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Virtuality at work and social media use among dispersed workers: Promoting network ties, shared vision and trust

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Purpose: Technology and globalization of services have facilitated the digitalization of many processes at work. However, their impact on social capital is unknown. Thus, the goal of the current study was to examine the relationships between virtuality in the workplace and social capital.
Design: Using an online survey, we recruited 152 female student workers using an opportunity sampling approach.
Findings: Participants who used social media at work (n = 112) reported higher social capital overall than participants who did not use any social media to communicate with colleagues at work (n = 40). This difference also presented itself in terms of the social capital subscales (network ties, shared vision, and trust). Mediation analysis conducted with users of social media at work (n = 112) revealed that social media use was a significant mediator in the relationship between virtuality at work and social capital overall (partial mediation). Subsequent analyses with the subscales for virtuality and social capital suggested full mediation of the relationship in most instances (with the exception of work practices).
Originality/value: This is the first study to examine the relationship between virtuality, social media, and social capital at work. The result of this study suggests that social media use at work between colleagues can play a significant role in promoting social capital in workplaces that are heavily reliant on technological application to support interactions at work and feature geographical and temporal dispersion.

Keywords: social capital, social media, virtuality

Introduction

The technological advances of the past several decades have made communication technology more accessible, accepted, and embedded in today's society and individuals' lives. Increased accessibility to communication technologies has allowed organizations to effectively transcend spatial and organizational boundaries, as well as given rise to a number of computer-mediated working arrangements previously not possible (Gibson and Cohen, 2003). With unprecedented connectedness and constant availability, many of today's employees perform the bulk of their organizational tasks online, without the need to be physically co-located with their colleagues (Kirkman *et al*., 2002). Despite the advantages that such developments have presented in terms of interactions across time and the globe, the computer-mediated nature of interactions is not without its challenges when we consider the importance of relationship building in the workplace.

Virtuality at work is a new concept that has become an everyday feature in many organizations, in line with reports of more people working remotely and from home (BLS, 2016). In this sense, it is important to differentiate virtuality at work from alternative definitions in different disciplines, as this term has been adopted by social scientists as well. Virtuality was originally considered the replacement of a physical object by a functional emulation or simulation of the item. This description is particularly prominent in computer science where a physical aspect is simulated, resulting in certain functionality to users without having corresponding physical components. However, in the context of online communication which emerged many years later, the concept of virtuality refers to the movement of physical or in-person processes to online platforms or tools which mimic or replace traditional processes. This means the physical components of everyday work (e.g., the interactions, the communication streams) are now replaced by online interactions and processes that take place online, rather than on a physical piece of paper or desktop. This means virtuality in its original form shares certain similarities to virtuality at work, the move from the physical to simulated or online versions of the original interactions and processes.

This move to more virtual working is the function of multiple drivers, including geographic or temporal distance, but also the increasing digitization of workplace processes (leading to the adoption of new technological processes and work practices). The major determining factor of virtuality at work is the extent to which employees rely on computer-mediated communication to perform work (Berry, 2011). In the social sciences and communication domain, a great deal of empirical literature on virtuality stems from the examination of the functioning of virtual teams. Virtuality was previously seen as a categorical dichotomy of virtual (computer mediated) versus face-to-face team arrangement (De Guinea *et al.*, 2012). In recent years, however, that is less often the case given that most organizations can be considered virtual to some degree (e.g., Kirkman *et al.*, 2002). As a result, virtuality has evolved into a position in a continuum with the two traditional dichotomies at the opposite ends of the spectrum.

In the context of this paper and these developments, we define virtuality at work as the extent to which workplace interactions between employees involves computer-mediated tools. The use may be the results of a number of workplace and organizational characteristics that shape employee interactions, such as the geographical or temporal dispersion of employees, or the reliance on technological tools and prominence of computer-mediated work practices (Gilson *et al*., 2015). This paper will refer to individuals working in some degree of virtuality as *virtual workers.* One particular area of interest in the current paper therefore concerns the process by which social capital formation may be supported by social media in work settings that feature varying degrees of virtuality at work.

Social media adoption and social capital

Social media is a broad umbrella term for a wide range of tools that are social in nature, and that enable individuals to create and share content and to participate in social networking (Kaplan and Haenlein, 2010). In contrast to virtuality, social media is focused on the computer-mediated interaction processes that have moved online (rather than any other aspects that may be virtual, such as processes that moved from physical desktops to online servers). However, both virtuality at work and social media use have been prompted by temporal or geographic dispersion – which may raise the necessity for online tools. Several researchers confirm that such platforms reinforce the development of new relationships, effective communication, and knowledge sharing between employees (Jackson *et al.,* 2007), thanks to increased visibility, persistence, and editability afforded by these tools (Treem and Leonardi, 2013). These results have been replicated using participant samples from organizational contexts, highlighting its applicability for social interaction in the context of work (Cao *et al.*, 2016).

An important theoretical framework to reference is social capital theory, one of the most prevalent theoretical frameworks for studying relationships and social networks since its inception in 1998 (Adler and Kwon, 2002). The concept refers to the sum of actual and potential resources embedded within and available to an individual via their network (Nahapiet and Ghoshal, 1998). Social capital refers therefore to the structure of the network as well as the resources that can be mobilized with the help of the network. These networks can be made up of co-workers, friends, family, former colleagues and so on, and include the reciprocal benefits of these connections for members of that network.

The relationship between social capital and social media has been researched by a number of authors. Social media may serve as a 'social lubricant' in that it enables users to access support and information (Ellison, Steinfield, & Lampe, 2011). The access to support and information as well as social media messaging have been shown to lead to increased social capital among social media users (Burke, Kraut, and Marlow, 2011; Gil de Zúñiga, Jung, & Valenzuela, 2012). Organizational benefits also arise, in that social media supports social exchanges, and may thus also support idea co-creation at work (Bharati, Du, Chaudhury, and Agrawal, 2018). Further research suggests that the use of social media, and the enhanced social capital that arises, may enable organizational knowledge management (Bharati, Zhang, and Chaudhury, 2015). In addition, social media use has been linked to routine and innovative job performance (Ali-Hassan, Nevo, & Wade, 2015), which may be more prominent when the social network using social media also features stakeholder diversity (Xu and Saxton, 2019). The current article contributes to this area of research by considering the role of virtuality at work.

Virtuality at work, social media and social capital

Virtual workplaces may benefit from the use of social media for a number of reasons. Social interaction and socialisation is an important part of team building, which is often lacking for remote team members who do not engage in office banter or informal conversation as often as their co-located counterparts. For example, when compared to traditional teams, highly virtual team members tend to report weaker relational links to their teammates (McDonough *et al.*, 2001). Social media can help to introduce members to one another and foster informal links between colleagues. Via these links, relationships and trust are fostered. In addition, having access to multiple peers may help individuals to feel part of the team and organization they joined.

In the absence of social media, virtual workers who are disconnected from their colleagues due to being in different locations or time zones, may increasingly feel disconnected from the organization, experience isolation and become potentially disengaged. This is where social media, social capital and virtuality at work intersect. In the virtual context, forms of social capital may be fostered by social media in a number of ways. The establishment and maintenance of shared vision as another form of social capital may also be supported in virtual settings by the use of social media. This is evidenced by a number of studies that link social media use to online social capital (Ali-Hassan *et al.,* 2015; Cao *et al.,* 2016; Huang and Liu, 2017).

The first aspect of social capital of interest in this study is shared vision which represents the extent to which members of one group share a common understanding about how to complete their tasks (Mathieu *et al.,* 2000). A shared mental model between colleagues exists when members of that group have similar knowledge structures, structures that also set the stage for specific communication practices, team identity, and team roles to support a consistent and effective workflow (Maynard and Gilson, 2014). For virtual workers, establishing and sharing the same vision may be critical to their motivation and sense of purpose.

The second aspect underlying social capital are network ties. Network ties generate social capital in the workplace when employees interact with one another, share their content and information, process and comment on each-others content. Network ties can involve both the bridging (weak ties across diverse groups) and bonding (strong ties across homogeneous or close groups) ties between individuals (see also Putnam, 2000). In order to access support at work, having network ties to various colleagues and peers within an organization may be critical for virtual workers. It enables them to reach out in times of need and seek advice from similar or dissimilar others when tackling a task for their employer.

The third aspect of social capital of interest here is trust. Trust plays such a central role in highly virtual work environments that it has also been called "the glue of the global workspace" (O'Hara-Deveraux and Johansen, 1994, p. 243). Trust is especially important in the workplace when it also features certain degrees of virtuality - as it has the potential to diminish the adverse impact of geographical dispersion on psychological intimacy (Walther, 1994) and can contribute to improved relationships at work (Sharifi and Pawar, 2002), as well as more knowledge sharing among virtual teams (Cao *et al.,* 2016; Chiu *et al.,* 2006).

Having many or no network ties can greatly affect the development of both shared vision and trust, as one cannot build trust if there is no one to build it with (Striukova and Rayna, 2008). It is indeed much easier to develop trusting relationships with colleagues if one has a central location in the network (Tsai and Ghoshal, 1998), as it is easier to spread and branch out one's social network if one has built up trust and credibility (Tsai, 2000). The ability to have informal, social exchanges with workers across time and geographic boundaries as facilitated by social media may therefore enable workers to reach a common understanding, form connections with one another, and thus help with the formation of trust (see also Valenzuela *et al.,* 2009), even when the work settings have many virtual characteristics. In other words, social media support the development of relationships of remote employees without relying on face-to-face in-person contact (Cao *et al.,* 2016).

Research rationale and hypotheses

Much of our knowledge of the exact relationship between virtuality at work, social media and social capital is gained on the basis of studies that examined social media and social capital in

virtual teams only (e.g., Suh and Bock, 2015; Wu *et al.*, 2016), or studies that looked at social capital and social media, but not virtuality at work (e.g., Sun and Shang, 2014; Zakaria *et al.*, 2004). As a result, our study is the first study to combine all three aspects, making this a novel, but also an exploratory, piece of work. Our research question is therefore as follows: What is the relationship between virtuality at work, social media use and social capital? The aim of the current study was to extend the current understanding of social media and social capital to virtuality at work by examining those links empirically.

In line with the previous research, the following hypothesis was put forward:

Hypothesis 1: Social capital is higher in workplaces when workers use social media tools at work (rather than none).

In line with the evidence on the link between social media use and social capital outlined in previous section, it is suggested that higher virtuality at work is associated with greater social capital due to higher social media use by more virtual employees (suggesting a full or potentially partial mediation of the relationship). As a result, when the workplace features many virtuality characteristics (e.g., in terms of the use of technology in place to support work processes) but communication between colleagues (e.g., via social media use) is relatively low or limited, virtual workers may also report lower social capital in terms of shared vision, trust, and network ties. However, when social media use is higher, virtual workers also report a stronger sense of shared vision, trust and network ties. We propose a partial mediation effect as virtual workers may build social capital independently from social media use, particularly when they build relationships with others via other media or in person. Accordingly, the next hypothesis proposed a mediation (see also Figure 1):

Hypothesis 2: The relationship between virtuality at work and social capital is partially mediated by the use of social media.

Figure 1: Proposed mediation (Hypothesis 2)



Method

Focus of data collection

We specifically wished to learn about the effect of social media use on social capital as reported by female student workers in work settings that feature various degrees of virtuality using a quantitative, survey approach. Student workers have usually been exposed to social media for most of their lives, making them regular users of such technologies, although the number of older adults

using these platforms has been increasing steadily (Pew Research Center, 2017). Certainly in the US context, up to 79% of Internet users in 2016 reportedly used Facebook, with a slightly higher number of users who are women rather than men (83% versus 75%) (Greenwood *et al.*, 2016). Other networks such as Twitter, Pinterest, Instagram and LinkedIn are also very popular social media platforms (Greenwood *et al*., 2016). In addition, gender differences are a recurrent theme in terms of how social media is used, which can be traced to different motives for the use of social media. According to Krasnova *et al.* (2017), women are particularly motived to use social networks to establish and maintain close ties and gain social information, while men are predominantly motivated to gain general information. Second, gender differences occur as female online learners appreciate the pastoral component of online tutoring more so than their male equivalents (Price, 2006). And third, research has also shown that the decision to continue or discontinue using social media is further influenced by gender in that women's intention to continue using social media is in part also based on their community identification, a factor not associated with continuance intention of men (Lin *et al.*, 2017). This suggests that gender differences may potentially affect how social capital is formed, maintained and affected by social media use, leading us to focus on female student workers in this particular study.

Procedure and participants

The present research study employed a non-experimental and cross-sectional online survey design. Upon approval from the ethics board, participants were invited by listing the study as an extra credit option on the recruitment portal hosted by a university with a high proportion of working students in the Western USA. Only participants with at least 2 weeks' tenure in their current job were considered for this study. The survey received 189 hits. A small section of participants were male, these were also excluded as preliminary results confirmed gender differences. The final sample included 152 female participants aged 18 to 52 years of age (M = 24.66, SD = 6.92; Mode = 20; 3 missing values). The average indicated employment tenure was 31 months (M = 31.38) and the average weekly workload was 24 hours (M = 24.27). The participants worked in the following sectors: Education (34.2%), Retail and Sales (16.5%), Food industry and hospitality (11.6%). Other sectors included healthcare, manufacturing, distribution, specialized services (clerical, tax, real estate, social services), and customer service. About a third (n = 51) of our participants were employed in customer service roles. Forty out of 152 (N = 40) participants reported not using social media at work, and as a result, they represented the control group for some of our analyses.

Measures

All of the measures that were used had been adapted from existing scales used in previous research.

Virtuality at work was the primary predictor variable and was measured using four subscales on virtuality, respectively focusing on geographical, temporal, work practice-related, and technology-related virtuality (Chudoba *et al.*, 2005). A sample question from the geographical subscale (4 items) ask participants to indicate the frequency with which they "Collaborate with people in different sites or geographies". Higher scores indicate a higher degree of virtuality. All scores were combined to create one composite representative of geographical virtuality (M = 2.11, SD = 1.23, Cronbach's α = .72). A sample question from the temporal subscale (2 items) ask participants to indicate the frequency with which they "Collaborate with people in different time

zones". These were moderately correlated and combined to create one composite representative of temporal virtuality (M = 2.02, *SD* = 1.39, r = .42, p < .001). A sample question from the work practice-related subscale (3 items) asked participants to indicate the frequency with which they "Work with people that use different collaboration technologies and tools". These were moderately correlated and combined to create one composite of work practices (M = 3.15, *SD* = 1.44, Cronbach's α = .61). A sample question from the technology-related subscale (4 items) ask participants to indicate the frequency with which they "Work with people via Internet-based conferencing applications". All scores were combined to create one composite representative of technology-related virtuality (*M* = 2.25, *SD* = 1.22, Cronbach's α = .60). The response scale for all items was a frequency scale, ranging from 0 'Never' to 6 'Daily'. Higher scores indicate higher degree of virtuality. A composite based on all four subscales was also created to have one overall measure of virtuality (*M* = 2.99, *SD* = 1.22, Cronbach's α = .83).

Social Capital. Cao *et al.* (2016) provided an overview of social capital measures based on a number of sources. Their scale was subdivided into three subscales corresponding to the three dimensions of social capital: network ties, shared vision, and trust. Some of the items were excluded because they were difficult to relate to the project conducted here. All items were answered on a five-point Likert-type scale ranging from 1 'Strongly disagree' to 5 'Strongly agree'. The combined composite based on all 11 items was also computed (*M* = 3.17, *SD* = 0.64, Cronbach's α = .87).

Network ties (subscale). This subscale was measured using 4 items used by Cao *et al.* (2016) and based on the measure from Tsai and Ghoshal (1998). A sample question is: "I maintain close social relationships with my colleagues through social media." A composite was created using all 4 items (*M* = 3.32, *SD* = 0.92, Cronbach's α = .87).

Shared vision (subscale). This subscale was measured using 3 items employed by Cao et al. (2016) and based on Chiu *et al.* (2006). A sample question from the shared vision subscale is "Members in the virtual (online) community created by social media share the same goal of learning from each other." A composite was created using all 4 items (*M* = 3.21, *SD* = 0.74, Cronbach's α = .77).

Trust (subscale). This subscale was measured using 4 out of 5 items utilized by Cao *et al.* (2016). The four items were based on the trust scale from Levin and Cross (2004). A sample question from the trust subscale is "I assume that members in the virtual (online) communities created by social media care what happens to me." A composite was created using all 4 items (*M* = 3.00, *SD* = 0.72, Cronbach's α = .81).

Actual social media use at work. This behavior was measured using two items adapted from a paper by Leftheriotis and Giannakos (2014). The purpose of this scale was to capture participant social media use for work related purposes, such as acquiring information or contacting colleagues. Two sample items from the questionnaire are "I often use social media to obtain work related information and knowledge" and "I regularly use social media to maintain and strengthen communication with colleagues at my work". The response scale ranged from 1 'Strongly Disagree' to 5 'Strongly Agree'. The two items were strongly correlated and combined to create one composite to capture the extent to which social media was used in the workplace (*M* = 3.06, *SD* = 1.18, *r* = .66, *p* < .001).

Frequency of social media use at work. We also asked one item to request more specific information on social media use as this was a potential covariate. This item asked "What is your frequency of usage of social media at work" with nominal response options of 1 'Never' (*n* = 23), 2 'Rarely' (*n* = 34), 3 'Sometimes' (*n* = 45), 4 'Often' (*n* = 36) and to 5 'A great deal' (*n* = 14).

However, we noticed that some of our participants had not used any social media (n = 39, reflecting the answers of all those who answered 'Never'). This led us to compute a dichotomous new variable to differentiate the groups. However, the majority of participants used social media (n = 110, combining all other answers).

Number of social media tools used. Forty out of 152 participants stated that they did not use any social media tools. From the remaining 112 participants, 63 used one type of social media at work, 32 used two forms; another 17 used 3 to 5 different social media tools at work (resulting in four categories).

Social media usefulness. The perceived usefulness of social media (9 items) was considered a potential covariate in our analysis (scale by Davis, 1989). The original scale was slightly modified to measure participants' attitudes towards social media. A sample question from the scale is "Using social media would enhance my effectiveness on the job". The response options ranged from 1 'Strongly Disagree' to 5 'Strongly Agree'. Higher scores indicate higher levels of perceived usefulness by participants (M = 2.87, SD = 1.02, Cronbach's α = .96).

Control variables. These included demographics (age and gender) and contextual factors (working hours and tenure).

Results

The descriptive results did not suggest any issues with skew or kurtosis that required transformations of the data. No evidence of outliers was obtained. The correlations were computed using Pearson's r as well as Spearman's ρ (which is more robust than Pearson's r for ordinal variables such as the virtuality scales and the frequency of work-based social media use). Virtuality at work (the composite) correlated positively with each virtuality subscale (Spearman's $\rho \geq .65$, $p < .01$), and all the subscales correlated with each other (Spearman's $\rho \geq .21$, $p < .01$). Social media use at work correlated with the virtuality composite and three out of four virtuality subscales (Spearman's $\rho > .34$, $p < .01$), the exception was the work practice-related virtuality subscale (p = ns). Social capital also correlated positively with all three subscales (Pearson's $r \geq .80$, $p < .01$) and with each other (Pearson's $r \geq .36$, $p < .01$). Virtuality correlated with age (Spearman's ρ = .21, p = .01). Age itself has been shown not to relate to social media use by employees (Leftheriotis and Giannokos, 2014) but it is possible that virtuality at work (e.g., remote working) is an option for more experienced and thus older employees than younger employees (more details can be found in Table 1). We noted some missing values for our control variables, which resulted in slightly different sample sizes for the various analyses performed. However, such minimal differences in sample sizes did not impact the power of the analyses or the interpretation of our final results.

Table 1: Correlations between all interval/ordinal measures and age, tenure and working hours

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1.Virtuality scale	1.000	.80**	.66**	.65**	.81**	.34**	.25**	.28**	.30**	.37**	.02	.44**	.21**	.08	.36**
2.Geographical (V) §	.87**	1.000	.60**	.29**	.59**	.29**	.17*	.26**	.27**	.34**	-.13	.45**	.20*	.12	.31**
3.Temporal (V) §	.76**	.73**	1.000	.21**	.47**	.22**	.17*	.18*	.22**	.37**	-.04	.39**	.18*	.07	.31**
4.Work Pract. (V) §	.63**	.32**	.25**	1.000	.33**	.18*	.12	.17*	.16	.14	.02	.15	.14	.03	.24**
5.Technological (V) §	.83**	.64**	.53**	.35**	1.000	.35**	.31**	.30**	.26**	.42**	.12	.43**	.20*	.07	.24**
6.Social Capital scale	.35**	.31**	.21**	.18*	.37**	1.000	.80**	.78**	.77**	.67**	.16	.58**	.07	.12	.15
7.Network Ties (SC)	.25**	.17*	.15	.12	.33**	.80**	1.000	.43**	.35**	.62**	.19*	.45**	.02	.18*	.11
8.Shared Vision (SC)	.29**	.29**	.16*	.16	.29**	.80**	.43**	1.000	.61**	.54**	.17*	.53**	.16*	.13	.11
9.Trust (SC)	.31**	.29**	.21**	.17*	.28**	.80**	.36**	.65**	1.000	.41**	.08	.42**	.03	.01	.10
10.SM Use at work	.37**	.32**	.33**	.13	.42**	.67**	.63**	.53**	.44**	1.000	.12	.69**	.13	.16	.16*
11.Frequ. of SM Use at work §	-.02	-.14	-.05	.00	.11	.20*	.22**	.19*	.08	.12	1.000	-.01	-.20*	-.06	.01
12.SM Usefulness	.43**	.44**	.38**	.11	.42**	.59**	.46**	.56**	.43**	.69**	.01	1.000	.18*	.25**	.20*
13.Age (N = 149)	.32**	.36**	.29**	.09	.25**	.05	.02	.14	-.00	.09	-.26**	.19*	1.000	.40**	.30**
14.Tenure (months)	.09	.13	.10	-.03	.08	.02	.09	.04	-.07	.10	-.22**	.22**	.58**	1.000	.22**
15.Working hours	.43**	.40**	.40**	.24**	.32**	.11	.10	.07	.09	.15	.01	.17*	.21*	.11	1.000

Note. N = 152. ** p < .01, * p <.05. SM = Social Media. The results below the diagonal reflects Pearson's r, the results above the diagonal reflects the correlation coefficients using Spearman's ρ (which is more robust than Pearson's r for ordinal variables such as the virtuality scales and the work-related frequency of social media use). § This symbol indicates ordinal scales/items. For example, 11. Frequency of use – This row represents the correlation with the third question on social media use with ordinal responses "How often do you use social media at work?" (response options ranged from 'never' to a 'great deal'). SC indicates that this variable is a social capital subscale. V indicates this is a virtuality composite.

Hypothesis testing

Hypothesis 1: Social capital is higher in workplaces when workers use social media tools at work (rather than none).

In order to test Hypothesis 1, we ran a number of analyses to assess social capital as reported by participants who did and those who did not use social media at work. The following ANOVA (without covariates) revealed a significant group difference in the expected direction ($F(1, 147) = 9.56$, $p = .002$, $\eta_p^2 = .06$) for social capital overall. Participants who worked with social media at work reported higher social capital ($M = 3.26$, $SD = .64$, $n = 110$) than those who did not use social media at work ($M = 2.90$, $SD = .57$, $n = 39$). The same tendency was also reported when we examined the subscales such as network ties ($F(1, 150) = 9.44$, $p = .003$, $\eta_p^2 = .06$) and shared vision ($F(1, 150) = 4.88$, $p = .029$, $\eta_p^2 = .03$). In the case of the trust subscales, all three covariates (working hours, tenure, and age) were significant covariates ($p < .01$). ANCOVA for this subscale nevertheless reiterated the findings for the overall and previous subscales ($F(1, 140) = 2.21$, $p = .016$, $\eta_p^2 = .02$). In each of the three subscales, those who used at least one social media tool at work reported higher social capital (overall, in terms of network ties, shared vision and trust).

We also considered the possibility that the number of social media tools used at work played a role in terms of the amount of social capital reported by our participants. Using the four categories, we ran another ANOVA which was significant ($F(3,148) = 5.65$, $p = .001$). The participants who reported that they did not use social media at work had the lowest social capital score ($M = 2.91$, $SD = .56$). Social capital among those who used one social media tool ($M = 3.17$, $SD = .66$) was lower than those who reported using two social media tools ($M = 3.50$, $SD = .54$). However, those who used three or more social media tools reported the same level of social capital ($M = 3.14$, $SD = .62$) as those using just one social media tool. This suggests that the benefits of the number of social media tools are not incremental for social capital, but rather appear to have the optimal effect on social capital when employees use two social media tools at work.

A quick analysis of mean differences with ANOVA in relation to virtuality at work also showed the same trend as reported when comparing those who did ($n = 110$) and those who did not use ($n = 39$) social media at work (dichotomous variable mentioned in earlier section, see also [1]). In order to control for job and context effects (i.e., working hours, tenure and participant age), we first used analysis of covariance which showed no significant effects for our covariates for most subscales. Participants who did not use any social media also reported lower values on the virtuality dimensions at work (overall virtuality, geographical virtuality, temporal and technology-related virtuality, all $F(1,150) = 9.40$, $p < .002$), except for work practices ($F(1, 150) = 1.97$, $p = .162$). Since we focus especially on the degree of social media use (the presence but not its absence) for social capital, the 40 non-users of social media were excluded from subsequent analyses.

Hypothesis 2: The relationship between Virtuality (overall and subscales) and social capital (overall and subscales) is partially mediated by use of Social Media

The mediation was tested using the PROCESS macro from Hayes (2013). The analysis involved a bootstrapping method to test the significance level of the indirect effect of the predictor variable

[1] Please note that the decision to use ANOVA rather than logistic regression was based on the fact that the former type of analysis generates results that are easier to interpret than odds ratios produced in logistic regression.

on the outcome variable. This approach has limitations as the virtuality scales were based on ordinal response options. A number of covariates were considered. Important covariates included the frequency of social media use at work (we are referring to the scale, not dichotomous variable, as we wanted to control for frequency of use), participants' tenure, working hours and their age (see correlations in Table 1). Perceived usefulness was excluded as a covariate as it correlated strongly with social media use (r = .69, p <.001).

The preliminary results (Table 2a) suggest that the virtuality overall had a significant main effect on the mediator (actual social media use, β = .43, t = 4.11, p < .001), while the mediator affected social capital overall (β = .32, t =7.96, p < .001). This effect on the mediator was also reflected in the results for most subscales (geographical virtuality β = .31, t =3.62, p < .001; temporal virtuality β = .27, t =3.64, p < .001, technology-related virtuality β = .45, t =518, 7.96, p < .001) – with one exception. Work practices-related virtuality was not a predictor of social media use (p = .404). As expected, the mediator also had a significant main effect on the outcome variables (all $\beta \geq .24$, p < .01), such as social capital and its three subscales (network ties, shared vision, and trust). The mediation results for the overall and subscale geographical virtuality (as a demonstration) are captured in Table 2b.

Table 2a. Main effects between virtuality (IV), actual social media use (M), and social capital (DV)

IVs (virtuality)	IV → M	M → DV	DVs
Virtuality (overall)	β = .43, t = 4.11, p < .001	β = .32, t =7.96, p < .001	Social capital (overall) *
Geographical virtuality	β = .31, t = 3.62, p < .001	β = .48, t = 8.20, p < .001	Network ties **
	β = .31, t = 3.62, p < .001	β = .28, t = 5.23, p < .001	Shared vision *
	β = .31, t = 3.62, p < .001	β = .24, t = 4.35, p < .001	Trust **

Note. * partial mediation, ** full mediation.

Table 2b. Direct and indirect (mediation) results

IVs (virtuality)	IVs → DV (direct)	IVs → M → DVs (indirect)	DVs
Virtuality (overall)	β = .10, t = 2.13, p = .035	β = .14, Z = 3.63, p < .001, CI[.084, .216]	Social capital (overall) *
Geographical virtuality	β = -.01, t = -0.15, p =.882	β = .15, Z = 3.29, p = .001; CI[.077, .240]	Network ties **
	β = .12, t = 2.46, p = .015	β = .08, Z = 2.94, p = .003; CI[.020, .177]	Shared vision *
	β = .09, t = 1.68, p = .097	β = .07, Z = 2.74, p = .006; CI[.034, .134]	Trust **

Note. * partial mediation, ** full mediation. CI refers to confidence interval provided with the bootstrapping results in PROCESS analysis (Vs. 2.16.1); BootLLCI and BootULCI.

The results (Table 2b) further suggested a partial, but not full mediation effect via social media use. As expected, virtuality at work had a significant direct (p = .035), as well as indirect, effect on social capital overall (indirect path: β = .14, Z = 3.63, p < .001, CI[.084, .216]). The results are summarized in Figure 2.

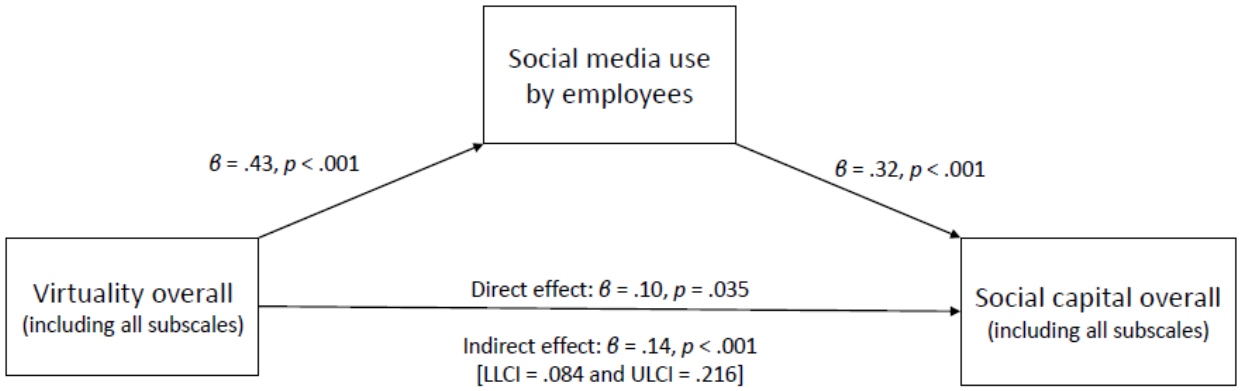


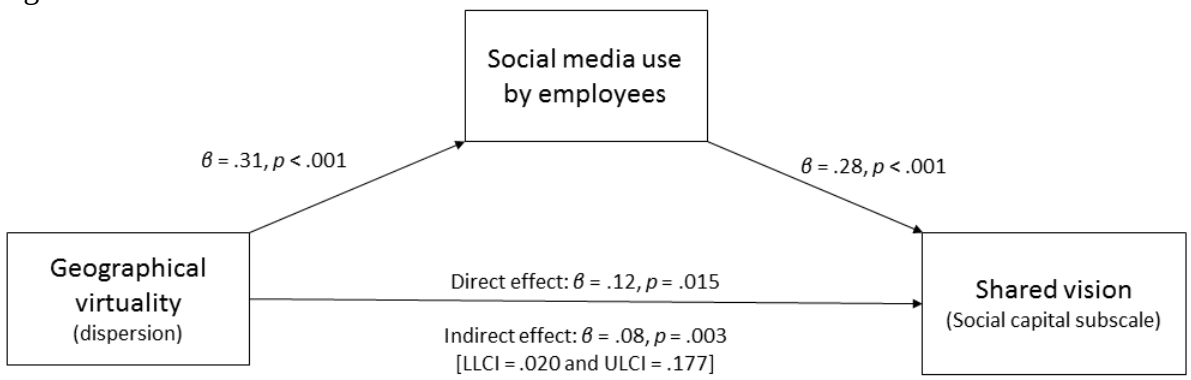
Figure 2: Partial mediation results in relation to social capital overall (Hypothesis 2)

Three out of four subscales (geographical, temporal and technological virtuality) predicted social media use ($p < .001$), and social media use in turn predicted social capital (network ties, trust, and shared vision; $p < .001$). Full mediation via social media use was noted in eight of nine cases (as evidence by significant indirect effects; $p \geq .006$) as none of the direct paths between the predictors and outcome variables were significant ($p > .05$). The same three subscales had a significant indirect effect on social capital via social media use ($p \leq .001$, see Table 2b).

The relationship between geographical virtuality and shared vision was partially mediated by social media (indirect path: $\beta = .08$, Z = 2.94, $p = .003$; CI[.020, .177]). This suggests that in the case of greater geographical dispersion among employees at work, this form of virtuality has a direct as well as indirect effect on shared vision – a finding not observed in relation to the other subscales of virtuality (Figure 3).

One exception represented the work practices subscale (again, this subscale did not have a significant direct or indirect effect on social capital). Work practices-related virtuality was not a predictor of social media use ($\beta = .07$, $t = 0.84$, $p = .404$). However, the mediator also had a significant main effect on the outcome variables (direct paths: $p < .001$) such as social capital and its three subscales (network ties, shared vision, and trust). These findings support the partial mediation proposed in Hypothesis 2.

Figure 3: Partial mediation results in relation to shared vision



Discussion

The aim of the present study was to answer the following research question: What is the relationship between virtuality, social media use, and social capital at work? No prior study has considered the link to virtuality in its various forms (geographical, temporal, work practice-related, and technological virtuality) to social media use and social capital. Our results showed that social capital was reported to be higher by employees who used at least one social media tool at work compared to participants who did not use any social media at work, in line with social capital theory (Adler and Kwon, 2002). The results also relate well to the previous literature on the importance of social media for social capital (Ali-Hassan et al., 2015; Cao *et al.,* 2016; Huang and Liu, 2017). As a result, social media may generate benefits beyond tangible outcomes for the organization via trust, network ties, and shared vision – all of which would encourage knowledge exchange (see also Treem and Leonardi, 2012), which may be particularly relevant to virtual workers in dispersed teams (Berry, 2011).

Furthermore, we found that social media use operated as a partial mediator between virtuality at work and social capital. Specifically, greater virtuality at work had a significant and positive direct effect of social media use at work, suggesting that virtuality at work may potentially contribute to the use of such computer-mediated tools. This finding is in line with our expectations. Further analysis suggests that the type of virtuality also mattered. Significant indirect effects were obtained for geographical, temporal, and technology-related virtuality. While the results for temporal and technology-related virtuality suggest full mediation, the results of geographical virtuality suggest partial mediation: this form of virtuality had a significant positive indirect and direct effect on social capital. This may be explained in two ways: First, geographical virtuality may raise the importance of connectivity for virtual workers. This may in turn lead virtual workers to actively work towards increasing their social capital (see also Price, 2006, Krasnova *et al*., 2017), in line with evidence that virtual workers often report having weaker ties to their team mates (McDonough *et al*., 2001). Second, when virtual workers have significant experience working remotely (which may or may not be a function of tenure), they may also have a substantial network in place to support them (see also Tsai, 2000), and have the skills to develop a trusting relationship with others (Tsai and Ghoshal, 1998). As a result, they may already have both weak and strong ties to support them in their work (see Putnam, 2000) – reducing their reliance on social media. And finally, virtual workers may also use other tools in addition to social media to gain social capital which we did not capture.

The results obtained for the work practices virtuality subscale differed, however. This subscale had low reliability and the emphasis on tools and processes in this subscale may have been insufficiently relevant to social media use and social capital. This may explain the lack of significant positive direct and indirect effects for virtuality overall and individual virtuality scales. Virtual work processes alone may not by default encourage relational benefits such as trust or network ties, and therefore, not support social capital among virtual workers. This also connects to Striukova and Rayna (2008) as only the presence of others supports the development of shared vision and trust. While shared mental models have been linked to improved work flow via shared knowledge structures (see also Maynard and Gilson, 2014), shared understanding of processes via work practices - without interaction with others - may not generate significant results either.

Implications for employees and organisations

The results of our study have a number of implications for employers and managers in organizations. We provide three implications for practice here. First, the benefits of social media for individual employees may depend on the workplace circumstances and the form of social capital being considered. As we would argue, such investment may depend on how many employees are virtual workers. However, an investment into building network ties (via social media or other tools) alone may not bring the same benefits as an investment into social capital formation related to shared vision and trust. This means that many of the virtuality at work and social capital dimensions at work may affect each other in combination.

Second, organizations may wish to identify all communication channels that may contribute to a sense of shared vision and trust, as well as those channels that support the building of more network ties across similar and adjacent teams and departments within an organisation (in line with both bonding and bridging ties proposed by Putnam, 2000). It is not uncommon that certain employee groups use one tool and another group use an altogether different tool. Guidelines regarding the terms of use of such tools may further ensure the productive and consistent use of communication channels, such as social media to generate bonding and bridging capital, thus expanding the benefits of increased social capital networks as outlined in social capital theory (Adler and Kwon, 2002).

Third, the use of social media may contribute to the maintenance of an existing relationship – and many on-site employees may become virtual workers over time. In our study, trust also correlated with tenure, working hours, and age (all significant covariates in the ANCOVA conducted involving trust scales, see results for hypothesis 1). This suggests that the degree and duration of involvement with others at work contributes to the formation of trust between employees. This has clear repercussions for workplaces where temporary employees are making up a significant number of the workforce: In these settings, trust between employees may be particularly difficult to establish and maintain. Thus, the use of social networking tools could help to facilitate trust on among these tenuous workers.

Fourth, employers may wish to invest some time to identify which networking tools are perceived as being useful to employees and enable them to meet their functional, social, and emotional needs (Sangwan, 2005). Some social media platforms are undoubtedly better at supporting collaboration and information sharing than others. The requirements of each workplace, as well as geographic and temporal virtuality, may also feature heavily in the decision to adopt certain technologies and computer-mediated tools, particularly when different social media tools are used in different countries. More internal investigation on the comparative performance of different tools and their reception by on-site and virtual workers would be helpful for organizations as this would also enable them to identify which elements of specific social media platforms generate what kind of outcomes for whom.

Limitations and future research

The results of the present study contribute to the existing literature in several ways. First, by studying all three dimensions of social capital simultaneously, the current research was able to gain a multi-faceted understanding of how different dimensions of virtuality at work and the actual use of social media by employees might relate to social capital overall and its specific dimensions.

Nevertheless, a number of limitations and possibilities for future research arise. We first discuss several correlational issues. As noted, the work practices subscale did not relate well to social media use. This might be a function of the sample or the items themselves as two of the three items referred to work practices unrelated to technology as such (e.g., team composition and work management). In terms of the correlations between social capital and social media use (Pearson's *r* ranged from .4 to .6), it is possible that similar item content increased the collinearity between our variables. While most of our measures were selected because they had been used in previous social media and capital research (e.g., Cao *et al.*, 2016; Chudoba *et al.*, 2005; Leftheriotis & Giannakos, 2014), we need to acknowledge the limitations in the use of the variables (e.g., the acknowledged use of ordinal variables treated like a continuous variable).

Another concern regards our data collection approach. For example, the participants for the study were gathered using a convenience sampling method. This creates potential problems for a number of reasons. Firstly, young students are less likely to work for globalized corporations, which tend to be the primary focus of virtuality research. Second, students are less likely to have started their professional careers, and be involved in serious and time consuming projects, where issues associated with virtual work tend to manifest the most. Third, the participant pool was comprised of individuals working in a variety of work settings, all with varying degrees of virtuality at work. And fourth, the current study examined virtuality as a whole but did not explore the possibility of team dynamics, which may further support or undermine the use of social media at work.

Lastly, we chose not to differentiate between different kind of social media platforms used with respect to their effect on social capital. We also did not consider potential differences in motivations in our sample (e.g., hedonic or utilitarian motives, see also work by Leftheriotis and Giannokos, 2014). An examination of the specific social media platforms would have required a more targeted approach in our analysis than was feasible given our sample size. Notwithstanding these limitations, the present paper offers important insight into social media applicability for work, and paves way for future research exploring its utility in greater detail. Future researchers may wish to look at both male and female samples to identify the strength of the relationship between virtuality at work, social media use, and social capital on the basis of gender, motivations for use, and perceived value of social media (see also Price, 2006; Krasnova *et al.*, 2017).

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