as support they receive (Ziv-Beiman, Reiman, Livneh, Malone, & Shahar, 2017). Direct disclosure (e.g., ask behavior) may bring better outcomes, posting in online communities to seek social support is a more efficient way compared to lurking (Mo & Coulson, 2010). However, even when ask for opinions directly, people often explain their personal circumstances so that they can receive opinions as soon as possible (Jans, Kaye, & Jones, 2012). If people do not disclose information about stressors they face, they may not receive the benefits of social support (Martins, Peterson, Almeida, & Costa, 2011). Therefore, the posts in online communities generally contain two aspects: describing the difficulties/stressors they face and asking for the help they need. This is also in line with Derlega’s claim on self-disclosure: self-disclosure makes individuals show others who they are and what their demands are (Valerian J. Derlega, 1984).

According to SPT, the depth of self-disclosure is reflected in the intimacy of information disclosed (Altman & Taylor, 1973). The depth of people’s disclosure largely determines how much understanding they can gain from others, thus people tend to disclose honestly and intimately to maximize self-disclosure (Stiles, 1987). When pregnant women disclose the difficulties they face, they may disclose personal information such as the results of the prenatal examination and interpersonal information such as the relationship with their husbands. In addition, pregnant women also disclose information about concrete needs such as inquiring about the process of the prenatal examination. As lack of nonverbal cues (such as facial expressions and posture) in online communities, the information about pregnant women’s concrete predicament is more detailed and richer than the information about their demands, which helps others to improve their understanding of pregnant women. Therefore, we divide the self-disclosure of pregnant women in online communities into personal level disclosure (disclosure of personal dilemma information) and superficial level disclosure (disclosure of demand information) according to the depth of self-disclosure, and personal level disclosure is deeper than superficial level disclosure.

Based on existing studies, when pregnant women conduct personal level disclosure, they would disclose their stressors, that is daily hassles, including bad mood (Congdon et al., 2016), the second child (Lu et al., 2020), symptoms during pregnancy (Yanikkerem et al., 2013), prenatal examination results (Tseng et al., 2006), gender expectation (Liao et al., 2020), relationship with husband (Martini et al., 2015), relationship with parents-in-law (Lau, 2011) and economic status (Fisher et al., 2013). Pregnant women would disclose their demands when they conduct superficial level disclosure, including suggestions of prenatal examination or delivery, how to adjust the mood, how to alleviate the symptoms during pregnancy and seeking comfort (Melender, 2002). Hence, we assume that two levels of self-disclosure have a positive effect on social support. Hence,

H1a. : Superficial level disclosure is positively related with online social support received.

H1b. : Personal level disclosure is positively related with online social support received.

3.2. The moderating effect of adverse impacts of COVID-19

During the COVID-19, the epidemic has become a new stressor for pregnant women and they may disclose the adverse impact of COVID-19 online to obtain social support. Based on previous research (Ferreira et al., 2021; Ikeda et al., 2021; Moyer et al., 2020; Wu et al., 2020), we summarized the adverse impacts of COVID-19 on pregnant women as follows: (1) worries about prenatal examination/seeing a doctor/delivery caused by the COVID-19, (2) economic pressure and (3) family conflicts caused by the COVID-19, (4) worries about home quarantine. Disclosure of the COVID-19 also belongs to the deep disclosure as it involves the disclosure of personal information. Therefore, there are three types of self-disclosure in the research model. Personal level disclosure and adverse impacts of COVID-19 belong to deep disclosure as they disclose personal information, while superficial level disclosure belongs to shallow disclosure as it discloses demand information.

The join of the new stressor may change the relationship between previous coping strategies and coping resources acquisition. The personal information about the adverse impact of COVID-19 disclosed by pregnant women will encourage other members to understand their needs and provide corresponding support (Derlega et al., 1993). For example, if a pregnant woman only discloses daily hassles for obtaining advice about the prenatal examination, other members will deem that she is asking about prenatal examination under normal circumstances. If the pregnant woman further discloses her concern about prenatal examination is caused by the COVID-19, other members will quickly understand that she is asking for how to undergo a prenatal examination during the COVID-19, and provide effective suggestions such as “must provide a negative nucleic acid result before prenatal examination”. Therefore, we hypothesize there is a positive moderating effect of adverse impacts of COVID-19 on the relationship between superficial level disclosure and social support. Hence,

H2a. : Adverse impacts of COVID-19 disclosure will enhance the positive impact of superficial level disclosure on online social support received.

As the COVID-19 is a serious emergency that people are experiencing, people will pay more attention to the adverse impacts of...
COVID-19 on pregnant women when daily hassles and adverse impacts of COVID-19 are disclosed at the same time, leading them to ignore the need to solve daily hassles and pay more attention to the needs to solve adverse impacts of COVID-19. Therefore, we hypothesize there is a negative moderating effect of adverse impacts of COVID-19 on the relationship between personal level disclosure and social support. Hence,

**H2b.** Adverse impacts of COVID-19 disclosure will negatively moderate the relationship of personal level disclosure and online social support received.

### 3.3. The moderating effect of participation role

Online communities are participatory platforms that thrive in creating and maintaining interpersonal relationships (Hether, Murphy, & Valente, 2014), their members can develop and maintain these relationships through long-term contact and continuous communication (Postmes, Spears, & Lea, 2000). Specifically, members can build interactions by disclosing their identities, wishes, emotions and fears in online communities (publish posts), and by supporting others timely with kindness and generosity (respond to others’ posts). These interactions will contribute to the development of interpersonal intimacy and they may transform online social ties into stronger connections (Barak, Boniel-Nissim, & Sulfer, 2008) from which to obtain social support (V. J. Derlega et al., 1993), thereby helping the online community members to cope with stressors (Braasch, Buchwald, & Hobfoll, 2019).

Researchers believe that “participation is fundamental for group members to develop a sense of belongingness, provide support to others, receive feedback, form interpersonal bonds, and gain recognition for their contributions” (Fiedler & Sarstedt, 2014). Given that the degree of participation is related to the degree of benefits that members can obtain from the community (Piotrowicz & Pietric, 2014), and social support is essential “an interpersonal, transactional process” involving interactions between support seekers and providers (Collins & Feeney, 2000), the pivotal role of members’ roles in online communities cannot be overlooked when studying social support acquisition. Coupled with a user’s number of published posts is often used to measure his/her participation intensity (Camacho, Nam, Kannan, & Streemersch, 2019), therefore, this study divides the participating roles of pregnant women into **social support seekers** and **social support providers** by comparing the number of their published posts and replies in the online community during the COVID-19. Pregnant women who prone to post are support seekers and who prone to respond others’ posts are support providers. There are several differences between these two participating roles.

**First, support providers and support seekers get social support in different ways.** Members writing down their feelings and struggles of managing depression usually give them a sigh of relief, coupled with the recognition and understanding from other peers or visible indicators that their posts are read by others help members develop a sense of belonging (Smit et al., 2021). Support seekers’ comments received are signals to others that the community is active and members are willing to establish connections, those interactions may eventually establish interpersonal bonds and make future interactions more enduring (Zhu & Stephens, 2019). Members who respond to others’ posts also receive recognition and emotional support from peers, which further enhances their sense of belonging. Specifically, individuals providing support or advice to others requires writing down their thoughts and reflecting on their own experiences, which seems to promote their emotional growth (Smit et al., 2021).

**Second, support seekers and support providers have different levels of community participation.** Wang et al. proved that those who have posted a large amount of information-seeking posts in the last month in the online community may not continue to participate in this community in the long run, although they may also receive a large amount of informational support (Wang, Zhao, & Street, 2014). But those users who provide more informational support or companionship will participate in the community longer (Wang, Zhao, & Street, 2017).

**Third, support seekers and support providers have different mental states and coping abilities.** When members feel down, they mainly read other members’ posts or ask questions but do not respond to others’ posts. In general, most members first seek support by reading the experiences of their peers and posting about how to deal with illness or disclose their own stories and needs. Gradually, when members’ moods and literacy that cope with stress have been improved, they would feel more empowered to support their peers and begin to respond to others (Smit et al., 2021). Taken together, we believe that support providers have a better mental state and coping ability during the COVID-19 than support seekers.

**Fourth, support providers have more social ties than support seekers in the online community.** Members’ frequency of communication with others in an online community is a major determinant of the extent that they form bonds with others (McKenna, Green, & Gleason, 2002). From this perspective, members providing help by initiative commenting on others’ posts is a more effective way to build social ties compared to posting their own posts in online communities.

Due to differences in content and depth, superficial level disclosure and personal level disclosure have different impacts on social support received. Specifically, when pregnant women conduct superficial level disclosure, they disclose their informational and emotional needs, which requires others to have sufficient literacy about how to solve their difficulties to provide support. Correspondingly, when pregnant women conduct personal level disclosure, they disclose their difficulties they are facing, which help attract “similar others” who could provide peer support. Potential social support providers understand pregnant women’s situation and offer support through their similar experiences with women who disclose personal information, problem-solving ability is less important in this process.

In short, the role of women in online communities may make difference in the relationship between their self-disclosure and access to social support. Specifically, women who disclose their personal information as support providers in an online community have more social ties, which will promote them to obtain social support. Conversely, when women disclose information about their needs to seek help as support providers, other members may be required to have higher abilities to answer their questions due to support providers.
having a high level of problem-solving literacy. Therefore, we hypothesize that support providers will get more social support by conducting personal level disclosure, and get less social support by conducting superficial level disclosure. Hence,

\[ H3a \]: Compared with support seekers, the positive impact of superficial level disclosure on online social support received will decline for support providers.

\[ H3b \]: Compared with support seekers, the positive impact of personal level disclosure on online social support received will enhance for support providers.

4. Methodology

4.1. Research context

To test our research model, we collected data from a major online parenting community in China—Babytree.com (www.babytree.com) which provides diversified services for new parents who are preparing for pregnancy or pregnant, or have children aged 0-6. According to the 2019 China Comprehensive Maternal and Infant Platform Monitoring Report, Babytree.com is in the first echelon in the industry. Among the mainstream comprehensive maternal and infant platforms in the first half of 2019, the number of active users of the Babytree.com was steadily ranking in the top two, its number of monthly active users in August reached 16.143 million. Moreover, Babytree.com is one of the two major platforms where active pregnant users are mainly distributed, which is in line with our research context. Babytree.com allows parents to share knowledge, record the growth of children and communicate with peers. Parents communicate with others through posting and replying (commenting on other people’s posts). If parents want to know a specific knowledge, they can use keywords such as “physical symptoms during pregnancy” to search for related posts in the platform. In addition, parents can also join different groups according to their own needs to get richer and more targeted information.

4.2. Sample and data collection

By developing a web crawler tool, we collected pregnant women samples who have joined the “COVID-19” group on Babytree.com and have expressed their subjective depressive symptoms such as blue, insomnia, and so on in their posts on January 1st, 2021, each of them has published at least one post in the “COVID-19” group, indicating that they are actively participating in online groups compared to lurkers. For each pregnant woman, we collected her posting time, the number of posts published and the number of replies to others’ posts from January 20, 2020 to May 31, 2020 in their homepage, we also collected the number of comments of the post received and the post’s content (see Fig. 2). To reduce bias, posts about popular science, posts with content unrelated to COVID-19 or depressive mood, posts that had been deleted by users, and duplicate posts are deleted. Finally, 814 posts were included in our empirical study, which spanned from January 20, 2020 to May 31, 2020. This dataset excludes lurkers in the online community, allowing the study to focus on active pregnant users and their online behavior.

4.3. Coding of self-disclosure

4.3.1. Explanations of self-disclosure items

By reviewing literature about SPT and self-disclosure, we know that a pregnant woman’s access to social support in online communities depends on her self-disclosure in two aspects: one is her predicament (which can be regarded as stressors and belongs to personal level self-disclosure as it involves personal information), the other is her current needs for solving problems or alleviating bad emotions (which can be regarded as informational support or emotional support and belongs to superficial level self-disclosure as these needs do not involve personal information) (Altman & Taylor, 1973; V. J. Derlega et al., 1993).

After reviewing the literature about risk factors for prenatal depression, we identified the stressors of pregnant women and regarded them as self-disclosure items that combined with the Chinese cultural context in this study. These stressors can be generalized into four domains: Motherhood, Interpersonal (O’Mahan et al., 2012), Cultural background and Financial. Stressors in the motherhood domain refer to stress about motherhood or pregnancy (O’Mahan et al., 2012), including (1) Bad mood during pregnancy. Pregnant women often experience bad emotions. They may feel that they are emotionally fragile, impatient, sensitive, easily irritated, and overreacting to trivial matters. They may also tend to cry spontaneously and be depressed for unknown reasons (Tseng et al., 2008). These negative emotions can cause stress for pregnant women and affect their normal life. (2) Symptoms during pregnancy. As the pregnancy progresses, pregnant women will experience tremendous physical changes. Especially in the final stages of pregnancy, women often suffer from discomfort and pain in the waist and back, edema, insomnia and cramps. These problems often lead to mood swings, which may manifest as a worsening feeling of discomfort. Even worse, physical symptoms and emotional problems would exacerbate each other (Tseng et al., 2008). (3) Second child. China has fully implemented the two-child policy since 2016. Women in their second pregnancy are more likely to experience anxiety (Lu et al., 2020). (4) Prenatal examination results. The main concern of expectant mothers is the safety of the fetus. Many women have heard stories about the dangers of pregnancy then they would worry

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2 https://www.iimedia.cn/c400/66180.html, accessed on December 30, 2021

3 http://www.gov.cn/gongbao/content/2016/content_5033853.htm
about the safety of themselves and their babies (Tseng et al., 2008). Stressors in the interpersonal domain refer to conflict with others or poor support from others (O’Mahen et al., 2012), including (1) Relationship with husband. Women who are dissatisfied with their marriage are more likely to suffer from prenatal depression (Martini et al., 2015). (2) Relationship with parents-in-law. Most women reported that living with in-laws is a stressor, and they do not receive any practical or emotional support from their elders (Tseng et al., 2008). Stressor about cultural background refers to gender expectation. In the Chinese cultural context, boys are considered more valuable than girls, this gender expectation is also a risk factor for prenatal depression (Liao et al., 2020). Pregnant women’s stress may also come from the financial domain. Low income or financial difficulties are risk factors for prenatal depression (Fisher et al., 2013).

Other members can better understand the needs of pregnant women from that personal information to provide targeted social support. According to previous research, suggestions of prenatal examination or delivery (Melender, 2002), how to adjust the mood, how to alleviate the symptoms during pregnancy and seeking comfort are the support that pregnant women need. (1) Suggestion of prenatal examination or delivery. The main concern of pregnant women during pregnancy is the health of the fetus and the fears about the delivery process. When they get the results of the prenatal examination or are about to give birth, they urgently need other experienced members to provide information due to their lack of obstetrics knowledge. In addition, the obstetrics department was closed and the routine prenatal examination was interrupted during the COVID-19, which brought great uncertainty to pregnant women and triggered fears about pregnancy and delivery (Melender, 2002). Whether or not there is an epidemic outbreak, the suggestion about prenatal examination or delivery provided by other experienced women in the online community will reduce expectant mothers’ uncertainty. (2) How to adjust the mood. Pregnant women who experience negative emotions are more likely to seek advice from others who have experienced the same situation, then pregnant women would communicate with them to confide in distress and get understanding. (3) How to alleviate the symptoms during pregnancy. Unbearable physical symptoms during pregnancy can affect the mood of pregnant women, they would like to seek advice from other members to improve symptoms. (4) Seeking comfort. The family conflicts, family responsibilities and financial difficulties all bring tremendous psychological pressure to pregnant women and lead to inadequate social support. They will seek support from other members of the online community, such as comfort and encouragement. We classify them as superficial level disclosure.

We manually coded all posts’ disclosure items of superficial level self-disclosure, personal level self-disclosure and adverse impacts of COVID-19 based on this coding schema. Each disclosure item is a dummy variable which is set to “1” if it appears in the post, and vice versa is set to “0”. To test the reliability of the intercoder, the first and the second authors of this study independently coded the randomly selected sample of 80 posts (~10%). There was general agreement on the selection and coding of posts. During the coding
Table 1
Description of self-disclosure items.

| Self-disclosure                        | Disclosure Items                                                                 | Description                                                                                                                                 |
|---------------------------------------|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Superficial level disclosure          | Prenatal examination or delivery (PED)                                          | Whether pregnant women i had asked the questions about the prenatal examination or delivery, adjusting mood, alleviating the symptoms during pregnancy and had expressed a desire for comfort-seeking in the post. |
|                                       | Adjust the mood (AM)                                                             |                                                                                                                                             |
|                                       | Alleviate the symptoms during pregnancy (AS)                                     |                                                                                                                                             |
|                                       | Comfort (Com)                                                                    |                                                                                                                                             |
| Personal level disclosure (personal   | Bad mood (BM)                                                                    | Whether pregnant women i had mentioned her bad mood, the second child, symptoms during pregnancy, prenatal examination results, expectation of the baby’s gender, relationship with husband, relationship with parents-in-law and economic status in the post. |
| and private information)              | Second child (SC)                                                                |                                                                                                                                             |
|                                       | Symptoms during pregnancy (Sym)                                                  |                                                                                                                                             |
|                                       | Pre-natal examination results (PER)                                              |                                                                                                                                             |
|                                       | Gender expectation (GE)                                                          |                                                                                                                                             |
|                                       | Relationship with husband (RH)                                                   |                                                                                                                                             |
|                                       | Relationship with parents-in-law (RP)                                            |                                                                                                                                             |
| Adverse impacts of COVID-19           | Economic status (ES)                                                             | Whether pregnant women i had mentioned her worries about prenatal examination seeing a doctor/delivery, economic pressure, family conflicts and home quarantine caused by the COVID-19. |
|                                       | Prenatal examination / Seeing a doctor / Delivery (PSD)                          |                                                                                                                                             |
|                                       | Economic pressure (EP)                                                           |                                                                                                                                             |
|                                       | Family conflicts (FC)                                                            |                                                                                                                                             |
|                                       | Home quarantine (HQ)                                                             |                                                                                                                                             |

process, if two authors have uncertainties about an item or they encounter a concept that the previous coding scheme cannot give guidance, they will discuss and adjust until a consensus is reached. Subsequently, another 160 posts (~20%) were selected randomly for independent coding. The discursive context of posts was considered when encoding. The reliability of the encoders in this study is high (Cohen’s kappa: coder 1 × coder 2 = 0.93). The range of Cohen’s kappa coefficients on each disclosure item was from 0.87 to 0.94, which demonstrated good agreement between coders. Next, the first author completed the coding of the remaining samples. Table 2 shows the coding keywords and examples of each disclosure item in the coding process, descriptions were translated to English to report in this article.

4.3.3. Measurement

4.3.3.1. Dependent variable: Social support. Previous research believed comments received on posts in online communities could be regarded as a proxy of social support (De Choudhury & Kiciman, 2017). Therefore, for the post j of pregnant women i in the “COVID-19” group, social support that mother i received is measured by the number of replies or comments of the post j. Future work should investigate the kinds of comments people are receiving to understand whether they are truly supported.

4.3.3.2. Independent variable: Self-disclosure. Self-disclosure is a continuous variable representing the sum of all self-disclosure items, which is divided into two categories: personal level disclosure and superficial level disclosure. Every self-disclosure item is a dummy variable is set to “1” if it appears in the post. The specific formulas for calculating the superficial and personal level disclosure are as follows:

\[
\text{Superficial level disclosure} = \frac{\text{PED} + \text{AM} + \text{AS} + \text{Com}}{\text{PED} + \text{AM} + \text{AS} + \text{Com}}
\]

\[
\text{Personal level disclosure} = \frac{\text{BM} + \text{SC} + \text{Sym} + \text{PS} + \text{GE} + \text{RP} + \text{ES}}{\text{BM} + \text{SC} + \text{Sym} + \text{PS} + \text{GE} + \text{RP} + \text{ES}}
\]

4.3.3.3. Moderators: Adverse impacts of COVID-19 and participation role. Adverse impacts of COVID-19 is a continuous variable representing the sum of all disclosure items about the adverse impact of COVID-19 and every disclosure item is a dummy variable set with “1” if it appears in the post. The specific formula for calculating the adverse impacts of COVID-19 is as follows:

\[
\text{Adverse impact of COVID-19} = \frac{\text{PED} + \text{EP} + \text{FC} + \text{HQ}}{\text{PED} + \text{EP} + \text{FC} + \text{HQ}}
\]

In this study, pregnant women show two participation roles in the online group: support seekers and support providers. A pregnant woman’s participation role depends on the number of her posts and replies. Participation role is a dummy variable is set with “1” if the pregnant woman’s number of times replies to others is greater than the number of posts, which presents her participation role as a support provider, and vice versa is a support seeker. We used a simple formula to express it:
Key words and coding examples.

| Disclosure items | Key words | Representative quotes |
|------------------|-----------|-----------------------|
| Prenatal examination or delivery | prenatal examination, delivery, caesarean section | I would like to ask whether the expected date of delivery is calculated according to the actual number of weeks or according to the color Doppler ultrasound. If the expected date of delivery is calculated according to color Doppler ultrasound, is it possible that I will have three weeks to give birth? In addition, what kind of clothes should I wear if I go to the hospital for delivery in winter? Would it be better to wear pajamas? |
| Adjust the mood | Pressure, depress, scared, cry, grumpy, depressive, anxious, uncomfortable, irritating, die, worried, painfully, sad, desperate, disappointed, angry, complain, regret, anhedonia, suicide, what should I do, treatment, adjust, alleviate, improve, relieve, advice, suggestion | My stomach is stiff and uncomfortable after a little movement, and it is accompanied by frequent urination. Can experienced pregnant women give me some advice? I have been pregnant for five weeks. Recently, I feel nauseous, I have no appetite. It is so uncomfortable! I feel so pitiful! Do you have the same symptoms? Can you talk to me, this is my first child, I don’t understand many things. During the COVID-19, my desire for life has gradually faded away! I don’t know whether I’m depressed. I suddenly feel so tired and don’t want to live anymore! My first child still needs my company, but I feel irritable when she is chatting with me, so I often yell at her. In fact, I feel regret after yelling at her. The child would be afraid of me, and I know that I was not doing it right. But I can’t control myself, and now I don’t know what should I do after the second child is born. I have been pregnant for 39 weeks. My ribs, pubic bones, waist and legs are very painful, my gums are bleeding badly, my breathing is difficult, and my sleep quality is poor. I have been pregnant for 22 weeks, and the Dow’s screening showed a critical risk, there has been no way to go for further inspection because of the COVID-19. Today I can finally do non-invasive DNA, and I feel so scared! I hope the second child is a girl. I want to get divorced. It’s so sad. I haven’t received the slightest attention from my husband. I am probably the most vulnerable pregnant woman, my parents-in-law blamed me for being picky eaters, and occasionally quarreled with me. I became pregnant during the COVID-19 and my income was reduced by more than half, but my expenses were increasing. The financial pressure was too great, and I felt almost depressed. I have been pregnant for more than 28 weeks, but the fetal movement is not obvious. The severe epidemic made me afraid to go to the hospital. I haven’t had a prenatal examination for more than a month, and I haven’t done glucose tolerance and Anomaly Scan! I’m almost depressed. The epidemic has been going on for so long. My families have no income. There is pressure on mortgage and car loans every month. My first child does not go to school caused by COVID-19. I have been taking care of the child since I was pregnant. I am not in a good mood and I tend to lose my temper. No one cared about me. I was very disappointed and desperate. My husband didn’t understand my anxiety. I was disappointed and irritated. Recently, the epidemic is serious, and I stay at home only with my mobile phone and TV! I’ve been very irritable lately, the expected date of delivery is approaching, will I get depression? |
| Alleviate the symptoms during pregnancy | Insomnia, pain, anorexia, stiff, frequent urination, uncomfortable, nauseous, appetite, what should I do, treatment, adjust, alleviate, improve, relieve, advice, suggestion | Comfort | comfort, encourage, communicate, chat, Is anyone like me, enlighten, suggestion, help, what should I do, chat/talk with me |
| Sensitivity | Bad mood | Pressure, depress, scared, cry, grumpy, depressive, anxious, uncomfortable, irritating, die, worried, painfully, sad, desperate, disappointed, angry, complain, regret, anhedonia, suicide, what should I do, treatment, adjust, alleviate, improve, relieve, advice, suggestion |
| Second child | My first child still needs my company, but I feel irritable when she is chatting with me, so I often yell at her. In fact, I feel regret after yelling at her. The child would be afraid of me, and I know that I was not doing it right. But I can’t control myself, and now I don’t know what should I do after the second child is born. I have been pregnant for 39 weeks. My ribs, pubic bones, waist and legs are very painful, my gums are bleeding badly, my breathing is difficult, and my sleep quality is poor. I have been pregnant for 22 weeks, and the Dow’s screening showed a critical risk, there has been no way to go for further inspection because of the COVID-19. Today I can finally do non-invasive DNA, and I feel so scared! I hope the second child is a girl. I want to get divorced. It’s so sad. I haven’t received the slightest attention from my husband. I am probably the most vulnerable pregnant woman, my parents-in-law blamed me for being picky eaters, and occasionally quarreled with me. I became pregnant during the COVID-19 and my income was reduced by more than half, but my expenses were increasing. The financial pressure was too great, and I felt almost depressed. I have been pregnant for more than 28 weeks, but the fetal movement is not obvious. The severe epidemic made me afraid to go to the hospital. I haven’t had a prenatal examination for more than a month, and I haven’t done glucose tolerance and Anomaly Scan! I’m almost depressed. The epidemic has been going on for so long. My families have no income. There is pressure on mortgage and car loans every month. My first child does not go to school caused by COVID-19. I have been taking care of the child since I was pregnant. I am not in a good mood and I tend to lose my temper. No one cared about me. I was very disappointed and desperate. My husband didn’t understand my anxiety. I was disappointed and irritated. Recently, the epidemic is serious, and I stay at home only with my mobile phone and TV! I’ve been very irritable lately, the expected date of delivery is approaching, will I get depression? |
| Symptoms during pregnancy | Insomnia, pain, anorexia, stiffness, frequent urination, uncomfortable, nauseous, appetite, bleeding |
| Prenatal examination results | Dow’s screening, non-invasive DNA, Ultrasound, Fetal heart rate monitoring, Progesterone Prog |
| Gender expectation | Boy, girl |
| Relationship with husband | Boyfriend, husband |
| Relationship with parents-in-law | parents-in-law, husband’s parents |
| Economic status | money, loan, borrow money, afford, salary, poor, income, financial pressure |
| Prenatal examination / Seeing a doctor / Delivery | COVID-19, epidemic, glucose tolerance, Anomaly Scan, fetal movement, prenatal examination, delivery, caesarean section, normal delivery, color Doppler ultrasound |
| Economic pressure | COVID-19, epidemic, money, loan, borrow money, afford, salary, poor, income, financial pressure, mortgage |
| Family conflicts | COVID-19, epidemic, child, take care of, parents-in-law, husband, housework |
| Home quarantine | COVID-19, epidemic, home quarantine, not allowed to go out, stay at home |

\[
f(\text{participation role}) = \begin{cases} 
1.0, & \text{number}_{\text{reply}} - \text{number}_{\text{post}} \geq 0 \\
0.0, & \text{number}_{\text{reply}} - \text{number}_{\text{post}} < 0 
\end{cases}
\]

4.3.3.4. Control variables: Posting time and Number of fans. The posting time is the number of days between the date of posting and the date of this study’s data collection. Based on the data set collected from Babytree.com, the posting time of posts ranges from January 20, 2020 to May 31, 2020. Given that the posts published earlier may get more replies (H. Wu & Deng, 2019), we added posting time (PT) as a control variable in the model to control for the effect of time on the number of comments received.
The number of fans is displayed on the pregnant women’s homepage. A woman’s fans represent other members who follow her. Studies have shown that the number of comments received by post will be affected by the number of users’ fans (Pechrova & Lohr, 2016).

The description and measurement of variables included in the study are shown in Table 3.

4.3.3.5. Model estimation. We test our hypotheses by using this regression model:

\[ \text{Social support} = \beta_0 + \beta_1 \text{Superficial level disclosure} + \beta_2 \text{Personal level disclosure} + \beta_3 \text{Adverse impacts of COVID-19} \times \text{Participation role} + \beta_4 \text{Posting time} + \beta_5 \text{Number of fans} + \varepsilon_i \]

where \( i = 1, …, n \) index the pregnant woman. \( \beta_1 \) and \( \beta_2 \) are the focus parameters to be estimated, \( \beta_0 \) is the intercept, \( \beta_7 \) and \( \beta_8 \) represent the coefficients of control variables. \( PT_i \) and \( NF_i \) represent the control variables. \( \varepsilon_i \) is the error term.

5. Results

We used the ordinary least squares (OLS) model to estimate the empirical results. All empirical models were done by STATA.

5.1. Descriptive statistics and correlations

Descriptive statistics and correlations for the key variables and self-disclosure items in the analysis are presented in Table 4 and Table 5, the correlations between the independent variables are low, which helps yield stable results. Among the 814 samples, 477 pregnant women’s participation roles are support seekers. Approximately 59.5% of pregnant women conduct at least one personal level disclosure, and 26.4% of them conduct at least one superficial level disclosure, which shows that pregnant women tend to disclose personal information rather than demand information in their posts during the COVID-19. 45.6% of pregnant women disclosed the adverse impacts of the COVID-19 on the lives of themselves and their families, and the most prominent trouble is that the COVID-19 hinders the normal progress of prenatal examination or delivery, accounting for 63.9% of the total disclosure about adverse impacts of the COVID-19. Ranked second among pregnant women’s concerns about COVID-19 is home quarantine, which accounts for 20.5% of the total disclosure about adverse impacts of the COVID-19.

It is worth mentioning that the percentages of pregnant women’s personal information about the second child, symptoms during

| Table 3  | Empirical variables. |
|----------|----------------------|
| **Dependent variable** | **Description** | **Measurement** |
| Social support (SS) | Number of replies or comments received after posting | Its logarithm value |
| **Indepedent variable** | **Description** | **Measurement** |
| Superficial level disclosure (SD) | The superficial level self-disclosure items include (a) ask questions about the prenatal examination or delivery, (b) the way to adjust the mood, (c) the way to alleviate the symptoms during pregnancy and (d) seek comfort. Every self-disclosure item is a dummy variable set with “1” if it appears in the post, the superficial level disclosure is the sum of all above self-disclosure items. | A continuous variable represents the sum of all superficial level disclosure items. |
| Personal level disclosure (PD) | The personal level self-disclosure items include (a) bad mood, (b) second child, (c) symptoms during pregnancy, (d) prenatal examination results, (e) gender expectation, (f) the relationship with husband, (g) the relationship with parents-in-law and (h) economic status. Every self-disclosure item is a dummy variable set with “1” if it appears in the post, the personal level disclosure is the sum of all above self-disclosure items. | A continuous variable represents the sum of all personal level disclosure items. |
| **Moderator** | **Description** | **Measurement** |
| Adverse impacts of COVID-19 (AC) | The disclosure items of COVID-19 include (a) worries about prenatal examination / seeing a doctor/delivery caused by the epidemic, (b) economic pressure and (c) family conflicts caused by the epidemic, (d) worries about home quarantine. | A dummy variable is set with “1” which presents that user “i” discloses at least one item of Adverse impacts of COVID-19. |
| Participation role (PR) | Compare the number of users’ posts and replies during the COVID-19. If the user’s number of replies is greater than the number of posts, the user’s participation role is support provider, otherwise, the user’s participation role is support seeker. | A dummy variable is set with “1” which presents that the user’s number of replies is greater than the number of posts. |
| **Control variable** | **Description** | **Measurement** |
| Posting time (PT) | Number of days between the date of posting and the date of data collection | Its logarithm value |
| Number of fans (NF) | The number of fans displayed on the user’s homepage. | Its logarithm value |
pregnancy and prenatal examination results account for 28.9%, 28.7%, and 23.3% of the total personal level disclosure respectively. This means that women’s worries or stress during pregnancy mainly come from (a) Not only do women have to endure the physical symptoms of pregnancy, they are also asked to put in the energy of caring for their first child; (b) the physical symptoms caused by pregnancy such as insomnia and nauseous, etc.; (c) concerns and uncertainties about the results of the prenatal examination and the health of the baby. Among all superficial level disclosure items, seek comfort, ask questions about the prenatal examination or delivery and the way to alleviate the symptoms during pregnancy accounted for 58.1%, 55.3% and 21.9% respectively.

5.2. Hypotheses testing results

OLS was used to obtain the results of the empirical analysis and the results were shown in Table 6. Model 1 contained the control variables. All independent variables and moderators were added to Model 2. The interaction terms of independent variables and moderators were added to Model 3. We found that both superficial level disclosure and personal level disclosure positively affect the social support received in the online community: Superficial level disclosure ($\beta=0.092, p<0.01$) and Personal level disclosure ($\beta=0.088, p<0.05$). Hypotheses 1a and 1b are supported, which answers the first research question of this paper. For the two moderators in Model 2, both adverse impacts of COVID-19 and participation role positively affect the social support: Adverse impacts of COVID-19 ($\beta=0.09, p<0.05$) and Participation role ($\beta=0.13, p<0.001$). In Model 3, adverse impacts of COVID-19 have no significant effect on the relationship between superficial level disclosure and social support, hypothesis 2a is not supported. Our results provide support for hypothesis 2b. Adverse impacts of COVID-19 decrease the positive influence of personal level disclosure on social support, as evidenced by a negative and significant coefficient of the interaction term ($\beta=-0.111, p<0.05$), which answers the second research question of this paper. Participation role decreases the positive influence of superficial level disclosure on social support, as evidenced by a negative and significant coefficient of the interaction term ($\beta=-0.143, p<0.01$). Hypothesis 3a is supported. Conversely, participation role increases the positive influence of personal level disclosure on social support, as evidenced by a positive and significant coefficient of the interaction term ($\beta=0.155, p<0.01$). Hypothesis 3b is supported. The confirmation of hypothesis 3a and hypothesis 3b answers the third research question of this paper.

We then introduced all disclosure items into the model and the results were shown in Table 7. We found that pregnant women’s disclosure about their relationship with their husband and parents-in-law in the post will positively affect the social support received: RH ($\beta=0.104, p<0.01$), RP ($\beta=0.073, p<0.05$). Pregnant women’s disclosure about prenatal examination results in the post will negatively affect the social support received: PER ($\beta=-0.084, p<0.05$). Pregnant women’s demands for information about the prenatal examination or delivery and comfort significantly affect the social support received: PED ($\beta=0.077, p<0.05$), Com ($\beta=0.1, p<0.01$).

5.3. Robustness checks

We conducted two more tests to check the robustness of our results (see Table 8). First, the data set contains 814 posts posted by members in the “COVID-19” group from January 20th, 2020 to May 31st, 2020 in our main empirical tests. To avoid deviation caused by measurement in a single period, we have expanded the time span of the sample by including 889 posts from January 20th, 2020 to August 31st, 2020 for the robustness check. Second, we replaced the control variable “number of fans” with the “cumulative number of visitors” displayed on the pregnant women’s homepage. We note that all the results are consistent with the previous results. Therefore, the results of additional empirical suggest that our results are quite robust.

6. Discussion and implications

6.1. Key findings

Based on the SCT and the SPT, this study extends extant literature by empirically investigating the effects of coping strategies (superficial level disclosure and personal level disclosure) on coping resources acquisition (social support), and the moderating effect of new stressors (the adverse impacts of COVID-19) and pregnant women’s participation roles in the online community. Using a dataset of 814 pregnant women’s online behaviors obtained from a main online parenting community in China, we find robust evidence for the relationships between their self-disclosure about stress, participation roles and social support received. Our results confirm that both coping strategies including superficial level disclosure and personal level disclosure significantly improve social support received.
Table 5
Description and correlation of disclosure items.

| Disclosure items | Mean | Std. Dev. | Min. | Max. | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 |
|------------------|------|-----------|------|------|----|----|----|----|----|----|----|----|----|----|----|
| PED              | 0.12 | 0.32      | 0    | 1    |    |    |    |    |    |    |    |    |    |    |    |
| AM               | 0.01 | 0.09      | 0    | 1    | 0.007 |    |    |    |    |    |    |    |    |    |    |
| AS               | 0.06 | 0.23      | 0    | 1    | -0.058 | -0.023 |    |    |    |    |    |    |    |    |    |
| Com              | 0.15 | 0.36      | 0    | 1    | 0.193*** | 0.108** | 0.187*** |    |    |    |    |    |    |    |    |
| BM               | 0.12 | 0.32      | 0    | 1    | -0.086** | 0.172*** | -0.058 | 0.003 |    |    |    |    |    |    |
| SC               | 0.17 | 0.38      | 0    | 1    | -0.126*** | -0.007 | -0.029 | 0.005 | 0.055 |    |    |    |    |    |
| Sym              | 0.17 | 0.38      | 0    | 1    | -0.125*** | 0.028 | 0.476*** | 0.051 | -0.075* | -0.034 |    |    |    |    |
| PER              | 0.14 | 0.35      | 0    | 1    | 0.096** | -0.037 | -0.054 | -0.043 | -0.07* | -0.089** | -0.107** |    |    |    |
| GE               | 0.02 | 0.16      | 0    | 1    | -0.033 | -0.015 | -0.039 | -0.002 | 0.04 | 0.18*** | -0.009 | -0.018 |    |    |
| RH               | 0.10 | 0.30      | 0    | 1    | -0.12*** | 0.059* | -0.081* | -0.002 | 0.15*** | 0.082* | -0.094** | -0.108** | -0.025 |    |
| RP               | 0.07 | 0.25      | 0    | 1    | -0.067* | -0.025 | -0.066* | 0.037 | 0.056 | 0.127*** | -0.082* | -0.078* | -0.01 | 0.179*** |    |
| ES               | 0.04 | 0.20      | 0    | 1    | -0.075* | 0.048 | -0.051 | 0.102** | 0.157*** | 0.121*** | -0.06* | -0.083** | -0.033 | 0.185*** | 0.271*** |
| SS               | 2.46 | 2.20      | 0    | 14   | 0.074* | 0.023 | -0.019 | 0.12*** | 0.048 | 0.07* | -0.039 | -0.107** | -0.004 | 0.12*** | 0.106** |

Notes: N = 814. Significance: ***p < 0.001; **p < 0.01; *p < 0.05.
When pregnant women face pressure, they can get help by disclosing their dilemmas and needs to others who may face the same situation in the online community. Pregnant women’s social support received is related to the content of their disclosure. Pregnant women can get more social support by disclosing information about their difficulties, such as the relationship with their husbands and in-laws that many other pregnant women have experienced. It should be noted that pregnant women disclose the prenatal examination results would negatively affect social support received. According to the posts’ content, the purpose of pregnant women disclosing prenatal examination results is to

| Table 6 | Empirical results for social support. |
|---------|-------------------------------------|
| Variables | Model 1 | Model 2 | Model 3 |
| Superficial level disclosure | 0.092** (0.126) | 0.16** (0.211) |
| Personal level disclosure | 0.088* (0.099) | 0.084 (0.146) |
| Adverse impacts of COVID-19 | 0.09* (0.179) | 0.104* (0.203) |
| Participation role | 0.13*** (0.158) | 0.145** (0.188) |
| Superficial level disclosure × Adverse impacts of COVID-19 | 0.023 (0.247) |
| Superficial level disclosure × Participation role | -0.143** (0.247) |
| Personal level disclosure × Adverse impacts of COVID-19 | -0.111* (0.177) |
| Personal level disclosure × Participation role | 0.155** (0.153) |
| Control variables | Yes | Yes | Yes |
| Adjusted-R2 | 0.004 | 0.034 | 0.06 |
| F-change | 2.785 | 7.139*** | 6.613*** |

Notes: Standard errors are in parentheses. Significance: ***p < 0.001; **p < 0.01; *p < 0.05.

| Table 7 | Empirical model results for all items. |
|---------|-------------------------------------|
| Variables | Model 1 | Model 2 |
| PED | 0.077* (0.247) |
| AM | -0.003 (0.834) |
| AS | -0.014 (0.374) |
| Com | 0.1** (0.221) |
| BM | 0.03 (0.243) |
| SC | 0.067 (0.209) |
| Sym | -0.023 (0.231) |
| PER | -0.084* (0.223) |
| GE | -0.006 (0.495) |
| RH | 0.104** (0.267) |
| RP | 0.073* (0.319) |
| ES | 0.006 (0.409) |
| Control variables | Yes | Yes |
| Adjusted R2 | 0.004 | 0.046 |
| F-change | 2.785 | 3.964*** |

Notes: Standard errors are in parentheses. Significance: ***p < 0.001; **p < 0.01; *p < 0.05.

| Table 8 | Robustness check results. |
|---------|---------------------------|
| Variables | Robustness check 1 | Robustness check 2 |
| Superficial level disclosure | 0.092** (0.122) | 0.092** (0.125) |
| Personal level disclosure | 0.078* (0.083) | 0.078* (0.089) |
| Adverse impacts of COVID-19 | 0.084* (0.165) | 0.084* (0.179) |
| Participation role | 0.114** (0.149) | 0.114** (0.162) |
| Superficial level disclosure × Adverse impacts of COVID-19 | 0.024 (0.238) | 0.026 (0.247) |
| Superficial level disclosure × Participation role | -0.141** (0.239) | -0.141** (0.247) |
| Personal level disclosure × Adverse impacts of COVID-19 | -0.098* (0.162) | -0.109* (0.176) |
| Personal level disclosure × Participation role | 0.14** (0.142) | 0.153** (0.153) |
| Control variables | Yes | Yes | Yes | Yes |
| Adjusted R2 | 0.001 | 0.026 | 0.049 | 0.006 |
| F-change | 1.237 | 6.798*** | 6.258*** | 3.322* |

Notes: Standard errors are in parentheses. Significance: ***p < 0.001; **p < 0.01; *p < 0.05.
ask other members whether the indicators of prenatal examination are normal and how to do it in follow-up care. BabyTree.com is an online parenting community where there are few professional health service providers, most members of the community cannot answer such professional questions as lack of medical knowledge, leading pregnant women to receive less informational support about the prenatal examination result. Conversely, pregnant women’s needs for procedure about prenatal examination/delivery and comfort can be better met.

According to our previous assumptions, the joining of a new stressor like the adverse impact of COVID-19 may change the impact of previous coping strategies on social support received. The results show that pregnant women’s pressure caused by the COVID-19 will negatively moderate the relationship of personal level disclosure and social support received. This can be explained as when pregnant women disclose their daily stress and the pressure caused by the COVID-19 at the same time, others may pay more attention to the adverse impacts of the COVID-19 on pregnant women as the epidemic is a serious emergency. Adverse impacts of the COVID-19 do not promote the positive impact of superficial level disclosure on social support as we previously assumed. The possible reason is that seeking advice and comfort by asking questions in the online community is a direct way to obtain support (V. J. Derlega, Winstead, Oldfield, & Barbee, 2003), thus other members don’t necessarily have to understand pregnant women’s needs and support them by understanding the adverse impacts of COVID-19 on them.

Pregnant women’s participation roles in the online community seem to be crucial to their social support received. Women who are prone to respond to others’ posts could build more social ties that can play a role when they ask for help. Furthermore, the relevance of women’s different levels of self-disclosure and social support received is also influenced by the role they play in the community. Specifically, women who act as support providers in online communities receive more social support when disclosing their personal information, conversely, receive less social support when disclosing their needs. We assumed that support providers have more knowledge and abilities than support seekers, so the questions they asked may be difficult to answer for other people who want to help them. The reasons why support providers get more social support when disclosing their difficulties are as follows: (1) support providers have more social connections by initiative replying to other people’s posts to establish social ties then increase the chance of being helped; (2) members’ ability and knowledge are not indispensable when they provide support according to women’s disclosure about dilemmas, which lowers the barriers for members to provide help.

6.2. Theoretical implications

This paper examines the relationships between online self-disclosure about different stressors, participation roles and social support received on the online community by using data from a major online parenting community in China. The theoretical implications of this study lie in the contribution to the SCT, SPT and the literature about social support in the online community.

First, our study contributes to SCT. SCT believed that people’s coping strategies are determined in part by the resources they have such as social support (Folkman, 1984). Many studies based on SCT have also explored the impact of coping resources that people have on their coping strategies (Cheng et al., 2020). However, rather limited coping strategies research has addressed the concern about coping resource acquisition. We are concerned about the impact of coping strategies on coping resource acquisition and we demonstrate that coping strategy (online self-disclosure) is an antecedent variable of the acquisition of coping resources (social support). This study also extends the applicability of the SCT to the context of online communities.

Second, the theoretical contribution of this paper to SPT comes from the following points: This article divides pregnant women’s online self-disclosure into personal level disclosure and superficial level disclosure according to the depth and content based on the SPT. Furthermore, we regard two levels of self-disclosure as two coping strategies based on the SCT to explore their role in obtaining online social support. Overall, based on SCT and SPT, our study offers a framework for how pregnant women obtain coping resources through coping strategies.

Third, this study contributes to the literature by proposing adverse impacts of COVID-19 and members’ participation roles as moderators between self-disclosure and social support received. Our study identifies the mechanisms between coping strategies, new stressors, members’ participation roles and coping resources acquisition. Specifically, our findings suggest that the relationships of coping strategies and members’ coping resources acquisition are influenced by new stressors and members’ participation roles. Potential support providers in the community will pay more attention to the current more urgent and serious stressors’ impact on pregnant women, and pregnant women’s self-disclosure strategies in the community need to be consistent with their participation roles (support provider vs. support seeker) to achieve better access to social support. This extends our knowledge on how pregnant women coping their stressors through obtaining social support in online communities during the COVID-19.

6.3. Managerial implications

Our findings also guide for pregnant women to seek social support online: (1) When women seek help in online communities, they need to assess what is the biggest difficulty they are currently facing to choose the most appropriate self-disclosure strategy. If pregnant women want social support that can solve their daily worries, they are not recommended to disclose the adverse impacts of COVID-19 alongside their daily worries in the post. Because other members will pay more attention to the more urgent and serious stressor, that is, COVID-19, which will lead to a decline in the support provided by other members that solve women’s daily hassles. (2) Women should understand their participation roles in the community and choose appropriate self-disclosure strategies to obtain more social support. Specifically, women who are more prone to post will get more social support through disclosing their demands information, while women who are more prone to reply to others’ posts will get more social support through disclosing their personal information.
6.4. Limitations and future research

There are several limitations and future directions in this study. The first limitation is the mechanisms of coping result. As a follow-up study, how coping strategies and coping resources influence women’s mental health in the context of online communities deserves further study. Further research can take mediator into account when considering the mechanisms between coping strategies and women’s mental health. Moreover, our data were collected from pregnant women of Babytree.com. These members may be different from those who use other online communities as Babytree.com is an online parenting community. Thus, further studies can consider collecting data from multiple online platforms. Third, despite prior studies proved that the number of comments received on posts in online communities could be regarded as a proxy of social support, future work can investigate other measurements about social support, such as the content or quality of comments received on posts.

6.5. Conclusions

The purpose of the current study is to determine how pregnant women obtain coping resources in online communities during COVID-19. Our empirical study is conducted in an online parenting community, the most obvious finding to emerge from this study is that the relationship between pregnant women’s online self-disclosure and social support received will be affected by the adverse impacts of COVID-19 and women’s participation roles. Specifically, disclosure about COVID-19 will negatively affect the relationship between personal level disclosure and social support received. Women who are more prone to reply to others’ posts in online communities will receive more social support when disclosing personal information but receive less social support when disclosing demands information.

CRediT authorship contribution statement

Xueqin Lei: Conceptualization, Methodology, Writing – original draft, Writing – review & editing. Hong Wu: Conceptualization, Methodology, Formal analysis, Supervision, Writing – review & editing. Qing Ye: Methodology, Formal analysis, Validation.

Declaration of Competing Interest

All authors confirm that they have no conflicts of interest.

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