



Modeling the relationship between IT-mediated social capital and social support: Key mediating mechanisms of sense of group

Yuan-Hui Tsai ^a, Sheng-Wuu Joe ^b, Chieh-Peng Lin ^{c,*}, Rong-Tsu Wang ^b, Yu-Hsiang Chang ^c

^a Chihlee Institute of Technology, Taipei, Taiwan

^b Vanung University, Chung-Li, Taiwan

^c National Chiao Tung University, Taipei, Taiwan

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ABSTRACT

This study proposes a model based on social capital theory to explain the formation of social support in virtual groups. Although previous literature suggests a direct effect of social capital on social support in face-to-face groups (e.g., working teams), it remains uncertain if such an effect exists completely in the same way among virtual social groups that count heavily on computer-mediated communication. In this study's proposed model, social support is indirectly influenced by social capital and need for affiliation via the mediation of sense of group (which includes perceived membership, mutual influence, and immersion). Empirical testing of this model, by investigating working professionals in online social networking communities, confirms the applicability of social capital and need for affiliation among virtual groups. Group-level data were analyzed by the technique of path analysis to test our hypotheses. Lastly, managerial implications and limitations of the research are provided.

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1. Introduction

Business organizations to date face dramatically volatile and turbulent competitive threats in global markets [1]. Effectively coping with such unexpected threats and taking advantage of them as opportunities lay heavily upon the ability of group social support in organizations [2]. Social support is considered “the exchange of verbal and non-verbal messages conveying emotion, information, or referral, to help reduce one's uncertainty or stress” [3]. Social support is critical due to its close relationship with people's physical and psychological well-being [4]. For instance, a buffering effect of social support is found to ameliorate the influence of physical or mental health factors such as depression, stress, irritation, anxiety, and somatic symptoms [5].

Despite social support transferring substantially from a real world to a virtual one in work settings due to rapid diffusion of social networking IT [6,7], scant attention has been paid to online social support that is substantially different from face-to-face social support, given the geographic dispersed nature of computer networks [8], the willingness of social networking IT users to trust and interact with online others [9], and the frequent participation of social networking IT users in online activities across virtual groups [10]. The online social support in this study can be conceptualized as online actions that people perform when they render assistance to a focal person via social networking IT [11]. The behavioral descriptions of our social support herein can be referred as “enacted” support that is substantially different from perceived support of availability and social embeddedness [11,12]. Collectively, the online social support in this study (i.e., enacted support in virtual communities) complements previous literature by evaluating what people actually do in virtual communities (e.g., Facebook) when they provide support, a research question that many studies have identified as critical for understanding coping and adjustment processes [11,13–17]. Based on

* Corresponding author at: 4F, 118, Sec. 1, Jhongsiao W. Rd., Taipei, Taiwan, ROC.

E-mail address: jacques@mail.nctu.edu.tw (C.-P. Lin).

previous literature that examines both online and face-to-face social contexts [18–25], this study summarizes the primary characteristics of online and face-to-face social contexts to better recognize their differences (see Table 1), highlighting potential improvements that may be made in the arena of online social support in this study.

Previous literature has explored how the use of social networking IT may be associated with social support and psychological well-being with mixed results [26–34]. While some research argued that online social relationships may detract from social involvement with friends more strongly than offline ones [26–37], others found that weaker ties generated online might replace offline ties with family and friends [29,33]. When examined over a longer period of time, online social support can be more efficient with improved communication and involvement with family than face-to-face social support [28], because online interactions and social support mitigate less loss in communication with others than offline ones [35]. In an experiment, Shaw and Gant [32] found increases in perceived social support and self-esteem following engagement in online chat sessions. Valkenburg and Peter [34] found that socially anxious adolescents perceived the social networking IT to be valuable for intimate self-disclosure, resulting in more online social support.

The proliferation of the social networking IT is facilitating technological and social changes that have been developing for decades in the ways that people contact, interact, and obtain resources from each other in a workgroup [36,37]. Using social networking IT, people in workgroups often adjust their social behavior to technological and social change [38]. Previous literature indicates that the emergence of new applications of social networking IT such as the establishment of virtual communities and the development of online social capital has excited considerable speculation about the technological innovation and social changes that could arise and be influential in global societies of the future [39]. Indeed, social networking IT strengthens group solidarities in virtual communities and affords a turn for networked societies that used to be loosely bounded and sparsely knit [8]. Nevertheless, little is known about the factors that drive group members to use social networking IT in order to obtain online social support [40], even though abundant findings in previous research have successfully examined IT usage from individuals' perspective. For that reason, investigating a potential paradigm shift regarding social support from co-located groups to virtual groups is essential in a modern business world full of social networking IT, which has helped bring about tremendous effects on virtual sense of group (or community) [41–47].

Online social support plays a critical role in a virtual group, which is inherently regarded as an innovative form of a social network linking people, organizations, and knowledge [46]. A virtual group is a set of social relationships forged through repeated contacts within the boundary of cyberspace [48] and can be defined as “a group of people with common interests or goals, interacting predominantly in cyberspace” [49]. Improved knowledge of the key determinants of online social support for virtual group members can help management prioritize human resources that are effectively tailored to the perceptions of virtual group workers, consequently improving group social support. Specifically, social support that involves online social affiliations by linking people or institutions together should not be studied in isolation, but rather be integrated into social networking based on a group in which they obtain such social support through sense of group [8,50]. Sense of group represents members' feeling of

Table 1
Comparisons of online and face-to-face social contexts.

	Online contexts	Face-to-face contexts
Condition of social interaction [18]	<ul style="list-style-type: none"> • No waiting for participants to arrive • No early leavers or latecomers, etc. 	<ul style="list-style-type: none"> • Waiting for others to arrive • Early leavers or latecomers during the interaction, etc.
Communication mode [19]	<ul style="list-style-type: none"> • Communication and discussions through text; can be structured; dense; permanent; limited; stark 	<ul style="list-style-type: none"> • Verbal communication and discussions; a more impermanent mode
Friendship qualities [20]	<ul style="list-style-type: none"> • The qualities of cross-sex online friendships were higher than those in face-to-face contexts 	<ul style="list-style-type: none"> • More interdependence, breadth, depth, code change, understanding, commitment, and network convergence
Physical and tangible settings [21]	<ul style="list-style-type: none"> • Meetings in virtual space; no shared physical context (other than text) 	<ul style="list-style-type: none"> • Meetings in a tangible room; strong physical context
Location and time [22]	<ul style="list-style-type: none"> • Meetings any time • Concept of “to meet” is different since no scheduled time, location and date • No sense of leaving the meetings • Less controllable 	<ul style="list-style-type: none"> • Meetings in “stop and start” fashion • Strong sense of when people meet – all those involved attend at same location, date, time, etc. • More controllable
Work mode [23]	<ul style="list-style-type: none"> • Work on multiple tasks simultaneously • Social contact continually maintained • Discussions often stop for various times, and then are restarted again • People sometimes lose sense of where they are in the discussions over long periods of time (cognitive overload) • High levels of reflections • Reshape conversations on basis of ongoing retrospection and understandings 	<ul style="list-style-type: none"> • Work is condensed and focused • Limited times of meetings • Discussions are usually completed during meetings • Discussions occur within a specific time frame, thus it is less likely that people lose sense of where they are • Often little time for open discussions and retrospections during meetings
Involvement with other social groups [24]	<ul style="list-style-type: none"> • Get access to other social groups easily • Get to see who is involved with other social groups • Participate in other social groups easily 	<ul style="list-style-type: none"> • Seldom have access to other social groups • Seldom involve with other social groups • Can't see what is happening in other social groups
Free and divergence degree [25]	<ul style="list-style-type: none"> • Loose-bound nature encourages divergent talk and adventitious interaction, since it is an open system regarding time, place, source and recipient 	<ul style="list-style-type: none"> • Are relatively densely knit and tightly bound networks of people • Divergent talks may be limited

relationship to the group or their knowledge about belonging to a collective that includes others [49]. Sense of group can be viewed as members' perception of similarity to other members and an acknowledged interdependence with each other [51].

Given that online social support (e.g., online helping) is much more valuable to a group than an individual to generate effective actions or good performance in organizations [52,53], this study's goal extends the viewpoint of sense of group to incorporate the notion of online social support and empirically tests the predictive ability of such sense of group in virtual communities, complementing previous research on traditional communities. Formally stated, the research questions of interest to this study are as follows.

RQ1. What factors are valued the most by virtual group members for improving their sense of group?

RQ2. What role does the sense of group play in boosting social support in virtual groups?

This study differs from previous research in two critical ways. First, most contemporary models of IT usage, such as the technology acceptance model (TAM) [53], the motivational model (MM) [54], and the unified theory of acceptance and use of technology (UTAUT) [55], have ignored the role of social support in professional networking groups. This study examining the relationship between social support and its determinants based on virtual groups demonstrates that it is worthwhile for management to invest in organizational initiatives directed at building social support. Some previous studies of social support focus on the level of individuals rather than the level of group. It should be noted that since sense of group is defined as a group level construct, we will never achieve a true understanding of it without group level research [56].

Second, this study is a pioneer in empirically validating whether sense of group fully or partially mediates the relationship between social support and its exogenous variables. Such a mediating issue (fully vs. partially) from a group perspective has never been assessed in previous studies. For that reason, by clarifying the determinants of social support and their direct or indirect effects on social support in a group, this study helps management in learning how to effectively leverage social support through key mediators.

2. Research model and hypotheses

A key driver for sense of group in virtual communities is social capital, referring to the features of social groups that facilitate social networking and coordination among network members [57]. The concept of social capital has captured the attention of sociologists [57,58] and organizational theorists [59] as a way of understanding why people in social groups provide social support to each other, even when there is no legal obligation or expectations of personal gains from doing so. This study applies social capital to examine our research questions by proposing a research model and empirically testing it.

Based on social capital theory above, this study first proposes the pivotal assumptions in which social capital strengthens the sense of group in virtual communities and consequently boosts social support in a group. Building upon these pivotal assumptions, this study further extends to the positive effect of the social need for affiliation on the sense of group. Previous literature indicates that both social capital and the needs for affiliation (i.e., social orientation of a group) are critical in a collectivist group (e.g., online Facebook groups) [60]. It is important to explore how social capital and needs of affiliation interplay with sense of group and social support. Overall, in this study's proposed model (see Fig. 1), social support is indirectly influenced by social capital (i.e., social interaction, trust, and shared language), and socially need for affiliation via the mediation of sense of group (i.e., perceived membership, influence, and immersion). The rationales and justifications about our hypotheses in the model are discussed in depth as follows.

Drawing upon previous research on sense of virtual community [49], this study proposes three different dimensions of sense of group: (1) perceived membership – people perceive feelings of belonging to their group, (2) mutual influence – people have reciprocal influence on each other in the group, and (3) immersion – people feel the state of flow in the participation of group activities. Given the three dimensions, this study's sense of group is defined as group members' feelings of perceived membership, mutual influence, and immersion toward their group, which reflect respectively the affective, cognitive, and behavioral aspects of group members [49,61].

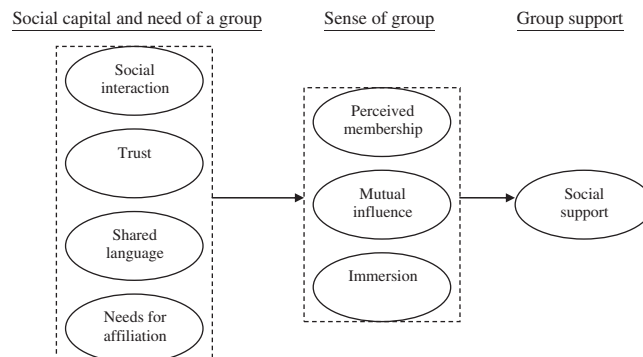


Fig. 1. Research framework.

An Internet group developed to encouraging connections between people in different locations is capable of fostering an online sense of group and increasing the availability of social support through information sharing, guidance, and the friendships developed with others of the group [62]. A sense of online group provides a means to create social support by reducing physical and social barriers for people with a disability to access information [63].

Previous empirical research illustrates that social support partially mediates the relationship between psychological sense of community and care-giver satisfaction and fully mediates the relationship between psychological sense of community and care-giver stress [64]. Similarly, another study indicates that the relationship of sense of community and collectivism to depressive symptoms is mediated through social supports [65]. Collectively, these findings suggest that sense of group is an influential factor that drives social support in the group [64].

People reporting a stronger sense of perceived membership, mutual influence, and immersion (i.e., sense of community) by revealing a greater endorsement of collectivistic values are seen to have higher levels of social support from family, friends, and significant others in a social circle group [61,65]. Virtual communities are places where people with their membership go to seek or provide social support and encouragement [66]. Since psychological sense of group can encourage group members to volunteer and connect with others [67], working professionals with a strong sense of group have potent belongingness and are more likely to provide social support for others in the same group. In business organizations, for example, employees who perceive a strong attachment or belongingness towards a particular group (i.e., high perceived membership) are more likely to provide social support to each other than those who work individually without a close connection with others (i.e., low perceived membership). Based on the above rationales, the first hypothesis is derived as below.

H1. Sense of group (perceived membership, mutual influence, and immersion) is positively related to social support in a virtual group.

Social capital is defined as people's social networks and mutual trust that they can draw upon in order to solve common problems [68]. Social capital is highly related to sense of group (or sense of community) [69,70]. Previous research indicates that social capital is very important for improving group social participation (e.g., perceived membership and influence) [68]. For that reason, various dimensions of social capital (social interaction, trust, shared language) are related to sense of group even though their weights of influencing such sense of group may vary from dimension to dimension [71]. Based on previous research on social capital [53,72], this study proposes that three dimensions of social capital (social interaction, trust, and shared language) have positive effects on sense of group. Specifically, social capital is a product of social learning interactions in two fields as below [73,74].

First, working professionals with strong social capital can effectively accumulate knowledge of their social group — who I am in the group, who others are, what we have in common, and how much mutual trust we have [75]. These social learning interactions help facilitate the positive influence of social interaction and trust on sense of group. For example, previous literature defines social capital in terms of the efficiency and effectiveness of group activity [57,76], suggesting that the features of social group, such as social networks (e.g., social interaction), trust, and shared norm, can improve the efficiency of society by facilitating coordinated actions. These features also enable people to act together more effectively to pursue shared group objectives and cohesiveness [57,75–77], thus enhancing sense of group. It is also found that trust can be contagious and is more effective in producing intimacy among group members [78], thus increasing their sense of group.

Second, group members with strong social capital develop a quality shared understanding of socially collective identities (e.g., shared language) [75,79,80], further strengthening their sense of group. Social capital has been identified as a promoter of group change through its influence on the group learning process [75] to boost the sense of group. For example, the sense of group that is fostered through communication and learning can be stronger when there is mutual trust [73]. A group that is perceived to be trustworthy facilitates increased participation (i.e., increased sense of group) [75]. Given that social networks arise within existing social capital [75], working professionals are likely to have a strong sense of group when they often obtain social interaction and shared topics to chat about. To sum up, social capital such as social interaction, trust, and shared language is implicit for group members in enhancing sense of group and its members' cooperative behavior [81].

Based on the above justification and previous literature support, the hypotheses about social capital can be summarized as below.

H2. Social interaction is positively related to sense of group (i.e., perceived membership, mutual influence, and immersion) in a virtual group.

H3. Trust is positively related to sense of group (i.e., perceived membership, mutual influence, and immersion) in a virtual group.

H4. Shared language is positively related to sense of group (i.e., perceived membership, mutual influence, and immersion) in a virtual group.

Need for affiliation represents a fundamental need reflecting people's desire to draw near and enjoyably engage in working activities with others [82,83]. Previous literature indicates that employees' motives such as need for affiliation have been shown to influence their various choices, including job choice [84], friend choice [85], organizational attractiveness [86], and group choice for collective activities [87]. For that reason, need for affiliation can be characterized as people's adherence and loyalty to a

friend, group, or organization, consequently facilitating the development of the sense of a group [88], which is explained in detail from three dimensional aspects (perceived membership, mutual influence, and immersion) as below.

First, Davidson, Cotter, and Stovall [89] reported a significant relationship between psychological sense of family membership and need for affiliation in a family setting. A need for affiliation is an attribute that corresponds to people's desire for social contact in communities or groups [90]. Previous literature indicates that the need for affiliation is positively related to group members' interaction and activity involvement [91]. Thus, it is likely that group members desire their membership due to a need for affiliation [87]. In business organizations, people with a strong need for affiliation are more likely to value their group experiences in virtual communities than those without a need for affiliation, and thus their perceived membership is often stronger.

Second, when people in a virtual group desire to draw near and enjoyably engage in activities with others (i.e., need for affiliation), they welcome people's mutual concern (e.g., comments or opinions) in the group to meet or satisfy their need for affiliation [92] and thus the mutual influence on each other grows strongly. Previous research examining the relationship between need for affiliation and the use of strategies indicates that those who have a strong need for affiliation use friendliness more frequently to influence others [93]. The phenomenon suggests a group's need for affiliation is likely to facilitate mutual influence among group members.

Third, immersion is a state of flow of those group members who value their relationship with group others (e.g., reflected by a high need for affiliation), because immersion is the holistic sensation of total involvement with the group [49,94]. To put it differently, immersion becomes stronger for people with a higher need for affiliation, because such people are often absorbed themselves with a particular social group they prefer [95] due to a strong desire to engage with group activities. In contrast, individuals with a weak need for affiliation have less intrinsic need for belongingness and view themselves as an independent party from others, consequently showing a low state of flow. In summary of the above rationales and justifications, a hypothesis can be derived as below.

H5. Need for affiliation is positively related to sense of group (i.e., perceived membership, mutual influence, and immersion) in a virtual group.

3. Method

3.1. Subjects

The research hypotheses described above were empirically tested using a survey of working professionals from two major industries in Taiwan (i.e., high-tech and traditional service industries). The population of working professionals was chosen since they represent one of the largest user groups of social networking IT in a global market. Facebook was selected as our target social networking IT of interest, because it is the most well-known virtual community in Taiwan and effectively facilitates online social networking for obtaining social support in a virtual group. Initially, we invited MBA students working professionally in industries to help with data collection. They also invited their colleagues to participate in our survey online. An online banner with a hyperlink to our web survey was posted on Facebook's wall of working professionals. We offered gift vouchers of NT\$100 to respondents individually by drawing lots after our survey to encourage people to participate. The gift vouchers were paid by the researchers of this study on their own. Five members from each team and a total of 140 teams were surveyed. Usable questionnaires from 675 respondents across 135 groups were returned. In our sample, a total of 342 participants are male (50.67%), a total of 323 participants are from traditional industries (47.85%), and a total of 464 participants have a bachelor's degree or higher (94.22%).

3.2. Measures

The constructs in this study are measured using 5-point Likert scales drawn and modified from existing literature. Three steps are employed in choosing measurement items. First, the items from the existing literature are translated into Chinese from English. Second, the items in Chinese were then substantially refined by a formal focus group of five people familiar with information technology, including four MBA students and their professor. For the purpose of having a vital stimulus for mutual exchange of views in the focus group, the group repeatedly examined both the English version questionnaire as well as its Chinese counterpart. The focus group was finished by summarizing each participant's suggestions and modifying our questionnaires based on the suggestions, consequently maintaining a high degree of correspondence between the two questionnaires. Third, a pilot test was conducted prior to the actual survey to assess the quality of our measures and improve item readability if needed. Some inappropriate items were repeatedly reworded or removed from our survey questionnaire after an exploratory factor analysis in a pilot test. Note that the respondents for the pilot survey were excluded from our study in the actual survey.

Social support was measured using four items modified from Cutrona and Suhr [96]. A sample item was "I provide members information." Perceived membership was measured using four items modified from Koh and Kim [49]. A sample item was "I feel happy to be a member of the Facebook group." Mutual influence was measured using three items modified from Koh and Kim [49]. A sample item was "My Facebook group members seek my comments or opinions." Immersion was measured using four items modified from Koh and Kim [49]. A sample item was "I spend more time than I expected navigating Facebook." Social interaction was measured using three items modified from Tsai and Ghoshal [97]. A sample item was "I maintain close social

relationships with some members in my Facebook group.” Trust was measured using three items modified from Tsai and Ghoshal [97]. A sample item was “The members in my Facebook group will not take advantage of others even when the opportunity arises.” Shared language was measured using three items modified from Nahapiet and Ghoshal [59]. A sample item was “The members in my Facebook group use common terms or jargons.” Finally, need for affiliation was measured using three items modified from Hill [98]. A sample item was “I find it very satisfying to be able to form new friendships with whomever I liked in Facebook.” We take one study as the basis to develop each set of measurement items because previous literature finds that using scale items from different sources for measuring a single construct might cause a problem of poor convergent validity [99]. In summary, all the measurement items and their original sources were listed in Table 2.

3.3. Data analysis

To confirm the mediation effects of sense of group between social support and its determinants, this study conducted group-level analyses through two steps. While the survey data were analyzed at the first step using confirmatory factor analysis (CFA) on all data collected to assess scale reliability and validity (i.e., measurement model testing), the second step applied path analysis based on team-level data in which individual responses were aggregated based on their group. Empirical test results from each step of our analysis are presented next.

3.4. Confirmatory factor analysis for measurement

CFA analysis was done on all items corresponding to the eight constructs of this study. The goodness-of-fit of the hypothesized CFA model was assessed by applying a variety of fit metrics as shown in Table 3. The figures of CFI, GFI, NFI, and NNFI were all larger than 0.9. The RMR was smaller than 0.05, and the RMSEA was smaller than 0.08. These figures suggest that the CFA model hypothesized in this study fits the empirical data well.

Three primary criteria [100] were used to examine the convergent validity of the empirical data herein. To begin with, as evident from the t-statistics listed in Table 3, all factor loadings were statistically significant at $p < 0.001$, which represented the first requirement to assure convergent validity of the construct. Second, the average variance extracted (AVE) for all constructs exceeded 0.50, showing that the overall hypothesized items capture sufficient variance in the underlying construct than that attributable to measurement error. Lastly, the reliabilities for each construct are all larger than 0.70, meeting the general

Table 2
Measurement items.

Construct	Measurement
Social support (modified from Cutrona & Suhr, 1994)	AF1. I provide members information. AF2. I give advice to my Facebook group members. AF3. I always offer to help my Facebook group members. AF4. I tell my Facebook group members about my own experiences.
Perceived membership (modified from Koh & Kim, 2003)	ME1. I feel happy to be a member of the Facebook group. ME2. I feel a sense of belonging in the Facebook group. ME3. I feel as if my Facebook group members are my close friends. ME4. I like my Facebook group members.
Mutual influence (Modified from Koh & Kim, 2003)	IN1. My Facebook group members seek my comments or opinions. IN2. I get contacted by some of my Facebook members frequently. IN3. I feel that I have been influenced by my Facebook group members.
Immersion (modified from Koh & Kim, 2003)	IM1. I spend more time than I expected navigating Facebook. IM2. I spend much time on-line in Facebook. IM3. I feel as if I am addicted to Facebook. IM4. I have missed work, because of Facebook activities.
Social interaction (modified from Tsai & Ghoshal, 1998)	SI1. I maintain close social relationships with some members in my Facebook group. SI2. I know some members in my Facebook group on a personal level. SI3. I have frequent communication with some members in my Facebook group.
Trust (modified from Tsai & Ghoshal, 1998)	TR1. The members in my Facebook group will not take advantage of others even when the opportunity arises. TR2. The members in my Facebook group always keep the promises they make to one another. TR3. The members in my Facebook group are trustworthy to one another.
Shared language (modified from Nahapiet & Ghoshal, 1998)	SL1. The members in my Facebook group use common terms or jargons. SL2. The members in my Facebook group use an understandable communication pattern during a discussion. SL3. The members in my Facebook group use understandable narrative forms to post messages or articles.
Need for affiliation (modified from Hill, 1987)	PN1. I find it very satisfying to be able to form new friendships with whomever I liked in Facebook. PN2. I feel like I have really accomplished something valuable when I am able to get close to my Facebook members. PN3. I seem to get satisfaction from being with my Facebook members more than a lot of other people do.

Table 3
Standardized loadings and reliabilities.

Construct	Indicators	Standardized loading	AVE	Cronbach's α
Social support	SS1	0.80 (t = 24.17)	0.59	0.85
	SS2	0.84 (t = 25.38)		
	SS3	0.74 (t = 21.31)		
	SS4	0.67 (t = 18.56)		
Perceived membership	ME1	0.79 (t = 23.78)	0.59	0.85
	ME2	0.74 (t = 21.51)		
	ME3	0.80 (t = 24.20)		
	ME4	0.75 (t = 21.98)		
Mutual influence	IN1	0.73 (t = 20.20)	0.58	0.80
	IN2	0.83 (t = 24.08)		
	IN3	0.73 (t = 20.50)		
Immersion	IM1	0.81 (t = 24.53)	0.64	0.87
	IM2	0.85 (t = 26.21)		
	IM3	0.87 (t = 27.44)		
	IM4	0.66 (t = 18.57)		
Social interaction	SI1	0.65 (t = 16.96)	0.53	0.76
	SI2	0.69 (t = 18.02)		
	SI3	0.84 (t = 22.59)		
Trust	TR1	0.72 (t = 19.45)	0.55	0.78
	TR2	0.84 (t = 23.43)		
	TR3	0.65 (t = 17.34)		
Shared language	SL1	0.71 (t = 20.00)	0.64	0.83
	SL2	0.88 (t = 26.82)		
	SL3	0.81 (t = 23.65)		
Needs for affiliation	PN1	0.72 (t = 20.42)	0.60	0.81
	PN2	0.84 (t = 25.38)		
	PN3	0.75 (t = 21.60)		

Goodness-of-fit indices (N = 676): $\chi^2_{296} = 994.65$ (p-value < 0.001); NNFI = 0.91; NFI = 0.90; CFI = 0.93; GFI = 0.90; RMR = 0.04; RMSEA = 0.06.

requirement of reliability for research instruments. Overall, the survey data of this study meet all three criteria required to empirically support convergent validity.

Discriminate validity was assessed by chi-square difference tests. The advantage of using this technique is its simultaneous pair-wise comparisons for the constructs based on the Bonferroni method. Controlling for the experiment-wise error rate by setting the overall significance level to 0.001, the Bonferroni method indicated that the critical value of the chi-square difference should be 17.09. The chi-square difference statistics for all pairs of constructs in this study exceeded 17.09 (see Table 4), thus confirming discriminate validity of our data. At any rate, the test results of this study suggest that measurement instruments used for measuring the research constructs are statistically adequate.

3.5. Group-level path analysis for construct relationships

After our aggregation of individual responses to group-level measures was well justified (see Appendix A), group-level data were analyzed by the technique of path analysis to test our hypotheses. Note that path analysis is employed instead of structural equation modeling (SEM), because SEM requires more than 200 sample subjects to obtain stable test results [101]. Previous literature indicates that, under some unstable sample conditions, it may be even necessary to have a sample of even 400 to 800 [102].

The test results from path analysis reveal that twelve out of fifteen paths in Fig. 2 are significant. We conducted post-hoc analyses to confirm whether our exogenous factors have direct effects on social support without going through our mediator (i.e., sense of group). In other words, we added four model paths in the model by linking social interaction, trust, shared language, and needs for affiliation to their outcome (i.e., social support). Post-hoc test results of the partial mediation model in Fig. 3 confirm that none of four exogenous factors has direct effects on social support, strongly supporting our hypothesized full mediations of sense of group.

3.6. Results

The test results in Fig. 2 can be subsequently described in accordance with our hypotheses. First, social support is positively influenced by all three dimensions of sense of group (i.e., perceived membership, mutual influence, and immersion), suggesting H1 is fully supported. Second, all three dimensions of sense of group are positively influenced by social interaction, suggesting H2 is fully supported. Third, although trust is positively influenced by two dimensions of sense of group (i.e., perceived membership and mutual influence), it is not affected by the third dimension of sense of group (i.e., immersion). Thus, H3 is only partially supported. Fourth, shared language is positively influenced by one dimension of sense of group (i.e., perceived membership), but it is not affected by the second and third dimensions of sense of group (i.e., mutual influence and immersion). Hence, H4 is only

Table 4
Chi-square difference tests for examining discriminate validity.

Construct pair	$\chi^2_{296} = 994.65$ (unconstrained model)	
	χ^2_{297} (constrained model)	χ^2 difference
(F1, F2)	1457.47***	462.82
(F1, F3)	1323.93***	329.28
(F1, F4)	1807.30***	812.65
(F1, F5)	1377.64***	382.99
(F1, F6)	1430.15***	435.50
(F1, F7)	1623.03***	628.38
(F1, F8)	1335.59***	340.94
(F2, F3)	1322.29***	327.64
(F2, F4)	1789.97***	795.32
(F2, F5)	1351.24***	356.59
(F2, F6)	1343.24***	348.59
(F2, F7)	1595.54***	600.89
(F2, F8)	1132.66***	138.01
(F3, F4)	1511.19***	516.54
(F3, F5)	1374.02***	379.37
(F3, F6)	1406.63***	411.98
(F3, F7)	1590.52***	595.87
(F3, F8)	1242.28***	247.63
(F4, F5)	1422.78***	428.13
(F4, F6)	1507.85***	513.20
(F4, F7)	1742.27***	747.62
(F4, F8)	1487.03***	492.38
(F5, F6)	1418.18***	423.53
(F5, F7)	1407.95***	413.30
(F5, F8)	1379.38***	384.73
(F6, F7)	1346.12***	351.47
(F6, F8)	1386.68***	392.03
(F7, F8)	1553.20***	558.55

Legend: F1 = Social support; F2 = Perceived membership; F3 = Mutual influence; F4 = Immersion; F5 = Social interaction; F6 = Trust; F7 = Shared language; F8 = Needs for affiliation.

*** Significant at the 0.001 overall significance level by using the Bonferroni method.

partially supported. Lastly, all three dimensions of sense of group (i.e., perceived membership, mutual influence, and immersion) are positively influenced by need for affiliation, thus suggesting H5 is fully supported.

The partially supported hypotheses are surprising. The insignificant effect of trust and shared language on mutual influence and the insignificant effect of shared language on immersion suggest that different dimensions of sense of group are unequally driven by social capital factors. Such a phenomenon suggests that one could be very much mistaken about research on the sense of group if different social capital factors are not clearly distinguished from one another in the research. Nevertheless, the empirical results for the partially supported hypotheses may warrant further study so that the insights behind the insignificant model paths in our model can be accurately interpreted.

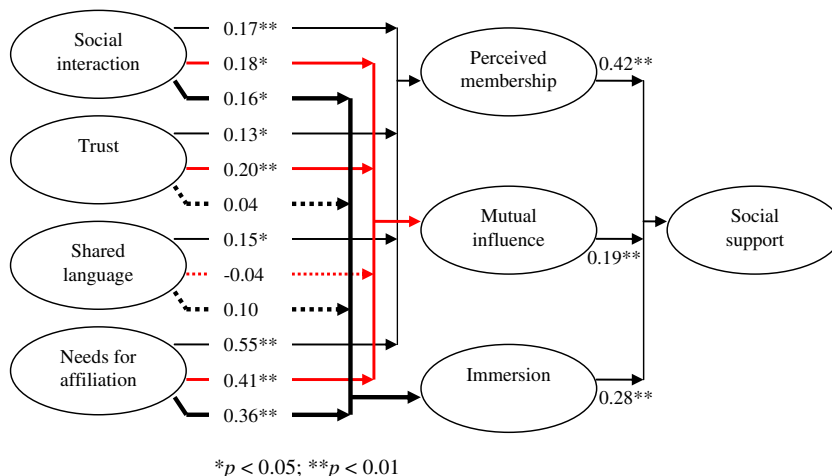


Fig. 2. Test results. *p<0.05; **p<0.01.

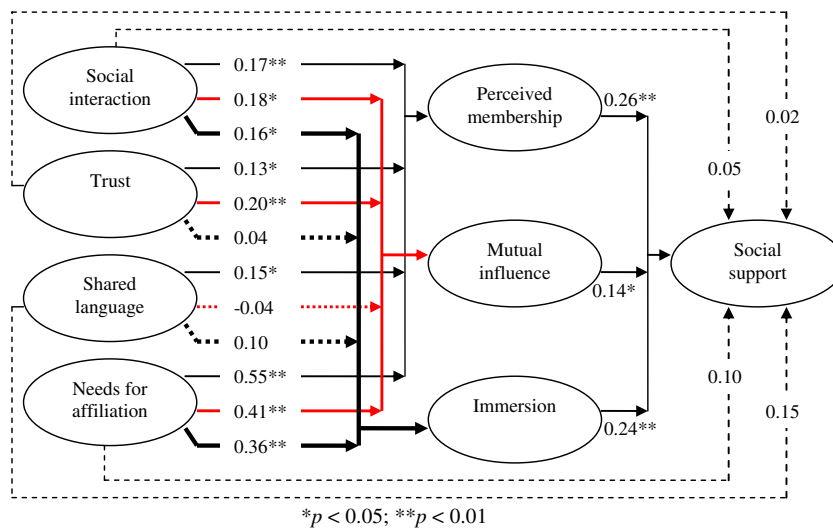


Fig. 3. Post hoc tests for both direct and indirect effects. * $p < 0.05$; ** $p < 0.01$.

4. Discussion

This study empirically confirms the indirect effects of social capital and need for affiliation on social support through a key mediator: sense of group. The findings of this study are an important complementary to previous research that mostly focused on direct relationship between social capital and social support without taking sense of group into account [103–106]. Web-based social support groups are widely used and powerful in practice, but little is known how they can function effectively [107]. This study fills such a research gap by describing how social support can be effectively obtained through its key antecedents (social support and need affiliation) and mediators (i.e., perceived membership, mutual influence, and immersion) at a group level. The managerial implications based on the findings of this study are further clarified in the following.

First, the positive effect of sense of a group (perceived membership, mutual influence, and immersion) on social support suggests that sense of group can be taken as monitoring instruments for management to examine whether social support in a group is available or not. This is important, because theoretically social support is expected to help employees cope with the negative effects of unfavorable factors such as stressors [2]. Previous research indicates that the level-of-analysis ambiguity partially explains why the empirical evidence confirming the role of social support is rather inconsistent, thus suggesting that social support and its predictors (e.g., social capital) should be examined based on groups [2], which becomes an important contribution of this study.

Second, the positive effect of social interaction on sense of group suggests that sense of group can be appropriately developed and maintained through online social interaction. Previous literature underlining the importance of social interaction states that the social process of developing a shared understanding through interaction is the natural way for people to learn about their group [108]. Given that social interaction represents a reciprocal process in which people effectively initiate and respond to social stimuli presented by their group peers, management promoting sense of group among working professionals should reward mutual engagement of participants in an online coordinated effort to solve the problem together [108].

Third, the positive effect of trust on two dimensions of sense of group (i.e., perceived membership and mutual influence) suggests trust can orient group members towards strengthening their pride at being a member (e.g., perceived membership) and increasing each others' importance (e.g., mutual influence). Thus, management should reinforce a trusting relationship between online group members by providing them professional courses of dialogues to facilitate mutual understanding and trust [109], consequently boosting perceived membership and mutual influence of group members. For instance, Hansen et al. [110] suggested that trust among members is one of the important predictors of group cohesion, which is a measure of the strength of members' desire to remain in a group and their commitment to its membership.

Fourth, the positive effect of shared language only on one dimension of sense of group (i.e., perceived membership) indicates that perceived membership can be effectively improved by similar experiences, beliefs, verbal communication, and norms (i.e., shared language) [111]. Therefore, management should establish a common conceptual framework or terminologies to form shared language for addressing or dealing with group issues [112]. In that case, perceived membership can be further boosted.

Finally, the positive effect of need for affiliation on all three dimensions of sense of group indicates that members' perception of sense of group is substantially determined by their social motives such as need for affiliation [113]. While Davidson et al. [89] reported a significant relationship between need for affiliation and psychological sense of community in a family setting, this study complements their research by presenting that such a relationship similarly exists in social contexts beyond a family

setting. Due to the benefit of a need for affiliation to increase social support, managers should stir up people's need for affiliation by encouraging online social activities (e.g., group blogs or group games). Managers should convey to employees that the group is committed to them and accepts them as welcomed members, which would help facilitate their need for affiliation [114]. Employees with a high need for affiliation can be appropriate candidates for virtual group work since they are more likely to keep a strong sense of group and eventually practice social support.

5. Limitations

This study contains two major limitations related to the interpretations of the results. The first limitation of this study is related to its cross-sectional survey which may limit our ability to achieve causal inferences from the data. However, it is important to note that this study applied two important measures to reduce a potential threat of common method variances. First, this study investigated respondents without obtaining their names to reduce their suspicion or hesitation for factually filling out the questionnaire. Respondents were assured of complete anonymity in the cover letter, confirming that neither their personal names nor the names of their group or organization would be disclosed. Second, Harman's single factor test is performed by this study [115], revealing no single factor accounting for a majority of the variances was found. Nevertheless, future studies may try to improve the above shortcomings (i.e., cross-sectional survey) by directly observing the subjects' actual social support behavior over time based on a group level.

Second, this study was conducted in a single country setting – Taiwan. As a result, the generalizability of the findings might be limited. Additional research across different countries may be helpful to generalize the findings.

The third limitation of this study may be related to its sample subjects' industries. In this study, the survey subjects include the working professionals from both high-tech and traditional service industries (which are both the largest and competitive industries in Taiwan and many other developed countries), but its empirical results may not be generalizable to monopolistic or oligopsonistic industries. In summary, future researchers are advised to explore other potential mediators or group characteristics beyond the theoretical scope of sense of community and compare their explanatory ability to the variables examined in this study.

Appendix A. Inter-rater reliability based on average measures

Construct	Intraclass correlation (ICC1)
Social support	0.31
Perceived membership	0.32
Mutual influence	0.31
Immersion	0.38
Social interaction	0.34
Trust	0.34
Shared language	0.33
Need for affiliation	0.37

Note: The ICC1 values are all larger than the recommended level of 0.12 [103].

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Yuan Hui Tsai is an Assistant Professor in the Department of Finance and Banking, Chihlee Institute of Technology, Taiwan. His research interests focus on organizational behavior and human resource management. His work has been published in a variety of journals including *CyberPsychology & Behavior*, *Journal of Business Ethics*, *Journal of Business and Psychology*, *Quality & Quantity*, *Social Science Journal*, *Technological Forecasting and Social Change*, and so on.

Sheng-Wuu Joe is an Assistant Professor in the Department of Business Administration, Vanung University, Taiwan. His research interests focus on organizational behavior and human resource management. His work has been published in a variety of journals including *CyberPsychology & Behavior*, *International Journal of Human-Computer Interaction*, *Quality & Quantity*, *Social Science Journal*, etc.

Chieh-Peng Lin is a Professor in the Institute of Business & Management, National Chiao Tung University, Taiwan. He received a MBA degree from National Sun Yat-sen University and a Ph.D. degree from Institute of Business and Management, National Chiao Tung University, Taiwan. He had practiced international trading for years before changing his career into the academia. His research interests focus on the social science related to organizational behavior and information technology. His work has been published in a variety of journals including *Asian Journal of Social Psychology*, *Computers in Human Behavior*, *CyberPsychology & Behavior*, *Electronic Commerce Research and Applications*, *Group & Organization Management*, *Human Factors*, *Information Systems Journal*, *International Journal of Electronic Commerce*, *International Journal of Service Industry Management*, *Journal of Business Ethics*, *Online Information Review*, *Personnel Review*, *Technological Forecasting and Social Change*, and so on.

Rong-Tsu Wang is an Associate Professor in the Department of Marketing and Logistics, Vanung University, Taiwan. His research interests focus on organizational behavior and human resource management. His work has been published in a variety of journals including *Journal of Marine Science and Technology*, *International Journal of Heat and Mass Transfer*, *International Journal of Production Research*, etc.

Yu-Hsiang Chang is a working professional in high-tech industries. He received his MBA degree from National Chiao Tung University, Taiwan.