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Neighborhood hotspot and community awareness: The double role of social network sites in local communities

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Abstract: There is a tendency in the literature on local digital media use and neighborhood outcomes to conceptualize Social Network Sites (SNSs) as mere transmission channels, thereby ignoring SNSs' dynamics and limiting the understanding of their role in neighborhood life. Informed by Communication Infrastructure Theory and social media literature, we propose and test a model to investigate the association between the use of SNSs, appropriated as online neighborhood networks, and neighborhood sense of community. We administered a survey to Flemish online neighborhood network users ($n = 590$) and found that active localized SNS use brings about an online sense of community and community awareness, which both independently lead to a neighborhood sense of community. Based on these findings, we argue that SNSs, appropriated as online neighborhood networks, function simultaneously as neighborhood hotspots in a neighborhood's communication action context as well as community awareness media in a neighborhood's storytelling network.

Keywords: online neighborhood networks, sense of community, community awareness, communication infrastructure theory, digital neighborhood storytelling

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1 Introduction

Studies over the past three decades have shown that the use of digital media in local contexts can contribute to various aspects of neighborhood life. Early studies on place-based internet communication found that integrating digital media in local activities helps people extend their local social network (Hampton and Wellman, 2003) and increase their number of local weak ties (Hampton, 2007). In addition, neighborhood belonging (Ognyanova et al., 2013), community engagement (Gregory, 2015; Kim et al., 2015; Tosoni and Tarantino, 2013), community participation (Capece and Costa, 2013; Kavanaugh, Carroll, Rosson, Zin, and Reese, 2005), and civic participation (Nah and Yamamoto, 2017) have all been positively associated to SNS use in general. These studies revealed that these beneficial local community outcomes are contingent upon the local connectedness of digital media use. However, there is limited understanding about how and why SNS use is positively associated to these outcomes. In this paper, we address this issue by proposing and testing a theoretical model that explains how localized SNS use is associated to a neighborhood sense of community. To do this, we draw on Communication Infrastructure Theory (Ball-Rokeach, Kim, Matei, 2001) and argue for a novel conceptualization of local SNSs and local SNS use. That is, studies investigating local SNS use tend to reduce SNSs to mere tools for local information transmission. Conversely, considering SNSs as media, with its own dynamics and logics, will help to understand how local SNS use is positively associated to local community outcomes. Specifically, we investigate the extent to which localized SNS use, conceptualized as digital neighborhood storytelling, is positively associated to neighborhood sense of community, while considering the mediating roles of community awareness and online sense of community. We investigated this in the context of the recent phenomenon of Online Neighborhood Networks (ONNs), in which neighborhood residents appropriate SNS platforms such as Facebook to develop self-organized neighborhood networks in which they reminisce about the neighborhood's past (Bouko and Calabrese, 2017), share neighborhood-related information (Gulyas, O'Hara, and Eilenberg; 2019; Turner, 2015; Konsti-Laakso, 2017; Nygren, Leckner, and Tenor, 2018), exchange small goods (Rufas and Hine, 2018), or fight for the preservation of local heritage (Gregory, 2015).

2 Theoretical framework

Communication infrastructure theory: Community through storytelling

Communication Infrastructure Theory (CIT) posits that engaging in neighborhood storytelling is essential to becoming a member of a local community (Ball-Rokeach et al., 2001). CIT is developed through a long-running research project that took place in several multi-ethnic neighborhoods in Los Angeles (Ball-Rokeach et al., 2001) and “looks at how the practice of everyday communication and connectedness to media technology serve to construct the social environment” (Hayden and Ball-Rokeach, 2007, p. 238). Central to CIT’s approach to neighborhood belonging are (i) the practice of neighborhood storytelling, (ii) the local storytelling network, (iii) an individuals’ connection to that storytelling network, and (iv) the communication action context (Ball-Rokeach et al., 2001). Before elaborating on these concepts, we first discuss the intended outcome of the storytelling process: community.

The notion of community typically entails an identification with a specific geographic area, common ties through an identification by residents with one another and with that area, and significant social interaction among the residents (Driskell and Lyon, 2002, p. 375). The connection of an individual to a community is often expressed as a neighborhood sense of community, which entails a “sense of belonging, fellowship, ‘we-ness’, identity, etc., experienced in the context of a [...] geographically based collective” (Buckner, 1988, p. 773). Experiencing a stronger sense of community has positive downstream consequences pertaining to community engagement and participatory behavior, collective efficacy, mutual trust, and solidarity (Prezza, et al., 2001; Talò et al., 2014).

Neighborhood storytelling – essentially *talking* about the neighborhood – is understood as “an act of constructing an identity through narrative discourse” (Ball-Rokeach et al., 2001, p. 394). In a neighborhood context, this means constructing an identity as a neighborhood resident, which happens through virtually every form of talk pertaining to the neighborhood (Ball-Rokeach et al., 2001; Kim and Ball-Rokeach, 2006a). Such neighborhood stories are told on an everyday basis by multiple actors, ranging from individual residents over local media outlets and resident associations to regional or national news media and government officials (Ball-Rokeach et al., 2001). Residents discuss news, share information, and gossip among each other about the neighborhood. Local organizations provide the opportunity to connect to new people or work towards a common goal. Regional or national news outlets in the broader storytelling system may break stories about

particular localities that feed back into the neighborhood as discussion material. Together, these actors form a storytelling network, situated on a micro-, meso- or macro-level, respectively, through which local stories circulate and recirculate. Residents who show a strong connection to multiple storytelling agents at various levels, who engage more in neighborhood storytelling behaviors, and are more exposed to neighborhood stories, are found to show higher rates of neighborhood belonging and community engagement (Ball-Rokeach et al., 2001; Chen, Dong, Ball-Rokeach, Park, and Huang, 2012; Kim and Ball-Rokeach, 2006a; Kim et al., 2015).

This storytelling network is set within a neighborhood communication action context, which sets the preconditions for residents' interactions and varies along a continuum from encouraging to discouraging residents to interact with each other. Communication hotspots have been identified as encouraging factors in communication action contexts (Burgess, Walter, Ball-Rokeach, and Murphy, 2019; Wilkin, Stringer, O'Quin, Montgomery, and Hunt, 2011; Zhang, Motta, and Georgiou, 2018). Typically, hotspots are (semi-)public locations in the neighborhood, including local cafés, community centers or parks. Crucial to their role in the local communication infrastructure is that they support the local storytelling network by allowing storytellers to meet each other, share information, and discuss local issues. In that regard, the notion of hotspots can be opened up to non-physical environments such as the ONNs investigated in this study.

Digital neighborhood storytelling

Digital media have been positively associated to various beneficial local community outcomes (Capece and Costa, 2013; Hampton and Wellman, 2003; Kavanaugh et al., 2005). Studies focusing on the local role of SNSs from a CIT perspective show that in order to contribute to positive neighborhood outcomes, SNSs should be used to connect to local stories and engage in local storytelling practices. For instance, local civic participation is higher among individuals who engage in community-oriented online behavior, including searching for online information pertaining to the neighborhood as well as communicating about the neighborhood with fellow residents (Ognyanova et al., 2013). Similarly, people who heavily rely on SNSs in their everyday lives show higher levels of community engagement if they are strongly connected to the local storytelling network (Kim et al., 2015). People who are strongly connected to a local storytelling network show higher levels of local civic participation when they use SNSs to express opinions on local issues and share local news stories (Nah and Yamamoto, 2017). Hence, SNS use can contribute to beneficial local community-oriented outcomes if its use and users are locally connected.

These studies typically conceptualize SNSs as a local tool for either meso-level information transmission (Kim et al., 2015; Wilkin, Ball-Rokeach, Matsaganis, and Cheong, 2007) or micro-level communication (Chen et al., 2012; Kim et al., 2015). However, this envisioned role for SNSs in local storytelling networks reduces SNS communication to a mere transmission process, thereby disregarding the mediation process and SNS affordances such as persistence and scalability (boyd, 2011). Persistence refers to the default setting of recording and archiving in many information systems. Every conversation through online media and every interaction with it is being recorded and archived. Scalability refers to the potential audiences that the persistent content can reach. Often, this involves an audience of which the scale and composition is unknown to the author of the content (Marwick, and boyd, 2014; Hampton, 2016).

Capitalizing on these affordances, a local social news stream is collaboratively created when residents use SNSs to engage in digital neighborhood storytelling (Hermida, 2010; Papacharissi, 2015). To clarify, on a micro-level, residents use SNSs to discuss neighborhood issues, share neighborhood stories, and access stories about the neighborhood within an online neighborhood network (ONN). As such, they essentially participate in micro-level neighborhood storytelling, with the ONN being a means to interact. However, because of the aforementioned affordances, these individual behaviors and interpersonal interactions also have an emergent property, being the collaborative creation of a local social news stream. Specifically, a produced news feed emerges out of individual's engagement with the platform (Papacharissi, 2015), with individual posts and comments being presented to an audience as a news stream (Hermida, 2010). Thus, the ONN also becomes a meso-level storytelling agent, broadcasting neighborhood stories to a local audience, allowing residents to connect to the stories circulating in the local storytelling network. Hence, we conceptualize digital neighborhood storytelling as the behavior in online neighborhood networks that involves both micro-level social interaction as well as the collaborative creation of a meso-level storytelling agent. Accordingly, in line with CIT, engaging in digital neighborhood storytelling via the ONN is expected to contribute to a sense of community.

(H1) Digital neighborhood storytelling is positively associated to a neighborhood sense of community.

To understand the association between digital neighborhood storytelling and sense of community, we propose a theoretical extension to CIT with two indirect paths. First, a meso-level path allowing residents to connect to local stories leading to a raised community awareness and second, a micro-level path of interpersonal social interactions allowing for both online and neighborhood community creation (cf. Figure 1). Below we discuss both.

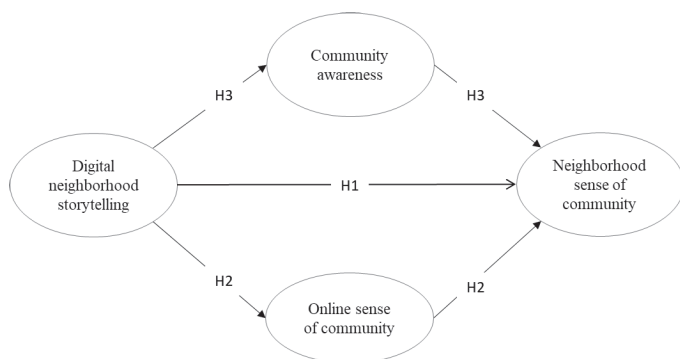


Figure 1: Hypothesized model.

Sense of community through awareness

Social media can be considered as pervasive awareness systems (Hampton, 2016; Hermida, 2010; Papacharissi, 2015). Hampton (2016, p. 103) defines pervasive awareness as “an affordance of the ambient nature of digital communication technologies that provides knowledge of the interests, location, opinions, and activities embedded in the everyday life events of one’s social ties”. As such, becoming aware is about collecting, processing, and making sense of information. Specifically, awareness develops from short asynchronous posts, status updates, or comments that are in themselves often banal (Burke and Kraut, 2014). However, in the context of a social news stream that emerges out of such SNS interactions, these interactions provide awareness about the others’ interests, opinions, whereabouts, life-course transitions, and so on (Papacharissi, 2015), allowing them to identify others with common interests and characteristics (Hampton and Wellman, 2003). In addition, ONN use has previously been associated with higher levels of awareness of being part of a territorial community (Capece and Costa, 2013), while ONNs are experienced as a “window to the neighborhood, bringing awareness to citizen activity, concerns and problems” (Konsti-Laakso, 2017, p. 138). Conversely, a study by Georgiou, Motta, and Livingstone (2016) indicated that not having access to local digital media may induce the feeling of being uninformed, unaware, and even excluded from local affairs. In that sense ONNs allow their users, when they engage in digital storytelling, to connect to the local storytelling network and develop knowledge of neighborhood events and concerns (Ball-Rokeach et al., 2001), hence develop what we call a community awareness (Han, Shih, and Carroll, 2014). Specifically, we

conceptualize community awareness as a cognition that manifests itself as the mental image a neighborhood resident has of the neighborhood, the neighbors, and the dominant issues, stories, and corresponding opinions circulating in the neighborhood.

Community awareness can contribute to a sense of community as it entails awareness about the discourses that exist within and about the neighborhood. As a local social news stream emerges from practices of digital neighborhood storytelling, a shared discourse develops pertaining who the neighborhood residents are, what the main issues are, and how these issues should be addressed. Within CIT, the construction of such a shared discourse is considered to be instrumental in the development of a local community (Kim and Ball-Rokeach, 2006b) as it provides the means to imagine a community within the neighborhood, even though only part of the network is actively interacted with (Anderson, 2006). Accordingly, awareness about this means that one is more likely to develop a sense of community. Therefore, we hypothesize that:

(H2) the association between digital neighborhood storytelling and a neighborhood sense of community is partially mediated by community awareness.

Online and offline sense of community

Engaging in digital neighborhood storytelling through ONN happens through interacting with, and reading the posts and comments of, other members in the ONN. Consequentially, not just the construction and awareness of a shared discourse is expected to explain the association between digital neighborhood storytelling and sense of community but also the downstream consequences of the online social interactions that underpin digital neighborhood storytelling behaviors.

Social interaction in itself is a cornerstone of community building. Interaction within established social relations increases tie strength (Burke and Kraut, 2014), while positive interaction with strangers has been found to reduce existing biases such as implicit prejudices or negative nonverbal behaviors (Amichai-Hamburger and McKenna, 2006; Miles and Crisp, 2013). Moreover, repeated positive interactions may lead to the development of interpersonal bonds as people share information about themselves and get familiar with each other (Ren, Kraut, and Kiesler, 2007; Ren et al., 2012) as well as to an online sense of community (Mamonov, Koufaris, and Benbunan-Fich, 2016). The positive emotions experienced within interpersonal bonds may transfer to the larger networks these bonds are nested in because of the process of affect generalization (Lawler and Yoon, 1996; Ren et

al., 2012). That is, as a liking is developed with a subset of ties within a particular group or network, that liking can generalize to the other members of that group. Applied to ONN, online interactions between residents may result in the development of interpersonal bonds, even among strangers. As these interactions are positive, individual members can attribute these positive emotions to the group these bonds are nested in, in this case the ONN.

The same process of affect generalization may induce a spillover effect to the larger neighborhood community the ONN is nested in. Intuitively, when local SNS users develop a liking for other members of the local SNS, they essentially develop a liking for neighborhood residents. In the case of a place-based online community, this implies that individual users' online sense of community transfers to their neighborhood sense of community. Thus, the social interaction aspect underpinning digital neighborhood storytelling contributes to a local sense of community via the online sense of community. Hence,

(H3) the association between digital neighborhood storytelling and neighborhood sense of community is partially mediated by an online sense of community.

3 Methodology

Population, sample, and sampling strategy

An online survey was administered to adult users of ONNs on SNS platforms in Flanders, Belgium. An ONN on an SNS was identified as a group with a specific reference in the name to a neighborhood in a major city (population > 100,000), a small city (population < 100,000) or village and with references to that geographical entity in the group description. In order to avoid over-representation of one or a few ONNs, we developed a recruitment matrix, taking into account both neighborhood characteristics in terms of size, geographical location, and level of urbanism as well as ONN characteristics in terms of size. Specifically, an invitation with a link to the survey was posted in 95 ONNs on Facebook and Hoplr, after asking permission from the administrator(s). Hoplr is a Belgian SNS designed for neighborhoods. In terms of functionalities and uses it has many similarities to Facebook groups, although only people living in a particular neighborhood or village can join the specific online group (www.hoplr.com). It is similar to international competitors such as Nextdoor.com in the US or Nebenan.de in Germany. After data cleaning, our final sample consisted of 590 respondents, with an average of four users per group ($SD = 5.27$) and with a minimum of one and a

maximum of 34 users. Demographically, our sample is predominantly female (73.1 %, $n = 431$) and has a mean age of 44.32 ($SD = 15.49$), ranging from 18 to 82. In terms of education, 59.1 % ($n = 349$) has either a Bachelor's or Master's degree. In addition, our sample shows rather high residential stability, with a mean time of residence of 21.87 years ($SD = 15.27$), ranging from less than one to 76 years. Finally, our respondents' local social network sizes range from zero, or having no local contacts, to a maximum of 500 neighbors, with a mean of 22.93 ($SD = 45.97$). This distribution was non-normally distributed with skewness of 5.88 ($SE = .10$) and kurtosis of 43.62 ($SE = .20$).

Measures

Digital neighborhood storytelling. Digital neighborhood storytelling was measured by means of the *shared interests* dimension from Vitak's (2014) Facebook relational maintenance construct, yet adapted to an ONN context. Shared interest is measured by three items and refers to the extent to which users proactively share content with the local online group and interact about communal interests. A sample item is "I share information about my neighborhood with the online group". All items were rated on a seven-point Likert scale, ranging from 1 = *totally disagree* to 7 = *totally agree*. Chronbach's α was .86.

Neighborhood sense of community. The outcome variable, neighborhood sense of community, was measured using six items, adapted from Buckner's (1988) 'psychological sense of community' scale. A sample item is "Living in this neighborhood gives me a sense of community". The items were rated on a seven-point Likert scale, ranging from 1 = *totally disagree* to 7 = *totally agree*. As expected, the construct proved to be reliable, with $\alpha = .89$.

Community awareness. The community awareness construct measures the respondents' awareness about their neighborhood and the people living therein. This construct was measured using six self-developed items. The items were derived from a qualitative study (in press), cognitive interviews and extensive pre-testing. A sample item is "I am mostly aware of important events in my neighborhood". The items are rated on a seven-point Likert scale, ranging from 1 = *totally disagree* to 7 = *totally agree*. The construct showed good reliability ($\alpha = .87$).

Online sense of community. Online sense of community refers to the extent to which users feel a shared emotional connection with the members of the ONN. This construct is an attitudinal construct, derived and adapted from Hsu and Liao (2014) and measured using four items which were rated on a seven-point Likert scale, ranging from 1 = *totally disagree* to 7 = *totally agree*. A sample item is "What

I want is similar to what the other members of this group want”, and the construct can be considered reliable ($\alpha = .82$).

Exploratory factor analysis. Before testing our hypotheses, we performed an exploratory factor analysis using principal axis factoring with Oblimin Rotation in SPSS 25 to assess the factor structure of the four latent constructs. Eigenvalues above 1 were considered significant for factor extraction, and factor loadings of .40 or higher were considered acceptable (Khazaee-Pool et al., 2016). Sampling adequacy was excellent ($KMO = .920$; $\chi^2 = 6454.877$, $p < .001$), and 67.08 % of the variance was explained by the four expected factors. All factor loadings, except one, loaded highly ($> .5$) and uniquely on one of the extracted factors (cf. Table 1). A full list of the items and their descriptive statistics can be found in the Appendix.

Table 1: Factor loadings for the four latent constructs extracted using Principal Axis Factoring with Oblimin Rotation.

	1	2	3	4
DNS_SI1	0.790	-0.027	0.070	0.061
DNS_SI2	0.798	0.061	-0.010	0.007
DNS_SI3	0.817	-0.009	-0.019	0.010
NSC1	-0.004	0.791	0.065	0.009
NSC2	-0.023	0.809	0.011	-0.001
NSC3	0.094	0.609	0.106	-0.024
NSC4	-0.047	0.517	0.059	0.197
NSC5	0.089	0.729	-0.061	0.002
NSC6	-0.054	0.892	-0.009	-0.008
CA1	-0.019	-0.011	0.775	-0.007
CA2	-0.007	-0.141	0.900	-0.002
CA3	0.167	0.117	0.494	0.010
CA4	-0.036	0.189	0.582	-0.037
CA5	0.035	0.076	0.671	0.033
CA6	-0.013	0.035	0.762	0.066
OSC1	0.176	0.000	0.025	0.663
OSC2	0.144	0.068	-0.013	0.665
OSC3	-0.066	0.017	0.023	0.738
OSC4	-0.044	-0.015	-0.003	0.721

Note. DNS = Digital Neighborhood Storytelling; SI = Shared Interests; NSC = Neighborhood Sense of Community; CA = Community Awareness; OSC = Online Sense of Community.

Covariates. Age, sex, and local social network size were used as covariates in this study. Local social network size was measured by asking the respondents about the number of people living in their neighborhood with whom they had contact on a weekly basis (Hardyns, Vyncke, Pauwels, and Willems, 2015).

Analytic strategy

We applied structural equation modelling using Mplus 8 (Muthén and Muthén, 2017) to investigate the association between digital neighborhood storytelling, community awareness, online sense of community, and neighborhood sense of community. Before fitting the measurement and structural models, we tested for any second-level variance in the outcome variable. The design effect amounted to 1.16, which is well below the cutoff point of 2 (Heck and Thomas, 2015, p. 37), meaning that the specific group of which one is a member only accounts for a marginal portion of the variance. Hence, multilevel analyses were not warranted. The analyses were performed in two phases. In a first phase, a measurement model was constructed in which we examined how reliably the observed variables reflected the latent constructs. In a second phase, a structural model was estimated in four steps in line with the formulated hypotheses. That is, we first estimated the direct association between digital neighborhood storytelling and sense of community. Next, we tested the indirect associations between both constructs via community awareness and online sense of community using the INDIRECT command in Mplus 8. Age, sex, and local social network size were included in the structural models as covariates.

To assess the model fit of both measurement and structural models, several fit indices were used. Specifically, we used χ^2 , Comparative Fit Index (CFI) (Bentler, 1990), the Tucker-Lewis-Index (TLI) (Tucker and Lewis, 1973), the Root Mean Square Error of Approximation (RMSEA) (Steiger, 1990), and the Standardized Root Mean Square Residual (SRMR) (Kline, 2005). A non-significant χ^2 is normally an indication of good model fit. However, χ^2 is almost always significant (Brown, 2006; Kline, 2005). CFI and TLI range from 0 to 1.00, with an adequate fit at a cut-off point of .90 (Byrne, 2001; Hu and Bentler, 1999). RMSEA values below .05 indicate a good model fit, while values below .08 indicate an adequate fit (Brown, 2006; Ponnet, 2014). For the SRMR fit statistic, a value lower than .08 indicates adequate model fit (Hu and Bentler, 1999).

4 Results

Bivariate correlations and measurement model

Table 2 presents the zero-order correlations between the latent constructs of the measurement model. We found significant positive correlations between digital neighborhood storytelling and neighborhood sense of community. Similarly, digital neighborhood storytelling was significantly and positively associated to both community awareness and online sense of community. Lastly, both community awareness and online sense of community were significantly and positively associated to sense of community. The measurement model showed a good fit to the data: $\chi^2(146) = 462.781$, $p < .001$; RMSEA = .057 [CI .053 – .065]; CFI = .950; TLI = .942 and SRMR = .043.

Table 2: Zero-order correlations among latent constructs.

	1	2	3
1 DNS/Shared Interests			
2 Community Awareness	0.36***		
3 Online sense of community	0.60***	0.44***	
4 Neighborhood sense of community	0.41***	0.66***	0.54***

Note. DNS: Digital Neighborhood Storytelling

*** $p < .001$

Structural model

We first tested whether digital neighborhood storytelling was positively associated with neighborhood sense of community (H1). Our initial model proved to have an adequate fit: $\chi^2 (47) = 158.061$, $p < .001$, RMSEA = .063 [CI .053 – .074], CFI = .963, TLI = .950 and SRMR = .035. As expected, we found that digital neighborhood storytelling was positively associated with neighborhood sense of community ($\beta = .40$, $p < .001$), explaining 17.0 % of the variance in the outcome variable together with the covariates.

Next, we tested whether community awareness mediated the association between digital neighborhood storytelling and neighborhood sense of community (H2). The estimated model proved to fit the data well: $\chi^2 (123) = 438.244$, $p < .001$, RMSEA = .066 [CI .059 – .073], CFI = .938, TLI = .925 and SRMR = .045.

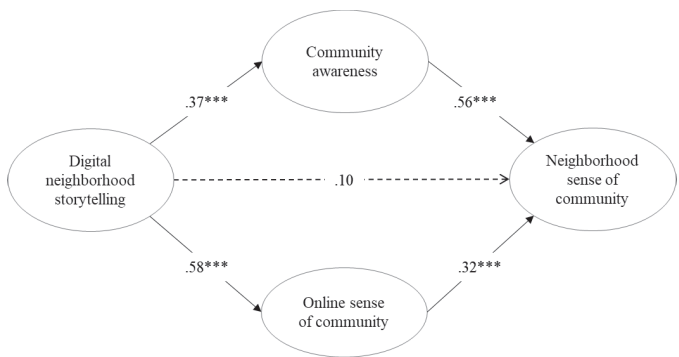
We found that community awareness partially mediated the association between digital neighborhood storytelling and sense of community, hence confirming our second hypothesis. Specifically, digital neighborhood storytelling was positively associated with community awareness ($\beta = .34, p < .001$) which in turn was significantly associated with neighborhood sense of community ($\beta = .62, p < .001$). The indirect pathway was significant as well (indirect $\beta = .21, p < .001$), while the direct association between digital neighborhood storytelling and sense of community remained significant ($\beta = .19, p < .001$). This model, adjusted for the covariates, explained 48.0 % of the variance in sense of community.

Then, we tested the mediating role of online sense of community in the association between digital neighborhood storytelling and neighborhood sense of community (H3). The tested model adequately fitted the data: $\chi^2 (92) = 320.897, p < .001$, RMSEA = .065 [CI .057 – .073], CFI = .946, TLI = .931 and SRMR = .040. Consistent with our third hypothesis, we found that online sense of community partially mediated the association between digital neighborhood storytelling and neighborhood sense of community. Specifically, digital neighborhood storytelling was positively associated with online sense of community ($\beta = .56, p < .001$), while online sense of community was positively associated with neighborhood sense of community ($\beta = .47, p < .01$). The indirect pathway proved to be significant as well (indirect $\beta = .26, p < .001$), while the direct path remained significant ($\beta = .14, p < .05$). Adjusted for the covariates, this model explained 31.3 % of the variance in the outcome variable.

Lastly, we tested a full structural model in which both indirect paths were included. The fit statistics showed an acceptable model fit of our structural model: $\chi^2 (192) = 652.559, p < .001$, RMSEA = .064 [CI .058 – .069], CFI = .927, TLI = .914 and SRMR = .060. The results are presented in Figure 2.

In the final model the association between digital neighborhood storytelling and sense of community was fully mediated by community awareness and online sense of community ($\beta = .04, p = .491$). Digital neighborhood storytelling was significantly associated with community awareness ($\beta = .37, p < .001$) and online sense of community ($\beta = .58, p < .001$). Community awareness and online sense of community in turn were positively associated with neighborhood sense of community ($\beta = .56, p < .001$ and $\beta = .32, p < .001$, respectively). We further found that digital neighborhood storytelling was indirectly associated with sense of community via community awareness (indirect $\beta = .21, p < .001$) and online sense of community (indirect $\beta = .18, p = .001$). The full model, adjusted for the covariates, explained 50.7 % of the variance in sense of community.

With respect to the covariates we found that sex was not associated with any of the latent constructs, while age was positively associated with digital neighborhood storytelling ($\beta = .46, p < .001$), suggesting that older neighborhood resi-



Note. Dashed lines are used for non-significant associations
*** $p < .001$

Figure 2: Full structural model.

dents are more likely to share and discuss neighborhood-related information and issues. In addition, residents' local social network size was positively associated with community awareness ($\beta = .23, p < .001$), indicating that having a larger local social network is indicative for residents' awareness of their neighborhood.

5 Discussion

As SNSs are increasingly appropriated in various aspects of everyday life, including in neighborhoods and local communities, this paper investigates their role with respect to a neighborhood sense of community. By building on Communication Infrastructure Theory and introducing the concepts digital neighborhood storytelling and community awareness, we studied the association between digital neighborhood storytelling and neighborhood sense of community and whether this association was partially mediated by community awareness and online sense of community. In line with CIT's predictions, using local SNSs to engage in digital neighborhood storytelling allows residents to develop a sense of community (Hypothesis 1). However, this association was fully, rather than partially, mediated by the combined effects of community awareness (Hypothesis 2) and online sense of community (Hypothesis 3), with the former being the most important mediator. In this discussion, we elaborate on these mediating paths and discuss their significance with respect to our proposed conceptualization of SNSs in neighborhood contexts in general and the CIT framework specifically.

SNSs enabling and supporting neighborhood storytelling

Digital neighborhood storytelling is primarily an individual neighborhood resident behavior of talking about the neighborhood, taking place on a micro-level in the storytelling network. In this process, SNS platforms are appropriated as ONNs, meaning they provide the infrastructure for neighborhood residents to meet, communicate, and share neighborhood-related information. Our findings suggest that these micro-level interactions result in an affective relation with the ONN that emerges out of the product of these behaviors and the socio-technical infrastructure of the SNS platform, with the affective relation towards the neighborhood being a by-product of this online sense of community.

This can be regarded as evidence to understand ONNs as a means of maintaining existing and developing new local bonds and thus as local hotspots in the local communication action context (Wilkin et al., 2011; Zhang et al., 2018). Similar to other hotspots, such as bars or parks, ONNs are places in the neighborhood that are instrumental in the development and maintenance of storytelling networks. That is, if there are no places to meet and interact, storytelling networks cannot develop, let alone become integrated.

Community awareness media as an emergent property

The path associating digital neighborhood storytelling to a neighborhood sense of community via community awareness could be interpreted as evidence for the ambient processing of the information circulating within the ONNs. That is, actively engaging in digital neighborhood storytelling not only means that an online sense of community is installed but also involves the exposure to the snippets of information that are shared in posts and comments of others. Even though this information is received and processed ambiently (Hermida, 2010) and requires little cognitive effort from the receivers, it does allow them to develop an awareness of the others' interests, location, opinions, and activities (Hampton, 2016, p. 103). In turn, this helps in developing a sense of community within that neighborhood as members develop a familiarity with the discourse about the neighborhood and its neighbors (Kim and Ball-Rokeach, 2006b) that develops from the short, irregular, and asynchronous posts and comments.

The stronger effect size for the indirect path via community awareness to neighborhood sense of community suggests that it is essential for developing a local sense of community. Although our data do not permit us to explain why this path is dominant, the notion of acquiring neighborhood information, developing thoughts and ideas about the neighborhood (Unger and Wandersman, 1985),

and establishing a shared history (McMillan and Chavis, 1986) are often associated to a sense of community in community psychology literature. Central to all this is the circulation and processing of neighborhood-related information, for which ONNs appear to be ideally placed. Moreover, based on our findings, we can state that ONNs predominantly act as community-awareness media, allowing residents to imagine a local community. It is this processing of neighborhood-related information that allows neighborhood residents to imagine a community of which they can be part.

The double role of SNSs in neighborhood contexts

Hitherto, SNSs have been regarded in CIT literature as a means for individual residents to interact on a micro-level (Kim et al., 2015) or as a means for meso-level agents to disseminate information to the neighborhood (Chen et al., 2012; Kim et al., 2015; Matei and Ball-Rokeach, 2003). We argue, however, that in the context of ONNs, SNSs first provide the opportunity to residents to interact and thus assume the role of a local hotspot. Yet, from these interactions a local social news stream emerges because of the socio-technical affordances of the SNS platform (boyd, 2011), allowing residents to develop knowledge and awareness about the neighborhood. Thus, the ONN also becomes a meso-level storytelling agent in itself, emerging out of the collaborative behaviors of the individual users.

In that capacity, SNSs can support the development of place-based relations and can have their value in community-building efforts when used for neighborhood communication and connecting to neighborhood stories. However, in order for ONNs to bring about positive neighborhood consequences, engender collective efficacy, and stimulate community participation, they ideally allow for an integrated local storytelling network (Kim and Ball-Rokeach, 2006b). This means that the micro-level interactions between residents should be complemented by stories shared by meso-level agents such as local media, while stories that develop out of interpersonal conversations can be explored further by such meso-level agents. Our study indicates that community awareness is the most important explanation with respect to neighborhood sense of community. Yet, this awareness is based on the information and opinions shared in the individual engagements of the ONN members. Hence, having a broader and more inclusive storytelling base implies that the awareness that follows from connecting to these ONNs will be less prone to particular predispositions that might come about from very vocal but biased neighborhood residents. After all, social news feeds tend to blend “emotion with opinion, and drama with fact” (Papacharissi and de Fatima Oliveira, 2012, p. 277).

Study limitations and future research

Despite its strengths, this study also has some limitations. First, this comes with the downsides of a cross-sectional survey study design, meaning the proposed directions of the associations could only be inferred theoretically. In that regard, we also explored an alternative, reverse model and found that this would also fit the data ($\chi^2(192) = 623.04$, $p < .001$, RMSEA = .062 [CI .056 – .067], CFI = .932, TLI = .919 and SRMR = .045), with neighborhood sense of community positively and significantly associated with both community awareness ($\beta = .64$) and online sense of community ($\beta = .50$). Interestingly, while online sense of community was significantly associated with digital neighborhood storytelling ($\beta = .43$), neither community awareness nor neighborhood sense of community were. In addition, online sense of community mediates the association between neighborhood sense of community and digital neighborhood storytelling (indirect $\beta = .22$). This indicates that a reciprocal relation does indeed exist, yet only partially. First, the failure to observe a relation between community awareness and digital neighborhood storytelling in this reciprocal model suggests that ONNs are indeed functioning as community-awareness media. Second, the found reciprocal relations suggest that there might be a self-sustaining process at play in which ONNs are constantly being socially reproduced by the most prominent members determining the dominant discourse.

Second, the data used in this study were obtained through a self-selection procedure, which might be a cause of unpredicted biases. It is, for example, likely that more highly engaged users of local SNS will have participated in this study as compared to less engaged users. This is partly suggested by the moderate negative skewness of several items (skewness ranging from .11 ($SE = .09$) to $-.81$ ($SE = .10$)). In addition, the survey was administered to a population of local SNS users in Belgium of which the characteristics are unknown. Our sample is highly female and well-educated yet follows a normal distribution in terms of age. The literature on local offline social interaction and local social networks indicates that the neighborhood becomes more prominent as people get older, have children, and settle down (Guest and Wierzbicki, 1999; Hampton, 2007; Mollenhorst, Völker, and Schutjens, 2009). Women typically have the role of social relationship maintenance bestowed upon them (Wellman, 1992 in Hampton and Wellman, 2003), resulting in larger personal social network sizes, including more neighbors (Hampton, 2007). Nevertheless, women (Smith, 2008) and well-educated individuals (Cifuentes et al., 2008; Demarest et al., 2013) are also more likely to participate in surveys, suggesting there is probably an unwanted bias in our sample on that account. Still, it should be noted that sex was not a significant covariate.

Third, the instruments to measure digital neighborhood storytelling and community awareness were adapted and specifically developed for this study. Their development is theoretically and empirically grounded, so they proved to be reliable, and they both showed adequate fit to our data in this study. Still, repeated use in future studies would be desirable to ascertain their reliability and validity in other contexts. Related to this, the item set used was unbalanced, meaning that a response set is possible. Although this may potentially lead to an overestimation of the relations between the constructs (Mirowsky and Ross, 1991), we believe that this problem, if present, is probably modest in size and does not outweigh the benefit of reduced cognitive load among the respondents (Sauro and Lewis, 2011; Solís Salazar, 2015). Specifically, with respect to our findings, the found effect sizes might be inflated, yet given their substantial sizes they would most likely remain in place with balanced item sets.

Lastly, although CIT is essentially an ecological theoretical framework, considering various factors to explain neighborhood-related outcomes, this study only took digital neighborhood storytelling into account as an exogenous variable. This was partly catered for by taking into account respondents' local social network size as covariate. Still, future research should consider other variables as proposed by CIT. Particularly, a pivotal aspect of CIT is the resident's connectedness to the local storytelling network (Kim and Ball-Rokeach, 2006a), which is typically measured using the Integrated Connectedness to the Storytelling Network (ICSN) index. Future studies could investigate the association between the ICSN construct and digital neighborhood storytelling, and whether residents engaging in digital neighborhood storytelling are more strongly connected to the local storytelling network. Furthermore, factors such as levels of urbanization, the neighborhood's socio-demographic, socio-economic composition as well as pre-existing social cohesion, residential stability or frequency of local social interactions among other variables (Ball-Rokeach et al., 2001; Hampton, 2007; Yamamoto, 2015) could be taken into account to investigate whether the proposed model is subject to any of these neighborhood-level characteristics.

6 Conclusion

The appropriation of SNSs in neighborhoods as Online Neighborhood Networks (ONNs) should be regarded as playing a double role with respect to residents' neighborhood sense of community. First, it enables residents to interact, share information, and engage in neighborhood storytelling, which allows them to develop

an online sense of community with the other members of the ONN. At the same time, the shared and discussed information emerges as a local social news stream, allowing residents to develop an awareness about the neighborhood, its residents, and its issues. Together, these two cognitions allow individuals to develop a sense of we-ness, belonging, fellowship, and local identity with respect to the neighborhood. Accordingly, the position of an online neighborhood network in the local communication infrastructure is doubly articulated, being a meeting ground or neighborhood hotspot for local social interaction as well as a local social news medium, allowing them to develop knowledge and awareness about the neighborhood, engendering the development of a local imagined community.

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Appendix – Used items and their descriptive statistics

Measure	Items	Mean	SD
Digital Neighborhood Storytelling – Shared Interests			
DNS_SI1	I share information about my neighborhood with the online group.	3.05	1.83
DNS_SI2	When I see something online that I think the online group would find interesting, I'll share it with them.	4.09	1.83
DNS_SI3	When I enjoyed something in the neighborhood (an event, a nice spot, a funny happening ...), I share it with the online group.	3.76	1.83
Neighborhood sense of community			
NSC1	I feel like I belong to this neighborhood.	4.87	1.37
NSC2	The friendships and associations I have with other people in my neighborhood mean a lot to me.	4.48	1.42
NSC3	If the people in my neighborhood were planning something, I'd think of it as something 'we' were doing rather than 'they' were doing.	4.04	1.54
NSC4	I think I agree with most people about what is important in life.	4.09	1.27
NSC5	I would be willing to work together with others on something to improve my neighborhood.	4.95	1.32
NSC6	Living in this neighborhood gives me a sense of community.	4.61	1.40
Community awareness			
CA1	I am mostly aware of important events in my neighborhood.	4.91	1.30
CA2	I am mostly aware of local issues.	4.58	1.31
CA3	I feel familiar with the history of my neighborhood.	4.53	1.59
CA4	I have a pretty good idea about who lives in my neighborhood.	4.34	1.50
CA5	I have a good idea about the common opinions about local issues in my neighborhood.	4.37	1.33
CA6	I know what matters to the neighborhood residents.	4.22	1.33
Online sense of community			
OSC1	I believe the time spent on the online group is worthwhile.	4.42	1.22
OSC2	I value the online group.	4.80	1.32
OSC3	What I want is similar to what the other members of this group want.	3.83	1.21
OSC4	I mostly agree with the opinions that circulate within this group.	3.91	1.25