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Fit to be Tied: Social Network Structures and Evaluation Apprehension

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Thesis submitted to the Eberly College of Arts and Sciences
at West Virginia University

in partial fulfillment of the requirements for the degree of

Master of Arts in
Communication Theory and Research

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Abstract

Fit to be Tied: Social Network Structures and Evaluation Apprehension

by Andrew L. Nicholson

In everyday life, people are typically connected to others, and these variably strong connections facilitate social influence related to a range of phenomena, from shaping body image and, impacting self-esteem to shaping behaviors through exhibiting social norms. Although the strongest ties (those most intimate and influential) can be very important to a person, there can also be a fear of judgement (i.e., evaluation apprehension) in those relationships. In online social networks, the relationship between tie strength and evaluation apprehension may emerge differently than in offline spaces due to affordances of social media, the asynchronous nature of computer-mediated communication, and the networked audience on social media; the potential influences of discrete ties may be additive because groups of strong ties may also exert a similar normative influence. In order to explore the possible links between evaluation apprehension and online social network structures (i.e., cumulative tie strength and network density), a study was conducted in which participants ($N = 96$) first completed an initial online survey (assessing online evaluation apprehension and demographics), then viewed an in-lab visualization of their Twitter network (to capture social network structure characteristics), and finally completed a second survey (to capture network use habits). Analysis revealed associations between evaluation apprehension and tie strength as well as evaluation apprehension and network density with a moderate effect size. Results are interpreted to suggest that evaluation apprehension may be digitally contextual, predictors of tie strength may serve as affirmation, social network features may influence evaluation apprehension, and digital social networks may function as a conglomerate discipline-mechanism similar to that of the panopticon.

Dedication

I would like to dedicate this thesis to my beloved father, Lamont D. Nicholson (1961-2015), for his inspiration and his motivation; he was always the biggest supporter of me, my two brothers, and my sister, and guided us to where we are now. May he rest in peace knowing he still keeps me moving forward and inspired.

Acknowledgements

I would like, first and foremost, to thank my adviser, Dr. Jaime Banks. Her extraordinary positivity and passion have facilitated my incredible learning experience with writing this thesis and served as a source of inspiration; she was always available, even when on the other side of the country; she always had words of encouragement; she is my mentor, role model, and friend. I would also like to express my gratitude to my committee members, Dr. Matthew M. Martin and Dr. Nicholas D. Bowman, for taking the time and effort to push me, to encourage me, and to support me. Finally, I would like to thank my mother for always being supportive of my endeavors, even if she is unsure of what those endeavors might be.

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Introduction

A camera focuses in on a petite red-headed woman. She strolls into a café, observing all the people enjoying their meals. They take pictures of their perfectly plated pastries next to artfully crafted and displayed mocha cappuccinos; they share the pictures with the community, accumulating likes and comments that increase their ratings. As she approaches the barista, her nervous smile and jittery giggle become hidden behind an obviously phatic conversation she has with the man behind the counter. He gives her a positive rating on the application—an application that is a barometer of society's perception and evaluation of her. She reciprocates; their average ratings increase slightly. Through the persistent awareness and evaluation of people, the pervasiveness of social norms creates a society in which, to borrow the lyrics of Malvina Reynolds (1962), "they are put in boxes, and they come out all the same." Given this socially reinforced normativity, interest rates, discounts, privilege, access, and social status are dependent on an individual's rating. The pressure this puts on an individual causes mental breakdowns and extreme psychological distress. This feeling of being constantly evaluated led the endearing, yet anxious, woman to have an existential crisis that created a scene where authorities had to pry a knife away from her in order to save a bride and groom from a dramatic and untimely demise. The scene fades to black.

Although it may seem futuristic or abstract, this zeitgeist depicted in an episode of *Black Mirror* (2016) may not be as extraordinary as one might think. There are features and characteristics of technology—e.g., persistence, paralinguistic cues, reputation ratings—that allow for people to maintain contact, anytime and anywhere, and allow for the public to see these interactions (Bittman, Brown, & Wajcman, 2009; Hampton, 2015). People also are constantly aware of what is going on in the lives of others due to these affordances (Hampton, 2015). It is

possible, then, that people using technology and its affordances will also feel a similar psychological discomfort as the girl in the café.

However, not everyone connected to an individual will contribute to feelings of apprehension or stress. It is the people closest to the individual that exert the most amount of influence and may cause the most amount of psychological discomfort for the individual. In other words, people who are strongly connected strongly influence each other (Green & Pritchard, 2003; Sheldon, 2010; Tang & Chen, 2013) and because these strongly connected individuals have such influence, this can create feelings of discomfort associated with being evaluated (i.e., evaluation apprehension; Bordia, Irmer, & Abusah, 2006; Duncan, Rosenberg, & Finkelstein, 1969; Porter, 1986).

Although extant literature clearly sets out these relationships, little is known about how an individual's strong connections have *aggregative* effects. This study aims to bridge that gap by empirically examining how social network users' social network structures (i.e., strong ties and related groups of people) may be associated with feelings of evaluation apprehension.

Review of Literature

People are situated in social networks; these networks consist of individuals with relationships of varying strength. For instance, a person has friends from work, from school, from extracurricular activities and from various other groups focused around interests; the relationships with those people can be more distant (as with mere acquaintances) or more close (as with a best friend). Each person in a network is considered a *node* (or *vertex*) and the relationship between each person is considered a *tie* (or *edge*). In an egocentric network—one in which a particular person, such as a social media user, is at the center—the *ego* is the central node from which the network expands (Granovetter, 1973). Observing a social network centered

around ego (i.e., an egocentric network) provides information on ego's immediate social network and environment (Marsden & Campbell, 2012); when studying multiple people with varying types of relationships, a social network perspective allows for aspects of small-scale interactions, such as interpersonal relationships, to be related to larger macro processes such as information flow (Granovetter, 1973). In other words, researchers adopting an egocentric social network perspective can account for each tie and the varying relational properties of those ties.

The Strength of Strong Ties

A given relationship or tie can be understood as having qualities based on its function in a social network (e.g., propinquity, or the tendency to be linked to those physically near; Granovetter, 1973) or based on unique relational properties between the nodes. One such relational property is strength: a bond between two people that varies depending on the amount of time, the amount of emotional intensity, the degree of intimacy (i.e., mutual confiding), and the extent to which services (e.g., social and emotional support) are reciprocated (Granovetter, 1973). Four main components characterize the strength of ties between people: the amount of time spent with each other, emotional intensity, intimacy, and reciprocity of services (Granovetter, 1973). Additionally, other researchers suggest the amount of time spent characteristic is synonymous with duration and frequency of contact as well as emotional intensity with relational closeness (Gilbert & Karahalios, 2009; Marsden & Campbell, 1984, 2012). Individuals with a weak tie share little closeness and are usually associated with the flow of novel information throughout a network (Granovetter, 1973; Marsden & Campbell, 1984, 2012; Nelson, 1989) and individuals who share a strong tie typically have a close, endearing relationship (Nelson, 1989), usually associated with trust and emotional/social support (Bouchillon, 2014; Gilbert & Karahalios, 2009). Although tie strength should be considered

continuous (Granovetter, 1973; Marsden & Campbell, 2012), it tends to be viewed as binary in the literature (i.e., weak and strong; Marsden & Campbell, 1984, 2012; Ryu & Feick, 2007; Tang & Chen, 2013) because of methodologically practical implications. Typically, kin and close friends are considered strong ties whereas weak ties are usually friends and acquaintances (Granovetter, 1973, 1983; Marsden & Campbell, 1984; Ryu & Feick, 2007).

Individuals in strong ties share deep connections with each other, allowing for them to be supportive of each other in numerous ways (e.g., emotional support, instrumental support, social support), and for that support to be easily and quickly given and received (Granovetter, 1983). This deep connection and general exchange may contribute to greater impact of psychosocial stressors (e.g., cognitive dissonance, dis/approval) when conversing with a person with whom they share a strong tie than with a person with whom they share a weak tie (Ryu & Feick, 2007). Additionally, when resources are exchanged between strong ties, there is little expectation for reciprocating resources of equal value and little expectation of simultaneous exchanges (Frenzen & Nakamoto, 1993) thus placing emphasis on the relationship and the strength of the tie, rather than the benefits of having that relationship.

Although weak ties may not share as strong of a connection, they are valuable for spreading information and for connecting, or bridging, groups of strong ties (Granovetter, 1973). Due to a weak tie's more phatic and less intimate connection to the individual at the center of the network than the individual's strong ties, this induces less pressure and influence on that individual. Society consists of groups of strong ties (i.e., clusters) due to the tendency of similar others to form strong ties (Granovetter, 1983). People who are weak ties are typically involved in different clusters, thus individuals can transfer information from one cluster to another with ease via their weak ties and without exposure to the source of information directly, similar to the

two-step flow (Frenzen & Davis, 1990; Granovetter, 1973; Katz, 1957). For example, a local coffee shop manager posts on their personal Facebook page that the business is looking to hire. A friend of the manager shares this post to their network. Now, the job offer has extended to individuals outside the coffee shop manager's network. Allowing the diffusion of information to those not directly connected to the coffee shop manager is a key characteristic of weak ties (Frenzen & Davis, 1990; Frenzen & Nakamoto, 1993; Granovetter, 1973; Weenig & Midden, 1991). Moreover, because of the propensity of individuals to form strong ties with similar others (Granovetter, 1983), the information becomes accessible to a wide variety of people that do not share similar characteristics with the coffee shop manager. Furthermore, when the coffee shop manger's friend shares the post with his/her friends, that individual's strong ties will be more likely to engage in the content due to the credibility associated with strong ties (Granovetter, 1983).

Social media factors. Variably strong ties can manifest within and across digital and physical spaces, however tie strength may manifest differently in those spaces. Granovetter (1973, 1983) originally conceptualized the characteristics of tie strength before social media emerged as an integral part of human interaction; thus, it is important to consider various social media factors that may influence the digital manifestation of tie strength. There are at least four ways in which social media have changed the way tie strength can manifest and be articulated: affordances, the networked audience, asynchronicity, and the interactive features of social media.

First, social media have unique affordances that may contribute to the ways people interact and create a potential for unique manifestations of the characteristics of tie strength. An affordance is a relationship between the medium and the user that can vary across media; it is not a feature of the medium nor is it an outcome (Evans, Pearce, Vitak, & Treem, 2016). Such

affordances are visibility (i.e., the degree to which information about a user is easily accessible), persistence (i.e., the degree to which a user is accessible), or anonymity (i.e., the degree to which the sender of a message is to be unknown or unspecified) that can contribute to the unique manifestations of characteristics of tie strength in digital spaces (Evans et al., 2016; Scott, 1998; Treem & Leonardi, 2012). Generally, social media have high degrees of the aforementioned affordances, except for most real-name platforms that are not characterized by anonymity (Treem & Leonardi, 2012). Important to note is that just because social media generally have high degrees of visibility and persistence, does not necessarily mean that it is the same for every user; affordances are more about a *possibility* rather than a *guarantee* (boyd, 2008).

Second, when people use social media for posting, commenting, and interacting, there is generally a mass, networked audience observing these messages and interactions (McMahan, 2004; Nechita, 2012). Before social media there were (a) interpersonal audiences where people were aware of their exact interaction partner and (b) mass media audiences consisting of an unknown number of people as well as unknown relationships among audience members and between the sender and the audience (Marwick & boyd, 2010; Nechita, 2012). Social media is a new way of bridging that gap between the interpersonal audience and mass audience; creating a networked audience consisting of audience members connected to each other as well as the sender (boyd, 2008; Marwick & boyd, 2010). Although the message sender may know an audience, they do not know who exactly is reading and receiving their messages; the sender has an *imagined* audience consisting of who they believe are reading their messages and then there is the *actual* audience to which the message is received and read (Marwick & boyd, 2010). The networked audiences, or networked publics, "reorganize how information flows and how people interact with information and each other" (boyd, 2008, p. 23).

Third, communication via social media is generally asynchronous, that is, the communication occurs with time in between each message for the interaction partners to take time to construct their messages and selectively self-present (Walther, 1996; Walther & Parks, 2002). Additionally, asynchronicity contributes to individuals' ability to more freely choose when to communicate and how much time to spend on the interaction (Walther, 1996) which could impact the manifestation of tie strength. Although asynchronous communication is not unique to social media and was frequently used historically (e.g., post mail, bulletin boards), social media users have the ability to edit a message after it has been sent (i.e. editability; Evans et al., 2016; Treem & Leonardi, 2012). Taken together with persistence and visibility, people can engage with content and each other despite temporal, social, and geographic boundaries; users can communicate when they want, where they want, and with whom they want (boyd, 2008; Ellison, Steinfield, & Lampe, 2007) while presenting the self they wish to present (Walther 1996; Walther & Parks, 2002). The reduced pressure of having to respond immediately to another and the reduced emotional intensity found in asynchronous communication (Walther, 1996) both contribute to the manifestation of tie strength in digital spaces.

Fourth, there are interactive features of social media that can influence the way tie strength manifests digitally. A unique characteristic of social media is the ability to "tag" another user, articulating that a relationship exists between the user and that individual. More importantly, a tag *publicly* demonstrates a connection between a user and the individual being tagged. The time spent tagging a user and the public articulation of that relationship with the user both uniquely contribute to the manifestation of tie strength digitally by integrating selective self-presentation (Walther, 1996; Walther & Parks, 2002), visibility, and editability (Evans et al., 2016; Treem & Leonardi, 2012). Before social media, two people could take a walk in a park as

a public articulation of spending time together and in turn, publicly articulate their relationship; however, when tagging a user, people have an asynchronous medium to take time to construct the tags (thus selectively self-presenting) and can edit the message/post after it has been sent and made visible (Evans et al., 2016; Treem & Leonardi, 2012). Previous researchers have used tags to measure tie strength in digital spaces (Grabowicz, Ramasco, Moro, Pujol, & Eguiluz, 2012). Additionally, there are paralinguistic digital affordances (PDAs; Hayes, Carr, & Wohn, 2016) that are simple, one-click cues on social media (e.g., likes on Facebook and Instagram, favorites or retweets on Twitter) that stimulate meaning without using written language (Hayes et al., 2016). The simplicity and ease of using PDAs may portray them as having little social meaning, however, researchers suggest that PDAs can be used as social support and may be indicative of relational closeness (Carr, Wohn, & Hayes, 2016; Hayes et al., 2016; Wohn, Carr, & Hayes, 2016).

Digitally manifested tie strength. As previously noted, Granovetter (1973) posits four characteristics of tie strength: time spent together, emotional intensity, intimacy, and reciprocity of services. Each characteristic, based on affordances, networked audiences, asynchronicity, and the interactive features of social media, should manifest uniquely to social media as compared to ties formed and maintained in physical spaces alone. For instance, affordances of social media make public the interactions between two tied individuals (Evans et al., 2016) while multiple, networked audiences observe (boyd, 2008, 2011; Marwick & boyd, 2010); affordances allow for the potential to be persistently contacted and observed (Hampton, 2015; Treem & Leonardi, 2012) while sometimes using one-click features of social media to help maintain relationships and express support (Carr et al., 2016; Hayes et al., 2016; Wohn et al., 2016); all these potentials can occur asynchronously, allowing for each person in an interaction to carefully construct a

self-presentation without the need for immediate attention or an immediate response (Walther, 1996; Walther & Parks, 2002) while being either geographically close or distant (Ellison et al., 2007). The remainder of this section will elaborate on the characteristics of tie strength as they manifest in physical spaces and how, considering the aforementioned social media factors, tie strength may emerge differently in digital spaces.

Historically, people could spend time together by engaging in activities such as shopping, watching TV, or going for a walk. However, while people can still do the aforementioned activities to spend time together, those activities require people to be within a physically/geographically close space. Social media is known to be able to bridge across geographic boundaries and help to maintain relationships (Ellison et al., 2007) and, more generally speaking, technologically mediated communication can often supplement face-to-face communication (Caughlin & Sharabi, 2013). For instance, in the context of Twitter, users are able to "mention" another user when they send a message (i.e., tweet). This is done by typing "@" followed by the Twitter username of the intended receiver of the tweet. This simple and direct message should stand place for time spent together (Grabowicz et al., 2012). Physically typing out the user name of the intended receiver of the message may substitute for the sender's time spent with the receiver (even if brief) because of the time it takes to type the intended receiver's name. The receiver then is notified of the tagging, which in turn can cause the receiver to spend time thinking about the sender and, potentially, responding to the message. Moreover, these tags are performed publicly, or in front of the audiences of the involved users; with networked publics or audiences, users are competing for visibility and the attention given by tagging can grant the user affirmation of their visibility (boyd, 2008). Persistent contact, the ability to communicate with someone at any moment (Hampton, 2015), also contributes to the

asynchronous nature of time spent together on social networking sites because if the sender's message can still reach the receiver, even if the receiver is preoccupied and unable to engage in conversation immediately. This also gives the receiver time to view and respond to the message when they have the free time. This is a key component of tags that articulate the relationship publicly, utilizing the affordance of visibility (Treem & Leonardi, 2012). Visibility can allow for users to not only see information about other users, but to also see their knowledge, opinions, and how they self-present (Treem & Leonardi, 2012). Therefore, the enactment of the time spent together characteristic of tie strength may manifest in digital spaces asynchronously and publicly.

It is possible that intimacy can be indicated through the use of tagging another user or sharing their content. Pervasive awareness, a sense of current events in friends' lives (Hampton, 2015) is contributed to by the visibility characteristic of social media (Treem & Leonardi, 2012). Pervasive awareness results in less time being needed to invest in a tie to become cognizant of their everyday life activities, along with life-changing events (Hampton, 2015) and occurs when the user is scrolling through their Facebook news feed, checking Instagram, or going through the Twitter feed. Moreover, Twitter users tend to have high levels of ambient awareness, a similar construct to pervasive awareness (Levordashka & Utz, 2016). Ambient awareness is associated with ambient intimacy, or the feeling of closeness with others on social media developed through status updates on social media (Lin, Levordashka, & Utz, 2016). Therefore, in addition to having high levels of ambient awareness, Twitter users may also experience high levels of ambient intimacy (Lin et al., 2016). Additionally, when a Twitter user feels close to another user, they are more likely to share (i.e., retweet) each other's tweets, demonstrating a public display of closeness (Tang, Miao, Quan, Tang, & Deng, 2015). Taken together, intimacy can

emerge as ambient or peripheral—a possible result of simply checking a social media's feed—and much like the time spent together characteristic of tie strength in digital spaces, intimacy may also be a public articulation.

Closeness is considered to be equitable to the emotional intensity characteristic of tie strength (Marsden & Campbell, 1984, 2012). PDAs are indicative of relational closeness when perceived by the receiver as intentional (Carr et al., 2016) and are positively related to perceived social support (Wohn et al., 2016). Much like mentions on Twitter, PDAs can suggest directionality (i.e., sender to receiver) as well as intentionality, however, PDAs can be more telling of relational closeness than the content of messages (Hayes et al., 2016). Furthermore, PDA exchanges happen asynchronously, similar to mentions, thus placing emphasis on how these characteristics of tie strength can manifest as asynchronous on social media as well. These characteristics of social media are exemplars of how social media reduces effort needed to maintain a relationship (Cornejo, Tentori, & Favela, 2013; Ellison et al., 2007) and thus, changing the manifestation of closeness and emotional intensity by reducing the time and effort costs.

The last characteristic of tie strength that can be manifested differently in digital spaces is reciprocity of services. Historically, people could reciprocate services by exchanging gifts or reciprocating emotional and social support when physically near each other. However, the reciprocity of those services can occur on social media without the need for physical proximity. For example, PDAs can serve as surrogates for emotional and social support (Wohn et al., 2016). Additionally, users of social media, such as Facebook, tend to use the medium for social and emotional support rather than the accumulation of weak ties (Ellison et al., 2007), although, there has been a decline in the use of Facebook for the aforementioned types of support (Ellison,

Steinfield, & Lampe, 2011). Retweeting a user can show support for what the user is saying, which contributes to why users that are close to each other tend to retweet each other as well (Tang et al., 2015). Important to note is that the asynchronous nature of social media allows for reciprocity to not take place in real-time or simultaneously, which is typical among strong ties (Granovetter, 1983). Therefore, a simple mention or tag should represent all facets of tie strength, making it a reliable predictor of tie strength in digital spaces.

Taken together, social media users spend time with others on social media, but may do so asynchronously by tagging; a mention is a public articulation of spending time together and a broadcast of the relationship between the users tagging each other. The pervasive and ambient awareness derived from scrolling through a news feed on social media can lead to an increase in the intimacy a user may experience with their social network. PDAs also contribute to the ease in developing and maintaining intimacy while simultaneously being used to reciprocate services such as social support; PDAs are also indicative relational closeness. These social media factors may facilitate a different manifestation of the characteristics of tie strength that may also contribute to individual-level and group-level influences derived from people a user is strongly connected to as well as the structure of the user's immediate digital social network.

Network Features as Normative Influences

The proceeding sections will elaborate on the features of a person's social network, how those features may influence an individual, and how the influences may manifest in an individual as a fear of being judged. First, the proceeding sections will explain networks features such as an individuals' strong ties—the people that individuals are strongly connected with—and their influence on the individuals by shaping their perceptions of themselves (Green & Pritchard, 2003; Sheldon, 2010; Tang & Chen, 2013; Yeung & Martin, 2003). Second, because strong ties

tend to gravitate towards each other (Granovetter, 1983), group-level network features such as the presence of multiple groups or, conversely, the presence of one main group, will be explained in relation to the groups' possible influences through social norms over the person at the center of the network. Third, network features and their (normative) influences will be elaborated on in the context of social media; certain affordances or features of social media may augment these influences and could possibly facilitate the manifestation of a fear of being judged on social media.

Individual strong-tie influences. A person's strong ties, in general, have more influence over one's thoughts, feelings, and behaviors than do weak ties. Individuals are more trusting of people with whom they have strong ties than weak ties (Bouchillon, 2014) and the people an individual is strongly tied with are perceived as more credible than the people the individual is weakly tied with (Granovetter, 1983); as such, information from strong ties is perceived as more influential in the receiver's decision making compared to information from weak ties (Brown & Reingen, 1987; Frenzen & Davis, 1990; Weenig & Midden, 1991). Individuals also tend to automatically present themselves more favorably to strangers but more modestly to strong ties because of expectation for future interaction, prior knowledge of the individual, or accountability for exaggerating (Tice, Butler, Muraven, & Stillwell, 1995).

Emerging from this more general influence, strong ties have more specific influence over an individual's self-image than do weak ties (Tang & Chen, 2013), even compared to the strong effects of mass media (Green & Pritchard, 2003) and individual differences. Pressures from family members (generally strong ties) can be remarkably powerful, as one's body dissatisfaction is more strongly influenced by family pressure and self-esteem than by the age of the individual or the influence of the media (Green & Pritchard, 2003). Furthermore, family and

peer pressure are also more predictive of low body esteem and social comparisons than amount of media consumed (Sheldon, 2010). Therefore, it may be the perceptions of others—others with whom an individual is strongly connected—that influence individuals' perceptions of themselves the most.

Aside from influencing self-perceptions, people that individuals are strongly tied with influence the individuals' behaviors. For example, information flows through weakly tied individuals in a network faster than those that are strongly tied, however, the information received from the people with whom the individual is strongly tied is more likely to change the individual's behavior (Weenig & Midden, 1991). Additionally, an adolescent's closest friend is more likely than the adolescent's good friends to influence the adolescent to have their first cigarette and drink of alcohol (Urberg, Değirmencioğlu, & Pilgrim, 1997). Taken together, these findings may suggest that when an individual's strong ties—the people who are strongly tied to the individual—are accepting of a behavior, the individual is more likely to adopt the behavior than when the individual's weak ties—those who are weakly tied to the individual—are accepting of a behavior. In other words, the social norms set in place by people strongly tied to the individual may be more influential than the social norms set in place by the people strongly tied to the individual.

Strong-tie influences on self-image may also be understood as a "looking glass effect:" when an individual's self-perceptions align with that of distinct others' perceptions of the individual (Yeung & Martin, 2003, p. 844). People seek this congruency (Yeung & Martin, 2003) and people also want their self-perception to align with how individuals with whom they are strongly tied perceive them (Cooley, [1902] 2015; Yeung & Martin, 2003). If the perceptions of the self and other do not align, this can result in a dissonance being experienced

(Yeung & Martin, 2003). Yeung and Martin (2003) present three findings of importance to this study that validate and expand upon the original conceptualization of the looking glass effect. First, an individual creates an understanding of how distinct others perceive him/her and internalizes it, particularly perceptions of people that are significant in his/her life, or those that are strongly tied to the individual. Second, an individual realizes that his/her self-perception does not align with that of the distinct other, this creates a feeling of apprehension associated with being evaluated. Third, if individuals realize their self-perceptions do not align with how the distinct others viewed them, the individuals would change their behavior or reported characteristics over time. Therefore, discrete, strong-tie relationships can induce a sense of apprehension about being evaluated according to social norms.

Although the influence of strong ties over a person's self-image (Tang & Chen, 2013) and behaviors (Urberg et al., 1997) as well as the investment (Granovetter, 1983) and trust (Bouchillon, 2014) people place upon strong ties, the possible additive and aggregate amount of tie strength have yet to be explored in regard to influence. Due to the unique influences of various types of strong ties (e.g., family, best friends), a possibility is that the larger the aggregate amount of tie strength—i.e., the cumulative amount of strength between people and their connections—the more influence and pressure the person at the center of the network could experience. Experiencing influences and pressures from strong ties, as previously mentioned, could give rise to evaluation apprehension; when the strength of ties in an individual's network is aggregated, then the network-level interpersonal influences can be more understood as it relates to the center of the network's experiences of evaluation apprehension.

Group strong-tie influences. One key characteristic of strongly tied individuals is their emergence through peoples' tendencies to gravitate toward similar others (Granovetter,

1983). These groups of strong ties, also referred to as *clusters* (Granovetter, 1983), form cliques and interest groups, often referred to as communities (Granovetter, 1983; Girvan & Newman, 2002; Newman, 2003). A characteristic of clusters is their density, or the number of direct connections among the individuals in the cluster (Ertem, Veremyev, & Butenko, 2016; Newman, 2003; Watts & Strogatz, 1998). For instance, a densely-knit cluster that consists of a group of individuals (three or more people) who all share relationships, or direct ties, with each other, is a *clique* (Luce & Perry, 1949) and a cluster with a small number of direct ties is considered *relaxed* (Ertem et al., 2016). For instance, an individual's friends from school may not all know each other, forming a relaxed cluster, whereas an individual's sports team or immediate family can be considered a clique because, everyone is connected to each other.

The propensity of similar individuals to cluster together may lead to cluster-specific norms (TenHouten, 2016; Turner & Tajfel, 1986) as opposed to strong tie-specific norms. An example could be a hobbyist group, such as a homebrew club. People seek to join the group because they share a common interest with that group: brewing beer at home. Within that group, cliques may develop based on professions or other characteristics. For instance, five members could realize, through spending time with each other and having conversations, that they are all secondary education teachers. The similarity between these individuals lead to similar norms, each person bringing the same norms to the group and thus reinforcing said norms. While the looking glass self is best understood at the dyadic level, expectations attributed to strong-tie judgment may also emerge out of more generalized, group-level norms.

Social norms as influence. Social norms are a dialectical construct (Lapinski & Rimal, 2005; Rimal & Lapinski, 2015) that are unofficial rules set to govern one's behavior (Klonick, 2016). There are descriptive norms and injunctive norms (Cialdini, Reno, & Kallgren,

1990). Descriptive norms refer to the explicit action taken by an individual in a certain situation (Cialdini et al., 1990; Napper, Kenney, Hummer, Fiorot, & LaBrie, 2016). For example, when an individual steps onto an escalator at the mall, he/she observes that everyone is standing in a straight line on the right side of the escalator, leaving room on the left for people in a rush to move faster. Since everyone else is doing it—that is, there is immediate social proof of a behavior viability—then it must be the right thing to do (Cialdini, 2001; Cialdini et al., 1990; Cialdini, Wosinska, Barrett, Butner, & Gornik-Durose, 1999). Injunctive norms can be thought of as what other people think about behaviors, or what should be done in a situation (Cialdini et al., 1990; Napper et al., 2016). For instance, a person walking a dog might see an abundance of dog feces at a local park, thus inferring that it is acceptable, by the community, to leave behind his/her dog's droppings. As such, descriptive norms are based on direct observation and injunctive norms are based on observation-based inferences for norms. To further distinguish the two types of norms, the seminal work on injunctive and descriptive norms by Cialdini, Reno, and Kallgren (1990) manipulated these variables by having a confederate litter in the presence of the participant (descriptive norm—explicit action) and by having the environment covered in litter before the participant arrives (injunctive norm—there is already litter around, therefore the community must be accepting towards littering here). Cialdini et al. (1990) found injunctive norms are more important to one's decision making and behavior choices than descriptive norms. Therefore, it may be the acceptance of a behavior by a group that has more influence over an individual than observing what other people do which is an important finding when considering a social media user's digital social network as discussed later in this section.

Injunctive norms set in place by individuals' groups of strong ties tend to have direct effects on an individual (Barman-Adhikari, Tayyib, Begun, Bowen, & Rice, 2016; Napper et al.,

2016). An individual is more likely to engage in cannabis consumption when he/she perceives that family and close friends (groups of an individual's strong ties) approve of cannabis use while descriptive norms had no direct or indirect effect on likelihood to consume (Napper et al., 2016). Some research, however, does not differentiate between individuals' perceptions of others' acceptance of behaviors and whether or not the individuals actually see the behavior being enacted. For example, if an adolescent's friend group smokes cigarettes and consumes alcohol, the adolescent is more likely to regularly smoke cigarettes and consume alcohol (Urberg et al., 1997), however, it is unknown whether the adolescent observes the friend group engaging in the behaviors or if the adolescent only hears about the behaviors and perceives the behaviors to be acceptable. Regardless, it is the *acceptance* of a behavior by a group, in particular a group of familiar others, that contributes to an individual's propensity to engage in said behavior.

The panopticon (Foucault, 1995) is an example of how a group, or society, governs its constituent's behaviors based on these norms set in place. Originally conceptualized as a prison, the panopticon was meant to keep prisoners abiding by the rules of the prison but doing so in a way that the prisoners monitor themselves (Foucault, 1995). A tall, stone tower stands in the middle of a dome; all of the dome is covered in prison cells that can be seen from the top of the tower; a staircase runs through the tower but the entrance and exit are hidden from the eyes of the prisoners; the top of the tower is positioned so that the lighting illuminates the cells but keeps the guards in the tower hidden by shadows; the prisoners are unsure whether they are being watched, however, they know that deviant behavior is punished so they keep to the standards of the prison (Foucault, 1995). Important to note is that no one needs to be in the tower because the prisoners keep themselves under control; it is the fear of surveillance and punishment of deviant behaviors that create an environment where the prisoners feel a pressure of indefinite

examination, even if no one is observing them because, as previously mentioned, they prisoners are blind to the (possible) guards in the tower. The physical panopticon has been considered more abstract though, being applied and observed in many groups; example of this are large scale groups—e.g., villages and societies—and small-scale groups—e.g., schools, hospitals, workplaces—each functioning as a metaphoric panopticon (Foucault, 1995). The idea is that because the prisoners of the panopticon are unaware of who is watching, no hierarchical surveillance needs to be present (Foucault, 1995). Anyone can be watching and enforce their norms onto the prisoners.

Foucault (1995) discusses the surveillance in terms of neighbors watching each other which could be considered an individual-level influence; however, it is the social norms of the group through which the individuals surveil each other for (un)acceptable behavior, and thus, the discipline-mechanism of the panopticon may be best understood as a group-level influence. There is no salient authority needed to change the behavior of the people in the group, however, the referent group from which the norms are set in place by is crucial to understanding the link between norms and behavior such that the acceptance of behaviors by a person's friend group is more likely to change behavior than the acceptance of behaviors by the person's college campus (Cho, 2006) and that similar others can influence the person's self-efficacy in doing a behavior more than the perceived benefits of doing a behavior (Rimal, Lapinski, Cook, & Real, 2005). Again, it is the *acceptance* of behaviors that in turn, influence an individual.

The affordances of social media may augment the influences and pressure to conform to the norms of the group. For instance, a social media user's profile is persistent, meaning that it can be accessed at any time by other users (Evans et al., 2016; Hampton, 2015) and the information a user shares on social media is highly visible (Treem & Leonardi, 2012) so at any

time and from anywhere, groups can surveil an individual with ease. Important to note is ambient awareness, or the knowledge users gain about other people in their social network through monitoring the news feed of a given social medium (e.g., Instagram, Facebook, Twitter). If users are ambiently aware of their connections on social media, it is possible that they know others are ambiently aware of them. Since mentions on Twitter can send an alert or notification to the individual being mentioned, this could result in that individual becoming aware that others are thinking of, or surveilling, them (Lu & Hampton, 2016). Although PDAs are associated with social support and relational closeness (Hayes et al., 2016; Wohn et al., 2016), they could also serve as reminders of the surveillance occurring. If people are aware that they are being surveilled, they may experience a fear of being judged (i.e., evaluation apprehension; Porter, 1986); they may feel pressure to keep performing in a manner consistent with what the group believes is acceptable.

The function of the norms of groups are not always dependent on varying weak or strong ties. Rather, the norms governing people may be greatly influenced by the density of their network. For instance, although injunctive norms may be more powerful when considering the referent group (Barman-Adhikari et al., 2016; Napper et al., 2016), they do not always function based on tie strength. In fact, the implicit nature of injunctive norms may even make tie strength irrelevant because of the environmental cues that signify an acceptance of a behavior rather than cues derived from particular others, therefore, the norms at the group level may be more important when considering network density rather than tie strength. Up to this point in the present study the argument has been that a densely-knit cluster, where each individual in the group is connected to each other (e.g., a friend group, family), may exert pressures on an individual to conform and act in an accepting manner and thus, may contribute to the individual

fearing being judged. However, rather than having a densely-knit network of strong ties, all exerting their influence, pressure, and norms onto a person, it may be that a diverse and differentiating, loosely-knit network of strong and weak ties that may exert the most pressure onto a person because of the multiple, differentiating, and possibly conflicting norms set in place by each group.

In the pre-industrial society, because of geographic boundaries, people typically had one densely-knit group of strong ties constituting their social networks; however, in urban-industrial or modern society, social networks became more loosely-knit and consists of a few strong ties and many week ties, usually focused around certain social contexts (Hampton, 2015). With networked audiences or networked publics representing different social contexts (e.g., family, work, school), it can become difficult for a user to maintain each differentiating social context (boyd, 2008; 2011). When each social context expects the individual at the center of the network (i.e., ego) to perform a certain identity or interact according to the norms of each social context, the social contexts may collapse (i.e., context collapse; boyd, 2008; 2011). As noted by boyd (2008), context collapses occurred before social media in the pre-industrial society (e.g., a wedding), however, in physical settings the audience(s) are typically aware of each other and the context collapse occurring whereas on social media, the user is often unaware of the different contexts. There are context collusions and context collisions (Davis & Jurgenson, 2014). A context collusion occurs when multiple audiences or publics are intentionally collapsed (Davis & Jurgenson, 2014), such as with a wedding or graduation party. Conversely, a context collision is when a message unintentionally reaches the multiple, differentiating audiences; usually some of the audiences reached by the user are unwanted and undesirable for the specific message sent (Davis & Jurgenson, 2014). Therefore, a context collision may result in a social media user to be

concerned with their messages being accepted by all the audiences and thus, could evoke a fear of judgment that is more salient with having multiple audiences than when a social media user has one main densely-knit audience for which to cater.

These collisions, or the potential of collisions, can increase the amount of unfriending on Facebook in an attempt to reduce the number of opposing viewpoints and increase network homogeneity (John & Dvir-Gvirsman, 2015; Sibona, 2014). Users often cater their behavior to their audiences (Vitak & Ellison, 2012; Vitak 2012) and when users have privacy concerns, they tend to disclose less (Vitak, 2012). Additionally, users are more honest, intimate, detailed, and sincere when they utilize features of social media that allow them to send specific messages for specific social contexts or friend lists (Vitak, 2012). Therefore, the fear of a context collision, rather than of a single social context, could induce more fear of judgment and acceptance.

Currently, there is a limited understanding of how these pressures and influences function in digital social networks and the effect they have on an individual. The multiple, and possibly conflicting norms set in place (Turner & Tajfel, 1986) by both the group and the dyad, may cause an individual to experience apprehension.

Norms and Contextual Evaluation Apprehension

Injunctive norms are associated with (dis)approval (Cialdini et al., 1990; Napper et al., 2016) and are found to directly affect an individual's behavior (Barman-Adhikari et al., 2016; Napper et al., 2016) influencing their decision of how to act in situations; therefore, an individual may feel a sense of apprehension related to the potential for being negatively or positively evaluated relative to these norms. In other words, a person may experience a fear of judgement (i.e., evaluation apprehension; Bordia et al., 2006; Duncan et al., 1969; Porter, 1986). Because digital social networks promote persistent, ambient awareness of the people in one's network—

and because those in the network may have an awareness of that person (Hampton, 2015; Treem & Leonardi, 2012)—reciprocal awareness could, implicitly or explicitly, create a feeling of evaluation apprehension, or the fear of being perceived unfavorably by an audience (Duncan et al., 1969; Porter, 1986; Tice et al., 1995). Given that strong-tie perceptions are valued over weaker ties, especially related to self-image (Green & Pritchard, 2003; Sheldon, 2010), injunctive norms associated with strong ties and associated clusters may have particularly strong potential to induce evaluation apprehension. When individuals feel high levels of evaluation apprehension, they are less likely to share knowledge than when they experience low levels of evaluation apprehension (Bordia et al., 2006). In Brodia, Irmer, and Abusah (2006), the researchers had an interpersonal condition and a database condition (i.e., an intranet program at an organization that connects members and allows for sharing work-related knowledge, similar to a SNS) and found that evaluation apprehension is greatest when sharing knowledge through the database as opposed to face-to-face communication, thus placing emphasis on the ability of a digital space to not only change how communication happens, but how it might even increase feelings of apprehension. Evaluation apprehension is also dependent on "contextual idiosyncrasies" (Porter, 1986, p. 9). In other words, the source of evaluation (in particular the importance of the source to the individual) influences the level of evaluation felt by that individual (Porter, 1986), such that a stronger tie should exert stronger felt evaluation than would a weaker tie.

Although evaluation apprehension may be considered a trait (Porter, 1986), there may be contexts that influence experienced evaluation apprehension such as the classroom environment (Edwards, Myers, Hensley-Edwards, & Wahl, 2003) and an organization's climate (Bordia et al., 2006). Therefore, digital environments and digital social network structures could be considered

a new context that influences experiences of evaluation apprehension induced by awareness of social norms. Traits are often more useful in predicting behaviors when observed over time (Infante, 1987; Infante, Rancer, & Wigley, 2011); conversely, states are temporary and more of a situational response (Booth-Butterfield & Gould, 1986). For instance, people with high trait evaluation apprehension generally experience high levels of fear of judgement, people with high state evaluation apprehension experience a high degree of fear of judgment at that moment, but it does not persist over time. However, some people may have a propensity to experience high amounts of evaluation apprehension in certain contexts, while concurrently experiencing low amounts of evaluation apprehension in other contexts (McCroskey, 1984; Booth-Butterfield & Gould, 1986). Important to note, however, is that argument here is not meant to ignore evaluation apprehension as a trait or to posit it as a state, but rather, to pose it as contextually dependent (particularly digitally). Proponents of communication traits also often emphasize the importance of considering one's predispositions *in tandem* with situational factors (an interactionist theory; Infante, 1987; Infante & Rancer, 1982) and therefore, a context approach to evaluation apprehension may be most beneficial to exploring possible influences.

There are four main dimensions of trait evaluation apprehension: valence towards being evaluated (i.e., approach-avoidance), expected rewards from evaluation, evaluation source, equitability of fairness (Porter, 1986). The aforementioned digitally specific phenomenon and affordances should change the way evaluation is experienced and in turn, may create new dimensions or modified dimensions specific to the digital context. Therefore, the remainder of this section will expand upon the trait conceptualization of evaluation apprehension and how it may be influenced by the digital context.

The valence dimension taps the facet of evaluation apprehension associated with an

individual's predisposition towards being evaluated (Porter, 1986). For instance, some people enjoy the thrill of being evaluated—the performance and possibility to impress leads them to approach situations that may have particularly high levels of evaluation. However, considering synchronicity, if a user has more time to carefully construct a message, then they could approach the potential evaluation more because they can self-present in a way that they could not do when face-to-face (Walther, 1996; Walther & Parks, 2002) or they may avoid more because of the time and effort it takes to carefully self-present. Additionally, when a users' digital social networks consist of multiple social contexts (boyd, 2008, 2011), there may be some audiences that they tend to gravitate more towards because of greater shared homophily (Granovetter, 1983).

The second dimension, expected rewards from evaluation, addresses the possibility that immense rewards (or no reward) will come from the situation (Porter, 1986). An example could be an undergraduate presenting a paper at a conference, expecting a large pay-off such as getting into a quality graduate program. On social media, expected rewards could be retweets, likes, or other PDAs that indicate other users are receiving and accepting of a user (Hayes et al., 2016). Additionally, there may be audiences or social contexts that are part of social media users' networks that have a possibility of being more rewarding than other social contexts. For example, an athlete may see a greater potential for rewards when being evaluated by members of her sports team, however, she may have little expected rewards from her summer retail job and thus, may be more likely to approach the evaluation of her sports team but avoid evaluation from her summer job.

The source of evaluation, or the importance and salience of the individual doing the evaluating, is the third dimension of evaluation apprehension (Porter, 1986). If the undergraduate from the previous example is being evaluated by a scholar that has been

influential in the undergraduate's decision to pursue a career in academia (that is, the scholar is a "higher-value" evaluator), s/he may feel more apprehensive. However, on social media, the source of evaluation is a networked audience that may be known or unknown (Marwick & boyd, 2010) and considering context collusions and collisions, there could be a difference between the *imagined* audience, the *intended* audience, and the *actual* audience (Davis & Jurgenson, 2014). The variety of audiences present (and persistent) in digital social networks may make the salience of the source more ambiguous. However, if a social media user receives considerable attention from a few friends on social media, that may lead to those friends being a salient source.

The last dimension of evaluation apprehension addresses the perceived fairness of the evaluation (Porter, 1986). For example, if the undergraduate is on a panel with Ohio State students and the respondent to the panel is also from Ohio State, s/he might feel more apprehensive because of the similarity between the other panel members and the respondent and the potential disadvantage it gives to the undergraduate. Although users may be unaware of the audience that is receiving their messages (Marwick & boyd, 2010), thus reducing the salience of the source, social media users may not feel any equitability of the evaluation because they are unaware of who specifically is judging them. However, it is also possible that the unknown audience might weigh heavier as far as equitability because it might be unfair that the user has little control over who receives their messages. Social media users do try to increase the homogeneity of their networks (John & Dvir-Gvirsman, 2015; Sibona, 2014) and sometimes actively choose who is receiving their messages and cater their behaviors to all the social contexts constituting their digital social networks (Sibona, 2014; Vitak 2012; Vitak & Ellison, 2012) which could be indicative of context collapse's influence on the equitability of evaluation

dimension. Therefore, the perceived fairness dimension may also be more context dependent, especially considering the variety of social contexts that may be present in a social media user's digital social network.

Hypothesis and Research Question

As outlined in the preceding literature review, an individual's strong ties have more influence over the individual than their weak ties. These influences occur at the individual level and the group levels because of the looking glass effect (Yeung & Martin, 2003) and through injunctive norms (Cialdini et al., 1993), respectively. Since strong-ties have more influence on individuals (Green & Pritchard, 2003; Sheldon, 2010), since strong ties induce injunctive norms (Cialdini et al., 1990; Cialdini et al., 1993), and since injunctive norms are associated with evaluation apprehension (Duncan et al., 1969), it follows that the greater the strength of immediate ties in a social network, the more evaluation apprehension one would feel. Therefore:

H_1: The aggregate strength of ties in an individual's online social network will be positively related to reported evaluation apprehension.

If an individual's strongest ties on social media are all part of the same cluster and form a clique (i.e., a group where every individual is connected to each other; Luce & Perry, 1949) and are all strongly tied to one another, then there may be one set of injunctive norms reinforced by each strong tie, increasing the amount of evaluation apprehension to conform to those norms. In other words, a user may feel as if their network is aggressive and strict because of how salient and reinforced that specific social context's norms are. Alternately, if the cluster is relaxed (i.e., a group which is only loosely knit together; Ertem et al., 2016) and only some of the individuals are connected or all group members are only weakly connected, then each strong tie may have its own set of injunctive norms set in place from the clique they are associated with. This collision

of injunctive norms could *also* result in increased feelings of evaluation apprehension associated with having to conform to the norms of multiple cliques. Given these competing potential influences on network density and evaluation apprehension, the following research question is posed:

RQ1: What relationship exists between the density of a user's immediate digital social network and the degree of evaluation apprehension the user experiences?

Method

To examine the posed hypothesis and research question, social networking service (SNS) users' network structures—in particular individual and cluster tie strengths—were evaluated to identify potential relationships between evaluation apprehension and (H1) tie strength and (RQ1) strong-tie cluster density.

Research Context

Individuals' strong ties may emerge from or are imported to SNS (such as Facebook, Twitter, and Instagram) that, as noted in the literature review, afford the ways strong ties may manifest. In particular, the tagging of a specific user such that the user becomes aware of the tagger creates the fundamental conditions under which strong ties may emerge. One network in particular—Twitter—takes this tagging as a core feature for SNS participation. As a practical consideration, Twitter allows for users' social networks to be exported and visualized, unlike other platforms, facilitating analysis of network structures. As such, this study will take Twitter as its research context in order examine relationships between tie strength (via mentions) and evaluation apprehension.

Twitter information. Twitter, which brought in more than 2.5 billion dollars in revenue for 2016 (Statista, 2017), is a SNS that allows a user to create an account and then can follow

another user in order to have that user's tweets, or message postings consisting of 140 characters or less, appear in a news feed. Twitter users can also make their account private so only users they allow to follow them can view their tweets. Twitter can be accessed through a computer connected to the internet or through a mobile phone. As of May 2016, the U.S. was the leading market of active Twitter users, with about 67 million monthly users whereas the second leading market of active Twitter users was India with about 41 million monthly users, followed by Indonesia with 24 million monthly users and Japan with 22 million monthly users (Statista, 2017). According to the Pew Research Center (2016), 24% of U.S. internet users (and 21% of all U.S. adults) are Twitter users. Most U.S. Twitter users are in the 18-29 age range (36%) as compared to the age ranges of 30-49 (23%), 50-64 (21%), and 65+ (10%). Of all the U.S. Twitter users, 42% are daily users, 24% are weekly users, and 33% use Twitter less frequently than weekly (Pew Research Center, 2016). Overall, the average time a Twitter user spends using Twitter is 165 minutes a month (Statista, 2017).

Tie strength on Twitter. Although the bifurcation of tie strength into weak or strong ties is popular in much related literature (e.g., Ryu & Feick, 2007; Tang & Chen, 2013), tie strength should be considered a continuous variable (following Chiu, Chen, Joung, & Chen, 2014; Frenzen & Davis, 1990; Marsden & Campbell, 1984). Notably, then, the heuristic of parsing out strong ties from weak ones—especially tendencies to assume that person categories have inherent strengths (e.g., family is high and co-worker is low)—is a bit simplistic, as tie strength actually exists along a continuum rather than being categorically low or high (Marsden & Campbell, 1984).

This variable tie strength is measured using parametric predictors of tie strength or nonparametric indicators of tie strength (Marsden & Campbell, 1984). *Predictors* of tie strength

are continuous variable measures of amount of time spent together, emotional intensity, intimacy, and reciprocity of services between two nodes (Granovetter, 1973) whereas *indicators* of strong ties typically request participants to categorize ties as close friends, family members, or acquaintances (Marsden & Campbell, 1984). Generally, the tie strength of an offline tie is measured using the indicators of tie strength (Marsden & Campbell, 1984; Ryu & Feick, 2007; Tang & Chen, 2013) or a combination of predictors and indicators (Frenzen & Nakamoto, 1993). For example, there are scales used to measure tie strength (Frenzen & Davis, 1990) however researchers also use categories (Brown & Reingen, 1987; Weenig & Midden, 1991). The strength of online ties, then, is measured inconsistently. In one study on blog networks, researchers operationalized tie strength by (a) whether the two users were official friends on the site, (b) number of comments an individual would leave on another's post, and (c) the direction of those comments (Chiu et al., 2014). Additionally, the number of mentions between two users on Twitter can aggregate to tie strength (Grabowicz et al., 2012). Other studies use the more categorical indicators of tie strength, asking participants to list five close friends and five acquaintances (Wilcox & Stephen, 2012). The frequency of interaction between two individuals is used to measure tie strength of online social networks (Chiu et al., 2014; Grabowicz et al., 2012). However, some researchers use indications of tie strength similar to offline studies (Wegge, Vandebosch, Eggermont, & Walrave, 2014; Wilcox & Stephen, 2012).

The present study used the number of times a user was mentioned (e.g., tags) and retweeted (i.e., PDA), respectively. These were used to measure tie strength because, as argued in the literature review, they potentially represent the facets of tie strength as they may manifest in digital spaces. First, the time it takes to type users' names when mentioning them, the public articulation of the relationship, and the opportunity to be reciprocating services (e.g., social

support, emotional support, conversation) contribute to make mentions an adequate measure of tie strength. Second, a retweet is a one-click feature of Twitter that could be considered a PDA. PDAs can be used for social and emotional support (Wohn et al., 2016) which may be services exchanged between two tied individuals; PDAs are indicative of relational closeness (Carr et al., 2016) which can be surrogate for the emotional intensity characteristic of tie strength (Marsden & Campbell, 1984, 2012); a retweet is a PDA that, much like a mention, is a public articulation of the relationship. Retweets have also been used to measure tie strength previously (Grabowicz et al., 2012).

Participants and Recruitment

Importantly, because the study focuses on tie and cluster strengths specifically on Twitter, the study was limited to active Twitter users. Specifically, inclusion criteria were that participants (a) must have been an active Twitter user—i.e., sent a tweet on Twitter within past two weeks—and (b) must have been an undergraduate at least age 18, enrolled in a Communication Studies research pool class. The two-week mark for sending a tweet is ideal because being active within that time frame should indicate that the participant uses Twitter regularly without making the time frame too narrow, thus reducing the number of potential participants because the majority of Twitter users are active at least bi-weekly (Statista, 2017). Considering participants spent an average of 68.48 minutes (SD = 57.05) on Twitter daily, it appears as if the two-week benchmark was sufficient for recruiting active Twitter users in terms of Twitter usage. Interestingly, the ranges of mentions (0-7) and retweets (0-12) were relatively low, suggesting that although participants were active consumers of Twitter content, they were not often producing or receiving content. In other words, it appears as if participants were frequent *passive* Twitter users.

Participants were undergraduate students enrolled in Communication Studies classes at a mid-sized, mid-Atlantic university (N = 96) consisting of freshman (n = 24), sophomores (n = 29), juniors (n = 24), and seniors (n = 18); one did not indicate a class ranking. There were 28 men (29.17%), 68 women (70.83%) and none identified as a nonbinary gender. The participants were recruited from the Communication Studies Department's research pool, using web and bulletin board posts, electronic class announcements, and in-class announcements. Participants were asked to participate in a study about their social ties and experiences on Twitter. The undergraduate student demographic is ideal because, according to the Pew Research Center (2016), the age group that most frequently uses Twitter is that of the 18-29 years (36%), a large portion of which is made up of college students. In exchange for participation, participants were offered research participation credit per the department's research participation policies. Although a total of 96 participants completed the initial online survey, not all of them scheduled an appointment to come into the lab for the second part of the study. Data from the 96 participants who completed the initial online survey were retained and used for scale development (see Digital Evaluation Apprehension Scale Development and Validation section), and data from the 43 participants who came into the lab were employed for the hypothesis testing and research question exploration.

To determine an appropriate sample size for the in-lab data collection, a G*Power (Faul, Erdfelder, Lang, & Buchner, 2007) A priori analysis was conducted. Although some studies of tie strength's effect on persuasion and support show small effect sizes (Cohen's d = .41; Chiu et al., 2014; Wilcox & Stephen, 2012; Cohen's d = .12; Weenig & Midden, 1991), there appears to be more studies on tie strength and self-image that show moderate effect sizes (Cohen's d = .52; Green & Pritchard, 2003; Cohen's d = 1.04; Carr et al., 2016). Therefore, a moderate expected

effect size of Cohen's $d = .3$ was used as a benchmark, with $p \leq .05$, because evaluation apprehension, although could induce performance anxiety (Porter, 1986), is an internal state and the effect sizes of the studies observing internal phenomena (e.g., self-esteem) have more moderate and less small effect sizes than the research on behavioral outcomes. The G*Power analysis indicated an ideal number of participants of to be 111, however, there were 43 participants that came into the lab to have their network visualizations displayed and to be interviewed. Due to the exploratory nature of the present study and considering patterns tend to emerge in data with as few as 30 participants, the low sample should be acceptable. The limitation of a small sample size is discussed in further detail in the Limitations and Future Directions section of this study. There were freshman ($n = 12$), sophomores ($n = 12$), juniors ($n = 10$), and seniors ($n = 8$); one did not indicate class ranking. The average age of participants was 19.86 ($SD = 1.27$), however, there were private accounts ($n = 6$) which were not included in the analyses for the hypothesis and research question because their network data was unavailable due to privacy restrictions of Mentionmapp, resulting in a final participant count of 37.

Study Procedure

Participants were asked to complete an initial online survey (via Qualtrics) to verify that they met the inclusion criteria and to capture demographic and evaluation apprehension measures (see this initial survey in Appendix B). The evaluation apprehension scale was administered online before the participant came into the lab because the user's network should be relatively stable and not vary from the time the survey is taken to the time the participant enters the lab such that the nodes with the highest number of mentions would be effected; capturing these measures beforehand minimized the activities required during the in-lab session. Additionally, participants' Twitter handles were collected to verify that they were active Twitter users. For

those who indicated compliance with the inclusion criteria, the Qualtrics survey forwarded them to the SONA online scheduling system through which they were asked to sign up for a 30-minute in-lab session. For those who were determined to *not* be active Twitter users, their sessions were canceled and the individuals were notified via email of their ineligibility to participate in the lab session. In the lab session (see Appendix C for the detailed procedure and script), participants were welcomed, invited to be seated in the living room-style environment and informed consent information was reviewed and endorsed; no participants declined consent.

Each participant was asked to use the MondoPad to sign into Mentionmapp.com in order to create a visualization of their social network (see Appendix F for an example). The web-based app uses the Twitter API to extract the users' connections (and connections among them) and to visualize that social network based on how many times unique nodes tweet a mention of the participant's Twitter handle, including retweeting the participant. The app also shows retweets (i.e., a function of Twitter that allows users to tweet other user's tweets) and generally, tweets are more likely to be retweeted by users that have a close relationship with the original tweeter (Tang et al., 2015). This was the best approach to addressing the hypotheses because tie strength was measured using Twitter mentions and retweets (see p. 28 for a discussion of Twitter mentions as a characteristic of tie strength). After loading the visualization of the participants' social network on the MondoPad, the researcher captured a screenshot of the network to facilitate analysis. From here, participants were led through a semi-structured interview (see Appendix C) to label their strong ties and clusters for the researcher which was retained for future qualitative exploration, and then completed an additional survey to indicate the level of perceived closeness of each individual user and to measure general anxiety experienced when performing certain actions on Twitter (see Measures, below). Following the completion of the

survey, the participants were given research credit receipts (per the departmental IRB procedures), instructions on how to disconnect Mentionmapp permissions from their Twitter account, and then dismissed.

Measures

Aggregate tie strength. Tie strength was measured in two ways: (a) by the number of times the participant was mentioned on Twitter (M = 2.23, SD = 3.11) as used in previous research (Grabowicz et al., 2012) and as reasoned in this study's literature review and (b) the number of times the user was retweeted on Twitter (M = 1.57, SD = 1.94) because the one-click feature of Twitter that is retweeting could be indicative of relationship strength (PDAs; Carr et al., 2016; Hayes et al., 2016). Additionally, the two measures were used to operationalize *unique* manifestations of tie strength on Twitter. For example, a PDA may be indicative of relational closeness whereas mentions may be more indicative of time spent together; therefore, the two measures of tie strength were kept separate in analyses as representatives of unique, aggregate measures of tie strength. Furthermore, retweets and mentions shared no statistically significant relationship, $r(34) = .25$, $p = .17$, Cohen's $d = .52$, indicating that mentions and retweets may indeed be representative of unique, distinct characteristics of tie strength.

Mentionmapp.com, by default, articulates the previous 200 mentions and retweets over an eighteen-month period between Twitter users in relation to the participant's Twitter social network. The five users mentioning and retweeting the participant the most were shown in order to standardize the number of ties being observed because network structures can vary among users. This created a visualization of the social-tie data (to facilitate the interview) and it provided the number of mentions and retweets required to calculate tie strength.

Cluster density. Cluster density was measured by calculating the clustering coefficient

(Watts & Strogatz, 1998) of each participant's network. In other words, the coefficient represents the number of nodes *currently* connected relative to the number of connections that could *possibly* be present among those top five connections. This was calculated by dividing the number of potential ties (PT; the number of ties needed to make the cluster a perfect clique with all nodes connected to one another) by the number of existing ties (ET; the number of actual ties among members of the network). For example, see the visualization of a participant's network (Figure 1). The formulas for calculating the clustering coefficient is as follows:

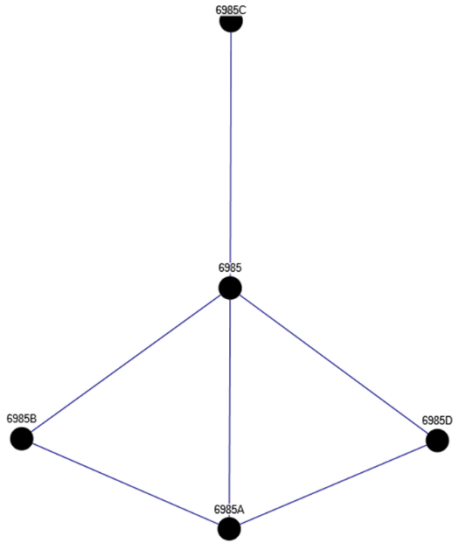

Figure 1. Visualization of Participant 6985's immediate social network on Twitter.

$5(5\text{-}1)/2 = 10_{PT}$

$6_{ET}/10_{PT} = .60$

In summary, there are 5 nodes with a *potential* of 10 ties among those nodes; ego can potentially be connected to each node and the nodes can also potentially be connected to each other resulting in a possibility of 10 total ties. However, the number of existing ties in the visualization of the network is 6. After dividing the number of existing ties (6) by the number of potential ties (10), the clustering coefficient becomes .60. The closer the clustering coefficient is to a value of 1, the denser the network is. In the present study, the mean clustering coefficient was .30 (*SD* = .35), indicating that generally, participants' networks were loosely-knit and not incredibly dense.

Evaluation apprehension. Evaluation apprehension was measured using a scale developed for the purpose of the present study: the Digital Evaluation Apprehension (DEA) scale. Based off the original Evaluation Apprehension Scale (Porter, 1986), the DEA scale is

meant to measure evaluation apprehension as it manifests from a digital context rather than the trait-like original conceptualization. A total of 42 items were used that are more applicable to digital spaces and through a principle components analysis with varimax rotation (see Digital Evaluation Apprehension Scale Development and Validation section), eight items were retained. Two dimensions emerged in the scale development: judgement affect (α = .83, M = 3.80, SD = 1.39) and perceived fairness (α = .77, M = 3.10, SD = 1.02). Both dimensions were reliable enough in the hypothesis/research question testing as well (JA; α = .76, M = 4.23, SD = 1.28; PF; α = .79, M = 3.03, SD = .98)

Additional measures. Various additional measures were included for (a) validation of the DEA scale and because (b) some variables may account for variance in the potential relationship between tie strength and evaluation apprehension as well as network density and evaluation apprehension. Self-esteem was measured using the Self-Esteem Scale (Rosenberg, 1965) and shares a strong relationship with both communication apprehension and evaluation apprehension (Porter, 1986) and therefore, was used as a validity measure for the DEA scale. This measure is a seven-point likert scale with items such as "On the whole, I am satisfied with myself" and "At times, I think I am no good at all" and was reliable for both scale development (α = .87, M = 5.43, SD = 1.03) and hypothesis/research question testing (α = .84, M = 5.36, SD = .91) data subsets.

A measure of computer-mediated communication apprehension (CMCA; Wrench & Punyanunt-Carter, 2007) was also included as a validity measure for the DEA scale because communication apprehension and evaluation apprehension have a strong relationship (Porter, 1986) and if CMCA is digitally contextual phenomenon, much like the DEA scale, CMCA should serve as useful validity measure. Additionally, because it is digitally contextual, it may

account for variance in the relationship between a participant's immediate digital network features and digitally manifested evaluation apprehension. CMCA was measured using a modified version of the CMCA scale (Wrench & Punyanunt-Carter, 2007) consisting of items such as "When communicating using Instant Messenger, I feel jittery" and "When communicating using email, I feel anxious" and was reliable for scale development (α = .87 M = 2.53, SD = 1.22) and for hypothesis/research question testing (α = .93, M = 2.31, SD = 1.21) data subsets. The modified version of the CMCA scale replaces the dimension on chat room apprehension with Twitter apprehension to match the research context of the present study and each statement was prefaced with "when communicating using Twitter" instead of the original "when communicating using a chat room."

There were four items, created for the purpose of validating the DEA scale, measuring anxiety on Twitter when engaging in certain behaviors. Each item was a statement (e.g., "I feel anxious when following someone") with responses ranging from 1 (strongly disagree) to 7 (strongly agree). There was one statement for sending a tweet (M = 2.53, SD = 1.61), retweeting another user (M = 1.63, SD = .90), liking another user's tweet (M = 1.91, SD = 1.13), and following another user (M = 2.29, SD = 1.40).

Demographic and SNS use information. Information collected in the demographics section of the online pre-survey included open-ended questions asking participants to identify their age, race, gender, year in school, and some basic Twitter information—i.e., how often they use Twitter, how many tweets they have sent out, how many followers they have, and how many users they follow.

Results

Digital Evaluation Apprehension Scale Development and Validation

The original conceptualization of trait evaluation apprehension (Porter, 1986) may not adequately represent the evaluation apprehension experienced from a digital context such as social media. This conclusion is based on the aforementioned characteristics of social media such as context collapse (boyd, 2008, 2011; Davis & Jurgenson, 2014), affordances (Evans et al., 2016; Hampton, 2015; Treem & Leonardi, 2012), and medium specific cues (PDAs; Hayes et al., 2016) as argued in the literature review. Therefore, a new measure (based on the Evaluation Apprehension Scale; Porter, 1986) was developed. The original 24 items were modified to represent a digital context's influence in evaluation apprehension and then 18 items were added that reflect social media factors such as context collapse, ambient awareness, and affordances. The total 42 potential scale items were subjected to a principle components analysis (PCA) with a varimax rotation. Although the Digital Evaluation Apprehension (DEA) scale is based on the Porter (1986) Evaluation Apprehension Scale (EAS), a PCA is ideal for the analysis because, as posited in the literature review, EA may manifest differently in a digital space due to factors such as affordances of social media that facilitate the persistence (Hampton, 2015; Treem & Leonardi, 2012) and visibility (Evans et al., 2016; Treem & Leonardi, 2012) of strong ties. Potentially, then, new factors may emerge that are different than the factors in the original EA scale (Porter, 1986). A PCA is appropriate because it presents the most pertinent items that emerge from the data as orthogonal principle components, or factors (Abdi & Williams, 2010). A varimax rotation is an orthogonal rotation that group together "items that were 'pure' measures of a given factor" (McCroskey & Young, 1979, p. 380). To be a factor, each factor must have an eigenvalue greater than 1.0 because the higher the eigenvalue, the more relevant and important the items are in that factor (Wold, Esbensen & Geladi, 1987) and generally, the rule is to keep the factors with eigenvalues greater than 1.0 (Abdi & Williams, 2010). The items must have a

primary factor loading of .60 or higher with a cross-factor loading of .40 or lower to ensure orthogonal and pure dimensions and items that do not cross load onto another factor (McCroskey & Young, 1979). Items that passed the aforementioned criteria were kept, with the items not meeting the criteria being deleted in each PCA iteration. The PCA was recalculated until all items met the criteria.

After four PCA iterations, three factors emerged from the data accounting for 60.9% of the total variance (Table 1). The first factor, labeled judgement affect (JA), consists of four

Table 1

Factor loadings for Digital Evaluation Apprehension Scale (DEA)

	M	*SD*	%Variance	*α*	F1	F2	F3
Judgement Affect	3.80	1.39	27.47	.83			
1. It bothers me when others judge me.					**.84**	.10	-.18
2. When others are judging me, I have trouble expressing myself.					**.82**	.11	-.15
3. I don't like being judged.					**.80**	-.09	.19
4. I care what others think of me.					**.76**	.06	-.10
Perceived Fairness	3.10	1.02	20.03	.77			
5. Others evaluate me unfairly.					.13	**.83**	-.19
6. Others seem to be biased against me.					.10	**.81**	-.05
7. Others' judgements of me are often inconsistent.					.17	**.74**	.22
8. I like my tweets being evaluated					-.22	**.70**	-.01
Evaluation Investment	3.54	1.07	13.10	.43			
9. I can pass the time without worrying what others say.					-.13	-.05	**.73**
10. The praise of others doesn't mean much to me.					-.14	-.01	**.67**
11. I'm satisfied with the number of 'likes' my tweets get.					.07	.01	**.61**

Note. Principle Components Analysis with Varimax Rotation. Primary loadings in bold.

items that indicate a user's internalized, subjective experience of evaluation apprehension which is the latent construct of EA (Porter, 1986). Items in the JA factor evaluate performance anxiety (i.e., item 2) and the degree to which the user is affected by the judgement of others (i.e., item 1,

item 3) which are inherent characteristics of EA (Porter, 1986). The second factor, labeled perceived fairness (PF), consists of four items that concerns a person's feelings of fairness associated with the evaluation. PF is nearly identical to the Porter (1986) conceptualization of EA's fourth dimension: equitability of fairness. Three of the four items in the scale's dimension of PF mirror three of the items in Porter's equitability of fairness dimension, however, the last item ("I like my tweets being evaluated") indicates a context-specific item. The third factor of the scale, labeled evaluation investment (EI), consists of three items that indicate the degree to which people are invested in being evaluated by others, which is unique to this emergent scale. At face value, it appears as if the EI factor is conceptually similar to the salience of sources dimension of EA by indicating how one feels about others' judgements (i.e., item 10, item 11) and the degree to which one is invested in what others say (i.e., item 9); however, the EI factor of the scale is concerned more with one's investment in being evaluated and how it might manifest (i.e., passing time with no worry, being satisfied with the attention their tweets receive). The third factor was dropped from validation analyses in the present study due to the low reliability of the factor (α = .43).

The Kaiser-Meyer-Olkin measure of sampling adequacy was .70, thus indicating a "middling" (Kaiser, 1974, p. 35), or moderate, sampling adequacy. However, to have an adequate amount of power, a .90 or higher should be achieved (Kaiser, 1974). While this is a limitation for the current scale, the moderate power of .70 will be sufficient for the exploratory nature of the present study. The Bartlett's test of sphericity was significant, χ^2 (55) = 306.26, p < .001, thus the data were likely not spurious (Tobias & Carlson, 2010). Important to note is that the original scale did not hold up during the rotations, even when attempting to force a 4-factor model; possibly due to the DEA scale as representative of evaluation apprehension derived from

a digital context. Although most items retained in the DEA scale appear to have trait language, it is not surprising considering that the present study considered possible contextual influences of trait-like EA rather than the causes of a possible state-like EA.

Validity of the newly developed DEA scale was tested using a series of Pearson correlations (Table 2). To ensure the scale is measuring the phenomenon it is meant to measure (i.e., EA), the scores must support the new measures' construct validity, or the degree to which the scale reflects the theoretical conceptualization of the phenomenon (Hubley & Zumbo, 2010; Messick, 1988). One way of testing construct validity is to test for convergent validity (i.e., the degree to which conceptually similar measures correlate with each other; Cunningham, Preacher, & Banaji, 2001). Following, EA should be negatively related to self-esteem because self-esteem is negatively impacted by the evaluation of others (Porter, 1986). As would be expected, the JA

Table 2

Correlations among the DEA Scale and Validity Measures

Variables	1	2	3	4	5	6	7	8
1. JA	-							
2. PF	.12	-						
3. CMCA	.17	.39**	-					
4. Self-Esteem	-.37*	.22*	-.45**	-				
5. Tweeting Anxiety	.54**	-.03	.50*	-.43*	-			
6. Retweeting Anxiety	.31*	.19	.32*	-.36*	.65**	-		
7. Tweet Liking Anxiety	.15	.15	.19	-.33*	.37*	.50*	-	
8. Following Others Anxiety	.02	-.17	.11	-.23	.19	.24	.20	-

Note. *$p < .05$. **$p < .001$.

factor is negatively related to self-esteem, $r(94) = -.37$, $p < .001$, $R^2 = .14$ and the PF factor is

also negatively related to self-esteem $r(95) = -.22$, $p = .03$, $R^2 = .05$. The scale's dimensions should also be positively related with CMCA; although both the DEA and CMCA scales measure a digitally manifested apprehension, they are two distinct constructs in that CMCA is the fear of real or anticipated *communication* in digital spaces whereas evaluation apprehension is the fear of *judgement*. As expected, the PF factor was positively related to CMCA, $r(95) = .39$, $p < .001$, $R^2 = .15$. However, the JA factor was not significantly related to CMCA, $r(94) = .17$, $p = .10$, $R^2 = .03$, although the association is in the predicted direction; given the moderate effect size (Cohen, 1988), the association may stabilize as significant in a larger sample and will be considered sufficient validation for the present analysis.

The expectation was that EA would have a positive relationship with the tweeting and retweeting anxiety because Porter (1986) found that EA is meaningfully related to CA and tweeting/retweeting are people communicating but to a mass audience (McMahan, 2004). Due to the visibility of actions such as liking a tweet and following another user, it is also expected that EA would have a positive relationship with liking and following anxiety. The JA dimension of the scale has a significant and positive relationship with anxiety when sending a tweet, $r(41) = .54$, $p < .001$, $R^2 = .07$, and anxiety when retweeting $r(41) = .31$, $p = .04$, $R^2 = .10$. PF was not significantly related to tweeting and retweeting anxiety, which is interesting considering it would be expected that people would be anxious about tweeting if they felt other users were going to judge them unfairly.

The results of the convergent validity tests indicate that although the DEA scale is conceptually similar to CMCA and anxiety when tweeting and retweeting, the moderate correlations indicate they are two distinct constructs. The two factors of the scale are not significantly related, $r(94) = .12$, $p = .27$, $R^2 = .01$, which is expected due to the PCA's nature to

present orthogonal factors (Abdi & Williams, 2010; McCroskey & Young, 1979). Additionally, participants may feel a fear of being judged without expecting or believing the judgment to be unfair. Taken together, the distinctness and orthogonal nature of the factors contributes to PF's significant relationship with CMCA and JA's nonsignificant relationship with CMCA.

Hypothesis Testing and Research Question Evaluation

The small sample size of the current study could possibly contribute to issues with significance testing (see Limitations and Future Directions section); many associations feature moderate or large effect sizes (Cohen, 1988) such that the relationships may stabilize as significant in a larger sample (Goodboy & Kline, 2017; Levin, Weber, Hullett, Park, & Lindsey, 2008). Therefore, examination of H1 and exploration of RQ1 will use effect sizes (i.e., R^2) in terms of small, moderate, or large rather than using the *p* value (i.e., significance testing). H1 predicted a positive relationship between aggregate tie strength and EA. JA and aggregate tie strength operationalized as the number of mentions, $r(34) = -.15$, $p = .38$, $R^2 = .02$, and the number of retweets, $r(34) = -.26$, $p = .14$, $R^2 = .07$; both emerged as small to moderate effects. Moreover, PF and aggregate tie strength operationalized as the number of mentions $r(34) = .24$, $p = .16$, $R^2 = .06$, emerged with a moderate effect size whereas the number of retweets $r(34) = -.07$, $p = .71$, $R^2 = .00$, appears to have little to no effect. Therefore, H1 may be partially supported in that both dimensions of the DEA have moderate effects with the number of times mentioned, however JA was negatively related which is the opposite direction than predicted. Additionally,

Various stepwise regressions were conducted in order to explore the predicted variables and for parsing out the explained variance. CMCA was related to JA in the validation correlation matrix, therefore it is expected to account for variance as well. Additionally, dispositional anxiety has been shown to have a positive relationship with time spent on social

media (Vannucci, Flannery, & Ohannessian, 2017), so for the regressions, time spent on Twitter was included. The first stepwise regression explored the variance explained in PF using CMCA, time spent on Twitter, retweets, and mentions (Table 3). CMCA and JA were entered into the first step, $F(2, 32) = 5.01$, $p = .01$, $R^2 = .24$, and mentions and retweets entered into the second step, $F(4, 30) = 3.64$, $p = .02$, $\Delta R^2 = .09$. Overall, both models were significant, however, the first step explained the most amount of variance in PF suggesting that predispositions may be more predictive of participants perceiving evaluation as unfair than tie strength because CMCA accounted for 21% of the variance in the first step and 24% in the second step.

Table 3

Stepwise Regression for CMCA, Time on Twitter, and Tie Strength as Predictors of PF

Variables	Step 1					Step 2				
	β	SEB	*t*	*p*	R^2	*β*	SEB	*t*	*p*	R^2
CMCA	.48	.15	3.00	.01	.21	.55	.16	3.24	.00	.24
Time on Twitter	-.03	.00	-.18	.86	.00	.01	.00	.06	.96	.00
Mentions						.28	.05	1.78	.09	.07
Retweets						.08	.09	.49	.63	.01
	$F(2, 32) = 5.01$					**$F(4, 30) = 3.64$**				
	$p = .01$					**$p = .02$**				
	$R^2 = .24$					**$\Delta R^2 = .09$**				

Note. Adjusted $R^2 = .34$. Durbin-Watson = 2.49.

The second stepwise regression conducted observed the variance explained in JA using CMCA, time spent on Twitter, retweets, and mentions as predictor variables (Table 4). CMCA and PF were entered into the first step, $F(2, 32) = 6.47$, $p = .01$, $R^2 = .29$, and mentions and retweets entered into the second step, $F(4, 30) = 3.39$, $p = .02$, $\Delta R^2 = .02$. The first model emerged as significant with the second model approaching significance. Interestingly, the second model accounted for very little change in variance, suggesting that predispositions may be more influential in someone fearing judgement than indicators of tie strength as well. This is also supported by the 16% variance accounted for by CMCA in the first step.

Table 4

Stepwise Regression for CMCA, Time on Twitter, and Tie Strength as Predictors of JA

Variables	Step 1					Step 2				
	β	SEB	*t*	*p*	R^2	*β*	SEB	*t*	*p*	R^2
CMCA	.41	.18	2.67	.01	.16	.37	.20	2.14	.04	.10
Time on Twitter	-.25	.00	-1.61	.12	.06	-.27	.00	-1.70	.10	.07
Mentions						-.12	.07	-.79	.44	.01
Retweets						-.09	.11	-.46	.65	.01
	***F*(2, 32) = 6.47**					***F*(4, 30) = 3.39**				
	***p* = .01**					***p* = .02**				
	R^2 = .29					**ΔR^2 = .02**				

Note. Adjusted R^2 = .22. Durbin-Watson = 1.60.

RQ1 attended to whether the density of one's immediate social network on Twitter may have a positive or negative relationship with EA. Results of a Pearson correlation indicated the relationship between JA and the clustering coefficient, $r(36) = -.19$, $p = .28$, $R^2 = .04$, had a moderate effect whereas PF and the clustering coefficient, $r(36) = -.02$, $p = .90$, $R^2 = .00$, had nearly zero effect. A stepwise regression was conducted for RQ1 to see if the predicted variables would emerge as significantly related when accounting for CMCA, minutes spent on Twitter, JA, and PF (Table 5). In the first step, CMCA and time spent on Twitter were entered, $F(2, 32) = .78$, $p = .47$, $R^2 = .05$, and the two dimensions of the DEA scale were entered into the second step, $F(4, 30) = .47$, $p = .76$, $\Delta R^2 = .01$. The most variance accounted for was from CMCA,

Table 5

Stepwise Regression for CMCA, Minutes on Twitter, and DEA as Predictors of CC

Variables	Step 1					Step 2				
	β	SEB	*t*	*p*	R^2	*β*	SEB	*t*	*p*	R^2
CMCA	-.20	.09	-1.11	.27	.04	-.19	.08	-.84	.41	.02
Time on Twitter	.04	.00	.25	.80	.00	.03	.00	.13	.90	.00
JA						-.09	.06	-.42	.68	.01
PF						.07	.07	.36	.72	.00
	***F*(2, 33) = .78**					***F*(4, 31) = .47**				
	***p* = .47**					***p* = .76**				
	R^2 = .05					**ΔR^2 = .01**				

Note. Adjusted R^2 = .06. Durbin-Watson = 2.50

indicating a moderate effect. Therefore, no apparent relationships exist between the variables (i.e., CMCA, time spent on Twitter, JA, PF) and the clustering coefficient except the moderate effect of CMCA.

Post-Hoc Analysis: Public versus Private Accounts

As outlined in the method section, private accounts were not included in the analyses because their social network structures were not legible to the network mapping tool. Although some participants had no networks display during the lab session, their clustering coefficient and aggregate tie strength could still be calculated as zero whereas private account structures are unknown, resulting in no readable data. Although the illegibility of private accounts was not considered in the study design, their emergence in data collection called into question whether there may be a difference in evaluation apprehension experiences between private and public accounts, overall. If a user has a private account, Twitter does not allow other to retweet that user, thus potentially reducing the anxiety felt when being retweeted. Also, when a user chooses to have a private account, this could limit their visibility and limit others' accessibility of the private user's information. Although mentioning another user could still be a predictor of tie strength (Grabowicz et al., 2012; Marsden & Campbell, 1984), the differences between private and public users' felt evaluation apprehension is unknown. Users with private accounts could experience less evaluation apprehension because their audience is limited to the users they choose, however, users may have private accounts because they generally have high levels of evaluation apprehension and becoming private protects them from the public's eyes. An independent-samples t-test with equal variance assumed, however, indicated no significant differences between private and public accounts regarding JA, $t(40) = 1.18$, $p = .25$, $R^2 = .03$ and PF, $t(41) = -.19$, $p = .85$, $R^2 = .00$, however, the moderate effect size (Cohen, 1988) of the

differences in JA indicates that private accounts (M = 4.79, SD = 1.07) may experience more negative JA (that is, higher evaluation apprehension) than public accounts (M = 4.13, SD = 1.30); thus, this somewhat counterintuitive finding warrants further exploration.

Discussion

The current study employed a series of surveys and lab-based network mapping procedures to examine the relationship between the structural characteristics of an individual's digital network (aggregate and discrete tie strengths and clustering coefficients) and evaluation apprehension. The Digital Evaluation Apprehension (DEA) scale was created and used to measure evaluation apprehension; two dimensions emerged: judgement affect (JA) and perceived fairness (PF). H1 posited a positive relationship between aggregate tie strength and evaluation apprehension; based on the moderate effect sizes, more research is needed explore these potential relationships (see Limitations and Future Directions section). RQ1 was posed regarding the potential relationship between the density of one's network and experienced evaluation apprehension; the moderate effect size of the relationship between JA and the clustering coefficient warrants continued investigation. Post hoc analyses indicates that, potentially, private Twitter users and Twitter users with no visualizations may experience more JA than public Twitter users and Twitter users who had a visualization. In the next three sections, the results of the present study will be elaborated on and categorized into four possible major implications: (a) the manifestation of EA in digital social networks, (b) the strength of (salient) ties, (c) network density and evaluation apprehension, and (d) public social networks as panoptica. Then, limitations and future research will be discussed, followed by the conclusion.

Manifestation of EA in Digital Social Networks

Evaluation apprehension was originally conceptualized to have four dimensions

representing people's propensity to approach or avoid instances of evaluation (approach-avoidance), the possible rewards gained from being evaluated (expected rewards), who is evaluating and how much people care about their evaluation (salience of sources), and the fairness associated with the evaluation (equitability of evaluation; Porter, 1986). As predicted in the literature review, however, the aforementioned dimensions did not emerge with the original factor structure; this is not surprising considering evaluation apprehension in the current study was observed in the digital context of Twitter. The remainder of this section will explain possible interpretations of the unique emergence of the DEA factors in the current study and why the original scale may not have retained because of the digital context.

The first dimension of the new scale (JA) consisted of items from the salience of sources dimension, the approach-avoidance dimension, and the expected rewards dimension but the original items indicating a source of relational significance (e.g., a friend) were not retained through the rotations. This speaks to the masspersonal nature of social media; that is, social media are bridging the gap between interpersonal communication and mass communication (McMahan, 2004; Nechita, 2012) insofar as messages are sent out to a networked audience of real and potential viewers; an audience that is connected to the sender and each other (boyd, 2008, 2011; Marwick & boyd, 2010). In interpersonal communication, people are generally aware with whom they are interacting–whether the receiver is known or not–and in broadcast media the audience may be completely unknown (boyd, 2008; Marwick & boyd, 2010). However, social media are unique in that people know some of their audience but yet, they may not be sure as to who exactly is reading their messages (Marwick & boyd, 2010). The frequency of the word 'others' in the items making up the JA dimension may be indicative of the ambiguity felt by the sender and the concomitant negative effect on their performance due to an unknown

audience. Interestingly, one item in the new scale is similar to items of the original scale's expected rewards dimension; not only does JA represent one's feelings towards the judgement, but it could also be indicative of evaluation apprehension's manifestation in one's behaviors. The aforementioned scale item, indicating a trouble with expression because of judgement, makes sense especially considering JA was found to have relationships with both tweeting and retweeting anxiety; if someone believes they are being judged and that the judgment may interfere with expression, it is possible that the person would experience anxiety with expressive behaviors such as tweeting and retweeting. This could also help to explain why JA was not related to anxiety derived from liking someone's tweet or following a new user: those actions are less visible and it could be that the user is less likely to feel judged when the 'others' may not be watching them. Therefore, JA may be characterized by one's internal experience of the evaluation as well as its effect on more external processes such as message production.

The PF dimension of the newly developed DEA scale consists of three items from the trait equitability of evaluation dimension of the original scale. However, there is one item that includes a medium-specific message (i.e., a tweet; "I like my tweets being evaluated"). Two affordances of social media that may be reflected in this item are visibility and persistence (Evans et al., 2016; Hampton, 2015; Treem & Leonardi, 2012). Visibility is an affordance, varying from high to low across media (Evans et al., 2016; Treem & Leonardi, 2012). When a post, or tweet, has a high degree of accessibility (Evans et al., 2016) and when previously unknown information about a person becomes easily accessible (Treem & Leonardi, 2012), the medium has a high degree of visibility. Generally, social media have a high degree of visibility (Treem & Leonardi, 2012). Persistence is another affordance that refers to the accessibility of a users' profiles, their content, or the users' messages after they have been posted, or sent (Evans

et al., 2016; Treem & Leonardi, 2012). It could be that because a tweet can be highly visible and can be highly persistent that it becomes salient to the sender that the messages being sent are free to be judged by others outside of the audience wanted. Additionally, tweeting is one of the primary methods of communication on Twitter and is one of the more visible actions a user can do on Twitter; it would be expected that if a medium-specific item were to be retained to represent the specific context from which the evaluation may be occurring, it would likely be tweeting.

Taken together, the affordances of social media—e.g., persistence and visibility—as well as the networked audience of both known and unknown social contexts may work in tandem to facilitate a manifestation of evaluation apprehension that is similar to trait-like evaluation apprehension as originally conceptualized by Porter (1986), however, the manifestation may be considered digitally contextual. Originally, the four dimensions of evaluation apprehension focused on (a) specific sources of evaluation, (b) the fairness of the evaluation, (c) if the evaluation apprehension is perceived to interfere with behaviors (i.e., expected rewards), and (d) a more general predisposition towards being evaluated. Digitally manifested evaluation apprehension seems to combine certain items from each of the four original dimensions in that a person's experiences of JA consider source salience, performance anxiety, and a negative affect towards the evaluation as concomitants and a person's experiences of PF considers the equitability of the evaluation as well as the addition of a highly visible medium-specific behavior (i.e., tweeting). The different manifestation of evaluation apprehension in digital spaces appears to give importance to the general 'others' that may be judging a user's most visible and persistent behaviors such as tweeting and retweeting. Moving forward, the DEA scale developed in the present study should have value because it operationalizes a digitally contextual experience of

judgment based on theoretical and conceptual factors unique to social media (e.g., affordances, context collapse) and could be a useful measure to help researchers understand digitally manifested phenomena.

The Strength of (Salient) Ties

The relationship between the number of times a user is retweeted and cumulative interactions between users with JA had a moderate effect size, however, in the opposite direction than predicted. Conversely, the relationship between number of times a user is mentioned and PF also had a moderate effect size but in the predicted direction. Therefore, it is possible that because the user is *not* being mentioned or retweeted, they may feel judged by others due to the lack of attention given to their messages. The proceeding section will elaborate on a possible interpretation of the results suggesting that indicators of tie strength in digital spaces may serve multiple functions for people such as affirmation of behaviors, affirmation of self, or as a process of making salient the audience and social context receiving the messages and thus, reducing the ambiguity of the unknown, but potential audience.

In the literature review, it was argued that tie strength would manifest differently in digital spaces than it does in physical spaces such that tagging or mentioning a user can stand as a surrogate for the time spent together, emotional intimacy, and reciprocity of services characteristics of tie strength (Granovetter, 1973). For instance, social media users often use a medium to seek social support which can foster feelings of emotional intimacy and encourage reciprocity of services (Ellison & Vitak, 2015; Vitak & Ellison, 2012). Also, people often use one-click features of social networking sites (e.g., retweeting), known as paralinguistic digital affordances (PDAs; Hayes et al., 2016) to express social support (Wohn et al., 2016) and can be just as indicative of the type of relationship between the two users as the content of their

messages (Carr et al., 2016; Hayes et al., 2016). However, when a user is *not* receiving support or spending time with others through the use of mentions and retweets, results of the current study suggest that this could facilitate feelings of evaluation apprehension; possibly, because social media users are generally ambiently aware of those they follow and know that there is an audience, when the users are not receiving attention from their audience, it could be anxiety inducing. Taken together, the findings of the current study may support an interpretation that tie strength may manifest differently in digital spaces than in physical spaces due to social media factors such as affordances and PDAs (Carr et al., 2016; Hayes et al., 2016; Wohn et al., 2016). Additionally, it may be that the lack of a public articulation of tie strength may foster feelings of evaluation apprehension, that ambient awareness of social others could induce anxiety for users when the social others are not interacting with them, and that digitally manifested evaluation apprehension may be influenced by explicit processes such as tweeting and retweeting as well as implicit processes such as ambient awareness. Interesting to note is the lack of significance of the relationship between retweets and mentions, indicating that retweets and mentions might be measuring two distinct, aggregate characteristics of tie strength.

A possible explanation for the positive relationship between PF and mentions could be due to the warranting principle (Walther & Parks, 2002). Social media users have propensities to selectively self-present on social media—displaying their best qualities to leave a desired impression on others—and sometimes the others will rely on information that cannot be easily manipulated in order to make more accurate assessments of people (Walther & Parks, 2002). If Twitter user A is mentioned by Twitter user B, the warranting principle would predict that both Twitter user A and Twitter user B's audiences will value the information in that tweet as an accurate representation of Twitter user A's character more than a tweet that Twitter user A sends.

The person being mentioned (Twitter user A in the example) has limited control over what the person doing the mentioning (Twitter user B in the example) includes in the tweet. Therefore, a possible outcome could be that the person being mentioned feels unfair that he/she cannot control what is being tweeted in addition to knowing that the tweet is highly visible to multiple, and possibly unintended, audiences. The warranting principle has received considerable attention and support (e.g., Hong, Tandoc, Kim, Kim, & Wise, 2012; Rosenthal-Stott, Dicks, & Fielding, 2015; Utz, 2010; Walther, Van Der Heide, Hamel, & Shulman, 2009) however, not much is known about the extent to which people are aware that others may be inferring information about them through other-generated content. The results of the present study indicate further exploration of how the salience of the warranting principle for a user influences their experiences on social media.

PF had no relationship with tweeting and retweeting anxiety but instead a positive relationship with CMCA and additionally, CMCA and time spent on Twitter emerged as accounting for the most amount of variance (24%) in PF; interestingly, this finding could indicate that users may, or may not, interact publicly if they feel they will be judged unfairly, however, if they feel the judgement is unfair then they may experience heightened CMCA. Conversely, it could also be that social media users with high levels of CMCA may be predisposed to believe they will be judged unfairly in digital spaces. Although it was originally expected that both dimensions of the DEA scale would be related to CMCA because communication apprehension and evaluation apprehension share such a strong relationship (Porter, 1986), an interpretation of the present study's findings could suggest that CMCA is more trait-like, similar to communication apprehension, rather than a digitally emergent or contextual phenomenon. Additionally, it could also be the orthogonal nature of the DEA dimensions

contributing to the significant relationship between PF and CMCA but not JA and CMCA. Another interesting relationship emerged through the stepwise regression between CMCA and the number of retweets one receives. The negative relationship between the two supports an interpretation that when others are retweeting a user, the user may feel less apprehension about tweeting and less fear of judgement because the attention received could be perceived as positive reinforcement for communicating. Although it is unknown whether the retweets in the current study were sent with commentary, future research might investigate the valence of the messages and observe the possible interaction between the valence of the commentary on a retweet and experiences of evaluation. At a group level, it has been noted in previous literature that when a user receives feedback on social media, it can make them aware that others are aware of them and in turn, reduces the potential problem of not knowing which audience(s) is reading the users' messages (Hampton, 2015; Lu & Hampton, 2016). At the individual level, people seek others' perceptions of them to align with their perceptions of themselves (Yeung & Martin, 2003) and an interpretation of the findings in the present study could be that users being mentioned and retweeted may serve as some indication of whether the users' perceptions of themselves align with others' perceptions of them and, in turn, may also be indicative of others' acceptance of the users. Additionally, affirmation of behaviors can contribute to people's beliefs that others' perceptions of them are indeed consistent with their own and can increase feelings of self-efficacy (Bandura, 1977; Steele, 1988). Evaluation apprehension is the fear of being perceived unfavorably or being judged negatively (Duncan et al., 1969; Porter, 1986; Tice et al., 1995) and because the measured predictors of tie strength could be affirmation that the user is being perceived favorably and is receiving positive attention, it would be logical, based on the results of the current study and the aforementioned literature, to conclude that being mentioned,

retweeted, or having strong ties present in the user's network, may in fact reduce feelings of evaluation apprehension.

Network Density and Evaluation Apprehension

A moderate effect emerged from the inverse relationship between network density and evaluation apprehension in that the fewer ties between the nodes in one's digital immediate social network, the more evaluation apprehension was experienced. One interpretation of this could be based on social norms and how they may function in a person's digital immediate social network. Social norms are usually implicit, unofficial rules that govern people's behaviors (Klonick, 2016). Different social contexts can have different social norms and when these audiences' norms collide with each other, this can result in a context collapse (Davis & Jurgenson, 2014). More specifically, when the unintended audiences are exposed to certain messages, this results in a context collision (Davis & Jurgenson, 2014). Considering the present study's findings and the concept of context collision, it could be that in a loosely-knit cluster—a group of nodes that are tied to the center of the network but not necessarily tied to each other—each user that is strongly tied to the user at the center of the network may be representing different social contexts. When the number of differentiating social contexts increases, so might the number differentiating of social norms; evaluation apprehension may then be experienced as a result of the number of differentiating and possibly conflicting social norms from each respective social context.

When users' digital immediate social networks are dense, or tightly knit, they might also experience less evaluation apprehension—as supported by the results—because there might be less social norms from differentiating social contexts; each person that is strongly connected to the user might be reinforcing, rather than conflicting, the norms of the other people strongly tied

to the user. The social cohesion of a user's network may then homogenize the social norms and thus, exert less social pressure onto the user. Taken together, context collisions may play a role in how people experience their digital immediate social networks in that dense networks might have a homogenous set of norms from one social context whereas loosely-knit networks might all have different social norms that may conflict; a user strongly tied to all these different, and possibly conflicting, social contexts and social norms could experience more evaluation apprehension than a user strongly tied to one (or few) social context(s) and social norms.

Interestingly, people with public Twitter accounts experience lower evaluation apprehension than those with private accounts, possibly because if a user has generally high levels of evaluation apprehension while being on Twitter, they may take themselves out of the eyes of unknown and unintended audiences to keep their messages to the audiences they know and intend to share information with, thus, avoiding a possible context collision. Conversely, it is also possible that social media users with private accounts restrict who follows them; they have more users with whom they are strongly tied and thus, as argued in the literature review of the present study, may consequently experience higher levels of evaluation apprehension than those with public accounts.

Taken together, the results of the current study are interpreted to suggest that a more loosely-knit network on a highly visible and persistent platform may increase the social pressure (i.e., evaluation apprehension) experienced from the multiple sources and collision of social norms; conversely, a more tightly-knit network on such a platform may decrease the social pressure through the homogenization of norms associated with a more cohesive social network.

Public Social Networks as Panoptica

The present study found that evaluation apprehension may manifest differently in digital

than in physical spaces, possibly due to the high degree of visibility that social media affords. In addition to visibility, it seems as if users' audiences also become salient when considering the digital manifestation of evaluation apprehension. A second major finding of the present study is that indicators of tie strength such as retweets and mentions may simultaneously function both explicitly and implicitly as affirmation for a social media user, as an indicator of which audience is watching, and as confirmation that a social media users' self-perception aligns with important others' perceptions of them (or possibly how the social media users want others to perceive them). Additionally, because of these potentially positive implications that indicators of tie strength may function as in digital spaces, it is possible that the strength of ties, as well as the absence of ties, influence experiences of evaluation apprehension. The third major finding from the current study is that dense immediate networks, consisting of a homogenous set of social norms and cohesive ties, may induce less evaluation apprehension than a diverse and loosely-knit immediate network that consists of strong ties from various social contexts. Altogether, if (a) evaluation apprehension, as it manifests digitally, emphasizes visibility and networked audiences, (b) indicators of tie strength serve multiple functions that influence a user and makes the audience salient to the user, and (c) social contexts can collide, as well as their respective norms, to possibly facilitate experiences of evaluation apprehension, then it may be possible that public social networks may sometimes function, implicitly or explicitly, as panoptica, or an aggregation of multiple social spheres that influences a person's internal experiences and possibly even a person's behaviors. The remainder of this section will contain a brief overview of the panopticon, how it may manifest through a person's social network, and detail the possible emergence and functions of multiple and distinct panopticons (referred to as panoptica after this point) through a social media user's immediate digital social network.

Foucault (1995), as mentioned in the literature review, refers to a prison (called a panopticon) he believed to be the most effective form of surveillance and tool for governing behaviors. The physical building itself is referred to as the discipline-blockade, however, the intangible, underlining mechanisms of the panopticon which facilitates a near perfect form of surveillance is referred to as the discipline-mechanism (Foucault, 1995). More specifically, the discipline-mechanism functions as a process of surveillance that governs people's behaviors through social norms much like the surveillance that governs people's behaviors in the discipline-blockade. The discipline-mechanism of the panopticon assumes each prisoner (i.e., person) is at center stage for a public to see (Foucault, 1995); the panopticon functions similarly with different publics such as schools, hospitals, and workplaces (Foucault, 1995).

As found in the present study, social media users may articulate characteristics of tie strength using mentions and PDAs which in turn, make their presence explicit and salient to their ties. The discipline-mechanism functions based upon unknown observers who may, or may not, be surveilling the prisoners (Foucault, 1995). The ambiguity of the source of judgement, much like the general and non-relational specific word 'others' that emerged in most items of the DEA scale, is key to discipline-mechanism's effectiveness (Foucault, 1995). Prisoners of the panopticon were unaware of who was watching, or even if they were being watched; however, the prisoners would feel a sense of indefinite examination because they were still punished for deviant behavior in prison (Foucault, 1995). Therefore, they assumed someone was always watching; that is why the prison could be empty of guards and yet the prisoners would still be on their best behavior; the prisoners governed themselves because of the fear of evaluation they assumed, but often did not know for sure, was constantly occurring (Foucault, 1995).

Considering the persistence affordance of social media, meaning users' profiles are

accessible at any time (Evans et al., 2016; Treem & Leonardi, 2012), their audience can access the users and their information at any given moment. Social media users also experience an ambient awareness of the others they are connected with through passively browsing the persistent profiles of their connections (Levordashka & Utz, 2016); who exactly is viewing their profiles though, or even if their profiles are being viewed, may be completely unknown and ambiguous. Findings of the present study indicate that when social media users' audience members interact with them by mentioning them or retweeting them, it may reduce feelings of evaluation apprehension—possibly because the users then know who the audience is and may even experience a sense of affirmation and of confirmation regarding their self-perceptions and behaviors. Thus, when social media users' audiences are unknown or ambiguous, they may experience a fear of judgment, much like the prisoners of the panopticon. Additionally, the potential for persistent contact (Hampton, 2015) may have been present in the panopticon whereby the guards in the watchtower could, potential, intervene and punish a prisoner; however, as supported by the findings of the present study, persistent contact may not be as adverse in the digital context as it was in the panopticon.

A common theme throughout the findings of the present study is the possible impact of the visibility affordance of social media (Evans et al., 2016; Treem & Leonardi, 2012). The high visibility of users, the high visibility their information, the high visibility of their messages, and the persistence of their profiles on social media (Treem & Leonardi, 2012) may be placing them on a stage for their audiences to surveil based on each audiences' social norms. Tweeting and retweeting (anxiety derived from these are related to JA) are highly visible and public actions that occur on Twitter whereas liking a user's tweet and following a user (anxiety derived from these have no relationship with JA or PF) are less visible and less public; therefore, it makes

sense that people would experience evaluation apprehension when tweeting and retweeting and not when liking a user's tweet or following a user on Twitter because of the differences in visibility of these actions to the surveilling eyes of the audiences. When a user chooses to tweet or retweet, though, the actual fear of judgment may become salient because they reveal a piece of information about themselves to their audience (Nechita, 2012) or selectively self-present themselves (Walther, 1996), much like the prisoners of the panopticon performing for their watchers' standards in a cell similar to a stage (Foucault, 1995).

However, when the discipline-mechanism of the panopticon was originally conceptualized, bringing together multiple differentiating publics or audiences of surveilling eyes into one place, at one time, was not necessarily as common as it eventually became with the advent and widespread adoption of social media (Hampton, 2015). The high degree of visibility of users' messages and users' information on social media in tandem with the high degree of persistence their profiles and messages have on social media (Treem & Leonardi, 2012) allow for multiple audience to have not only have ease in surveillance, but ease in access to and ease in contact with a user. In addition, other researchers indicate that audience characteristics can influence a user such that the less homogenous and dense the user's social network is, the more tension the user experiences (Binder, Howes, & Sutcliffe, 2009); thus, a variety of a user's audiences that are not connected to each other can cause conflict with that user. Moreover, the finding that the less dense users' networks are the more evaluation apprehension they experience, may suggest that the when a users' immediate social networks consist of audience members that are not connected, but rather representative of distinct and different clusters or social contexts with distinct and separate social norms. Therefore, if one social context consisting of a homogenous audience with similar beliefs of what are (un)acceptable behaviors (i.e., social

norms) has a potential to function as a panopticon when no interaction is occurring with the user at the center of the network, it may be possible that a diverse network of strong ties representing different and distinct social contexts may function as an augmented panopticon in which there are multiple guard towers, each with their own rules and expectations. In other words, considering the affordances of social media such as visibility and persistence, the possible combinations and conflictions of distinct social contexts' social norms, and immediate social network structures, findings of the present study along with theoretical reasoning based on existing literature may indicate that a social media user has the potential to become influenced and governed by a digital network of panoptica.

Limitations and Future Research

In considering the present study's findings, there are four main limitations that should be noted. First, the application used to gather the participants' Twitter network data only displays the previous 200 mentions and retweets. The recency of the data may be representative of the *current* rather than *historical* state of the participants' networks (and their experience of them) which is beneficial when measuring evaluation apprehension as a contextually influenced from digital spaces and not as a trait. However, the application may not display a complete picture of one's digital network which decreases the amount of data that can be collected which limits the potential to both practically investigate and theoretically elaborate on social networks as panoptica. Additionally, there may be other digital representations of the characteristics of tie strength on Twitter that could contribute to a greater understanding how tie strength might emerge digital spaces that the application used to gather network data is practically unable to gather. For instance, maybe time spent viewing a user's profile could be a surrogate for time spent together. Therefore, future research should use an application that displays a more

complete picture and provides more historical information of one's digital social network as well as more information about interactions.

Second, the current study had a relatively small sample size. Overall, forty-three participants arrived at the lab, however, six participants had to be dropped because they had private networks and thus, no network structure could be observed. The small sample size could, consequently, have a few implications. It is important to note the growing argument that an artifact of small sample sizes is an increase in the Type II error, or that important effects can emerge as nonsignificant (Levine, Weber, Hullett, Park, & Lindsey, 2008) due to sample-specific variation (Goodboy & Kline, 2017). Although significance testing has its place, especially when considering both significance and effect size together (Levine et al., 2008), the exploratory nature of the current study relies on a smaller sample size which results in lower statistical power. While no statistically significant relationships based on the *p* value emerged in support of the hypothesis, research question, and post hoc analyses, some effect sizes are large enough, based on interpretations of effect sizes (Cohen, 1988), that it is possible a statically significant relationship would emerge with a larger sample. In addition, another artifact of a small sample contributed to the Kaiser-Meyer-Olkin measure of sample adequacy being moderate; a high power is preferred and would benefit the validity of the scale, but, despite this confound, the DEA scale still appeared to be construct valid and suitable for the current exploratory nature of the current study. Future research should replicate and expand upon the validity measures and tests to ensure the DEA is the best possible measure of digitally manifested evaluation apprehension.

Third, a theoretical limitation is that the data does not indicate if strong ties in digital spaces are the same as strong ties in physical spaces. It was found that characteristics of tie

strength may manifest differently in digital spaces, however, it is unknown whether the typical typology used as indicators of tie strength (Marsden & Campbel, 1984) can be applied to both digital and physical spaces. Additionally, another theoretical limitation was the lack of network visibility for private accounts. Given that there were differences in evaluation apprehension between those participants using public and private accounts, future research should explore the relationship between EA and network structures among private account-holders, especially in terms of network density because of private-account holders' need to selectively give permission.

The fourth main limitation of the current study is that the overall number of interactions (i.e., mentions, retweets) was low. Interesting to note, however, is that participants spent slightly less than seventy minutes on Twitter daily. Although participants may be active in consuming content on Twitter, they were not active in socialization; thus, participants may be online often without interacting or while interacting minimally. The small number of interactions could have reduced the emergent effect sizes, however, despite this confound, some moderate effect sizes were found in the current study.

In addition to these limitations, the exploratory nature of the present study opens up a range of fruitful directions for future research. For example, results of the present study indicate that evaluation apprehension may manifest differently in digital spaces than in physical spaces and Communication Apprehension is also known to manifest differently in digital spaces than in physical spaces (Hunt, Atkin, & Krishnan, 2012; Patterson & Gojdycz, 2000; Wrench & Punyanunt-Carter, 2007). Might other trait-like communication variables manifest uniquely to contextual characteristics in digital spaces due to the affordances of social media, much like evaluation apprehension?

For instance, there are aggressive communication traits such as argumentativeness and verbal aggression. Argumentativeness is a predisposition one has towards advocating a position on a topic or attacking another's position on a topic (Infante & Rancer, 1982) while verbal aggression is a predisposition one has towards verbally attacking a person or their self-concept (Infante & Wigley, 1986). On social media, if two users have opposing viewpoints and the medium affords anonymity, the use of *ad hominin* attacks (i.e., verbally attacking a person and discrediting their argument because of a personal flaw) and the use of profanity both increases (Maria & Rezende, 2016). If a medium has a high degree of edibility (i.e., the degree to which one can edit a message or post after it has been sent; Evans et al., 2016; Treem & Leonardi, 2012) then it may influence the propensity to engage in argumentation because users can change their argument or how they articulate it after initially posting it. However, it is important to note that these arguments on social media take place in front of an audience (Marwick & boyd, 2010; McMahan, 2004); therefore, the visibility that a medium affords could also influence users' propensities to engage in aggressive communication. Additionally, social network structures also influence people's likelihood to engage in argumentation or verbal aggression (John & Dvir-Gvirsman, 2015; Maria & Rezende, 2016). Weak ties that hold extreme opposing viewpoints are more likely to 'unfriend' each other on social media (John & Dvir-Gvirsman, 2015) and networks of people who share the same opinions (i.e., homogeneous networks) are more likely to engage in profanity use about others with opposing viewpoints than heterogenous networks (Maria & Rezende, 2016). Future research should examine the relationship between social network structures and aggressive communication traits, as well as their manifestation in digital spaces and how affordances of social media (e.g., anonymity, editability, visibility) may affect their manifestation.

Findings of the present study indicate a negative relationship between network density and evaluation apprehension. Other researchers have found that the more diverse a SNS user's network is, the more likely they are to experience online tension (Binder et al., 2009). Online tension is when others express criticism about a user, breaches the user's trust, or gossips about the user (Binder et al., 2009). Future research could explore the possibility that evaluation apprehension may increase due to the diversity of one's network rather than the lack of strong ties. In fact, the number of family members (a social context of strong ties) has on Facebook has been found to have a direct, positive relationship with online tensions (Binder et al., 2009); therefore, a diverse, loosely-knit network of weak ties in tandem with the presence of many strong ties (or strong ties of a specific social context) may lead to the greatest increase in experienced evaluation apprehension. Future research regarding the aforementioned hypothesis would not only contribute to the literature on social network structures and people's experiences with them, but it may also further unpack the question of whether a diverse, loosely-knit network of multiple audiences may function as panoptica, or a convergence of diversely-normed surveillance clusters.

The medium-large effect of the difference between public and private in regard to the first dimension of the DEA scale suggests that the affordance of anonymity (Evans et al., 2016; Treem & Leonardi, 2012) may also play a role in a user's feeling of evaluation apprehension. Although a t-test was conducted in order to see this difference, anonymity is not binary, but rather, it exists on a continuum (Scott, 1998) that varies across media (Evans et al., 2016). For instance, proposition three of the Communication Model of Anonymous Interaction states:

> Receivers are more likely to accept an anonymous source when there is minimal perceived threat to them, when the message is agreeable or of minimal importance,

> when source credibility is unimportant, or when the channel used is either routine or would make source attributions difficult. (Scott, 1998, p. 396).

Based on this proposition and the results of the current study, if a weak tie of high anonymity interacts with a user, a variety of outcomes could occur. First, if a user (i.e., the receiver) is tagged or retweeted by an initially high anonymous person (i.e., the source) and the message aligns with how the user wants to be perceived (i.e., the looking glass effect; Yeung & Martin, 2003), the user may feel less evaluation apprehension because of the affirmation the user has received and further, the user may be more accepting the anonymous person because of the minimal perceived threat and the agreeableness of the message. However, if the message is not attitude consistent or threatens the user's self-concept (increasing the amount of experienced evaluation apprehension), the user may indeed seek out more information about the anonymous person, thus reducing the source's anonymity and the user's feelings of uncertainty. Existing literature and the results of the current study suggest that evaluation apprehension could emerge from weak ties (cf. Binder et al., 2009) because perceived non-attention may be interpreted as negative evaluation. Taken together, the anonymity affordance, weak ties, and attitude (in)consistent messages sent by them may influence a user's experience of evaluation apprehension. Future research should explore this hypothesis to further contribute to literature on tie strength, affordances, and digitally manifested evaluation apprehension.

One of the more intricate and theoretically complex implications of the present study is that of panoptica. As stated previously in this section, the application used to display the visualization and gather network data was unable to generate more historic information about a user's network, but more important for panoptica, it was unable to display connections beyond those of the five users that mentioned and retweeted the participant the most. Therefore, making

claims about the emergence of multiple differentiating clusters would be strengthened by further investigation into the complexities of people's immediate digital social networks. Additionally, it would contribute to the understanding of each differentiating cluster's potential influence or relationship with the person at the center of the network to not only examine the density of clusters, but characteristics of each cluster that are related to the social norms instated by each cluster. From there, context collisions could be more thoroughly understood in terms of how conflicting norms may affect the person at the center of the network. For example, if a social media user identified a cluster of contacts from work along with the degree of formality and privacy the cluster expected as well as a cluster of contacts the social media user plays softball recreationally on the weekend with along with what they expect from the social media user in terms of formality and privacy (among other variables). Researchers could then explore the relationships among network density, cluster density, tie strength, the clusters' expectations or social norms, and various possible outcomes such as digitally contextual evaluation apprehension, CMCA (Wrench & Punyanunt-Carter, 2007), and online tensions (Binder et al., 2009). Following this direction would greatly contribute to the validation and potential of panoptica as a framework for understanding people's digital social network features and how those features are experienced both cognitively (e.g., CMCA) and behaviorally (e.g., Facebook intensity, social isolation).

Conclusion

The current study developed a new measure of evaluation apprehension as it manifests in digital spaces. In examination of the hypothesis and in exploration of research question, the moderate to large effect sizes of some relationships suggest that tie strength may not only manifest in different ways on social media, but that the predictors of tie strength may play a role

in people's experiences of evaluation apprehension and serve as affirmation of their behaviors in digital spaces. Specifically, (a) JA was found to be negatively related, with a moderate effect size, to being mentioned and retweeted, (b) PF was found to be positively related, with a moderate effect size, to being mentioned, and (c) JA was found to have a negative relationship, with a moderate effect size, with the clustering coefficient (i.e., the density of an immediate digital social network). These findings are important because it was previously unknown whether the strength of ties and a user's social network structure may elicit or be related to feelings of evaluation apprehension or, further, if evaluation apprehension and tie strength manifest uniquely in digital spaces. The findings indicate a potential for these relationships and manifestations to emerge in future research.

The original conceptualization of tie strength (Granovetter, 1973) and evaluation apprehension (Porter, 1986) occurred before the advent of social media. Taking an affordance approach to studying social media allowed for the results of the current study to be applied to more media than Twitter (Ellison & Vitak, 2015; Evans et al., 2016; Treem & Leonardi, 2012). Examining results through the lens of visibility and persistence as well as elaborating on the results by suggesting future research based on the editability and anonymity affordances of social media contribute to the scholarly understanding of digital tie strength, immediate digital social network structures, and digital evaluation apprehension that is more developed and generalizable across media platforms. Understanding affordances and how they function based on certain phenomena also allows for stronger predictions of future research questions and hypotheses; the present study's results contribute to this understanding of affordances.

Some major takeaways from the current study is that a given person's immediate social network structure and their (possibly most salient) digital strong ties may influence and elicit

experiences that are unique to social media such as digitally manifested evaluation apprehension or computer-mediated communication apprehension. Additionally, affordances of social media may play a vital role in how these network structures emerge as well as contribute to the uniqueness of digital social ties and their influence on a user. Taken together though, the key theoretical takeaway is the possibility of social media users to experience a digital network of panoptica; users could potentially have a multitude of social norms being exerted onto them from various distinct, differentiating clusters that seem to emerge from loosely-knit, low density immediate social networks. In conclusion, the present study advances the theoretical literature on the influence of the strength of ties and immediate digital social networks, as well as advancing pragmatic approaches to studying and operationalizing digitally manifested social ties and immediate digital social network density.

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Appendix A: Recruitment Announcement

Hi everyone! My name is Andrew Nicholson, and I'm here today to invite you to participate in a research study about how people are linked together on Twitter and how people may experience those links. If you decide to participate in this study, we'll ask you to take a brief online survey to tell us a bit about yourself (things like your demographics, your personality, and your experiences with Twitter). At the end of that survey, we'll ask you to schedule a time to come into the lab in person. When you come into the lab, we'll show you a visualization of your Twitter network and then ask you some questions about a few of the users you are connected with. We expect that the initial survey and scheduling will take you about 15 minutes total and the lab session will take about 30 minutes in total. If you wish to participate in the study, you can visit the URL in the flyer that I'm passing out to get more information, complete the initial online survey, and schedule a time to come into the lab.

As a student enrolled in a COMM course for Fall 2016, you **may** be eligible to receive research credit (extra credit) for participation in this study. To find out if you are eligible, please contact your Instructor and/or your course syllabus. Your course syllabus should also include details regarding how many research credits you may be eligible for (as well as how many research opportunities you can attempt for that class). If research credit is being offered, students not wishing to volunteer for this study are able to receive credit by completing an alternative assignment, which will be provided by the instructor.

If you decide to participate in the study, your participation will be completely confidential. Participation in the study is completely voluntary and your class standing will not be affected in any way if you choose not to participate.

If you have any questions about the study, feel free to email me at aln0012@mix.wvu.edu.

Thanks so much, and I hope to see you in the Lab!

Appendix B: Initial Online Survey

This survey is live at: **https://tinyurl.com/Studying-Twitter-survey**

Research Study: Social Ties and Experiences on Twitter

Please affirm the following to continue participating in this research. If you cannot truthfully affirm the following, you are not eligible to participate in this research and should exit this website.

- ❑ I am at least 18 years of age.
- ❑ I have an active Twitter account.
- ❑ I have sent at least one tweet in the past two weeks.
- ❑ I willingly agree to participate in this research.

Please click "Next" below to start the survey.

[NEXT]

Thank you for helping us with this research! This study is about your social ties and experiences on Twitter. Your participation in this study will help us better understand what feelings an individual may experience when using Twitter.

In the upcoming screens, you will see a series of questions about how you feel when tweeting and some basic information about you. It's very important for you to answer as honestly as possible and in the way that makes the most sense to you. There are no right or wrong answers - understanding what you actually think is most important. Usually, it is best to answer according to your first impression.

In total, the survey should take about 15 minutes to complete**. Please make sure you can complete this survey in one sitting**, as you will not be able to save your answers and come back to the survey. It is also recommended that you complete the survey on a **desktop or a laptop computer**, since some questions may not display properly on a smartphone or tablet.

Your Experiences on Twitter... Part 1 of 3

First, please help us understand a bit about how you experience Twitter.

It’s common for people to have different feelings when sending out a tweet. Here, we’re interested in your unique thoughts and feelings about what it’s like to send out a tweet. Please indicate how much you disagree or agree with each of the statements below -- some of the statements may sound strange, but there's a method to our madness - please just answer to the best of your ability. This is also a rather long list, but we promise it goes quickly!

For each of the statements below, please click one button indicating the degree to which you agree or disagree with the statement as it applies to how you feel when you use Twitter.

On Twitter...

	1 - Strongly Disagree	2	3	4	5	6	7 - Strongly Agree
I care what others think of me.	❍	❍	❍	❍	❍	❍	❍
I care how others judge my tweets.	❍	❍	❍	❍	❍	❍	❍
Others' approval is very important to me.	❍	❍	❍	❍	❍	❍	❍
The praise of others doesn't mean much to me.	❍	❍	❍	❍	❍	❍	❍
I don't care very much about what others think of me.	❍	❍	❍	❍	❍	❍	❍
I make sure my tweets appeal to lots of people.	❍	❍	❍	❍	❍	❍	❍
I think about my followers when I tweet.	❍	❍	❍	❍	❍	❍	❍
I expect that others are judging my tweets.	❍	❍	❍	❍	❍	❍	❍
I'm generally aware of others even if I don't see their tweets.	❍	❍	❍	❍	❍	❍	❍
Other people read all of my tweets.	❍	❍	❍	❍	❍	❍	❍

The way people are judged is unfair.	❍	❍	❍	❍	❍	❍	❍
Others evaluate me unfairly.	❍	❍	❍	❍	❍	❍	❍
Judgments of me are usually unreasonable.	❍	❍	❍	❍	❍	❍	❍
Others' judgments of me are often inconsistent.	❍	❍	❍	❍	❍	❍	❍
Others seem to be biased against me.	❍	❍	❍	❍	❍	❍	❍
Usually, others' judgments of me are accurate.	❍	❍	❍	❍	❍	❍	❍
There are too many standards for what counts as a 'good' tweet.	❍	❍	❍	❍	❍	❍	❍
When I tweet, my ideas are fair game for criticism.	❍	❍	❍	❍	❍	❍	❍
It's unfair when people don't follow me back.	❍	❍	❍	❍	❍	❍	❍
I'm satisfied with the number of 'likes' my tweets get.	❍	❍	❍	❍	❍	❍	❍

Others don't retweet me as much as they should.	❍	❍	❍	❍	❍	❍	❍
I expect that others will compliment my ideas.	❍	❍	❍	❍	❍	❍	❍
It's likely that others will critique what I say.	❍	❍	❍	❍	❍	❍	❍
I can communicate best when I know I'm being judged.	❍	❍	❍	❍	❍	❍	❍
I can pass the time without worrying what others say.	❍	❍	❍	❍	❍	❍	❍
I can connect with people in spite of what they think of me.	❍	❍	❍	❍	❍	❍	❍
When others are judging me, I have trouble expressing myself.	❍	❍	❍	❍	❍	❍	❍
I get nervous when people tag me.	❍	❍	❍	❍	❍	❍	❍
I expect that others will retweet my good ideas.	❍	❍	❍	❍	❍	❍	❍

When I create a hashtag, I hope it will go viral.	❍	❍	❍	❍	❍	❍	❍
I feel nervous when someone I don't know follows me.	❍	❍	❍	❍	❍	❍	❍
I don't like being judged.	❍	❍	❍	❍	❍	❍	❍
I like my tweets being evaluated.	❍	❍	❍	❍	❍	❍	❍
I don't like my words being analyzed.	❍	❍	❍	❍	❍	❍	❍
It bothers me when others judge me.	❍	❍	❍	❍	❍	❍	❍
I don't like my ideas being challenged.	❍	❍	❍	❍	❍	❍	❍
I don't like being criticized.	❍	❍	❍	❍	❍	❍	❍
I don't speak my mind because I know others are watching.	❍	❍	❍	❍	❍	❍	❍
I seek out followers with diverse perspectives.	❍	❍	❍	❍	❍	❍	❍
I try to be involved even if it means I'll be criticized.	❍	❍	❍	❍	❍	❍	❍

I try to avoid being noticed.	❍	❍	❍	❍	❍	❍	❍
I am usually just a lurker.	❍	❍	❍	❍	❍	❍	❍

Please click ‘Next’ below to move forward to the next survey.

[NEXT]

Your experiences on Twitter... Part 2 of 3

It is normal for people to experience different feelings when using technology. The next scale measures different feelings experienced when using Twitter. Just as you did with the last survey, answer these questions **as they apply to you**. There is no right or wrong answers, just answer to the best of your ability and **it is often best to go with your first instinct**.

	1 - Strongly disagree	2	3	4	5	6	7 - Strongly disagree
When communicating using Twitter, I feel tense.	❍	❍	❍	❍	❍	❍	❍
When communicating using Twitter, I feel calm.	❍	❍	❍	❍	❍	❍	❍
When communicating using Twitter, I feel jittery.	❍	❍	❍	❍	❍	❍	❍
When communicating using Twitter, I feel nervous.	❍	❍	❍	❍	❍	❍	❍
When communicating using Twitter, I feel relaxed.	❍	❍	❍	❍	❍	❍	❍

Please click 'Next' below to move forward to the next survey.

[NEXT]

Your experiences on Twitter... Part 3 of 3

It is also important to know that many people feel a certain way **about themselves** on Twitter. We want to know how you may feel about yourself when on Twitter. Some of these statements might strike you strange, but answer to the best of your ability and **try to go with your first instinct.**

On Twitter...

	1 - Strongly disagree	2	3	4	5	6	7 - Strongly Disagree
On the whole, I am satisfied with myself.	❍	❍	❍	❍	❍	❍	❍
At times I think I am no good at all.	❍	❍	❍	❍	❍	❍	❍
I feel I have a number of good qualities.	❍	❍	❍	❍	❍	❍	❍
I am able to do things as well as most people.	❍	❍	❍	❍	❍	❍	❍
I feel I do not have much to be proud of.	❍	❍	❍	❍	❍	❍	❍
I certainly feel useless at times.	❍	❍	❍	❍	❍	❍	❍
I feel that I'm a person of worth, at least on an equal plane with others.	❍	❍	❍	❍	❍	❍	❍

I wish I could have more respect for myself.	❍	❍	❍	❍	❍	❍	❍
All in all, I am inclined to feel that I am a failure.	❍	❍	❍	❍	❍	❍	❍
I take a positive attitude toward myself.	❍	❍	❍	❍	❍	❍	❍

Please click ‘Next’ below to finish the last part of the online survey.

[NEXT]

A bit about you… Part 1 of 2

You're almost done! In this last section, please answer these basic demographic items and a few questions about how you use Twitter. As a reminder, all information you include will be kept strictly confidential.

What is your age?

[Open Response]

What is your race?

[Open Response]

What is your gender?

[Open Response]

What is your ranking at school?

- ❍ Freshman
- ❍ Sophomore
- ❍ Junior
- ❍ Senior
- ❍ Non-traditional undergraduate
- ❍ Graduate student

What is your major?

[Open Response]

How many minutes a day do browse your Twitter feed?

[Open Response]

What is your Twitter username? This information will be used to verify your eligibility and will be deleted from our data after the study is complete – it will be kept completely confidential.
[Open Response]

Please click ‘Next' to complete the survey.

A bit about you... Part 2 of 2

Just one more step ...

Thank you for participating in the online portion of this study! There is just one more step you must complete ...

First, please enter your MIX ID below -- this is NOT the 700 or 800 number, but the variation on your name, initials, and/or numbers. It is VERY important that you accurately enter your MIX ID because this will be matched up with your scheduled lab session to verify that you are eligible.

Please enter your MIX ID here:

Now, when you click the 'NEXT' button below, you will be directed to a program that will allow you to schedule a time to come into the lab in Armstrong Hall. As a reminder, this session should last about 30 minutes, and you will be shown a visualization of your Twitter network and will be asked to answer some questions about the people you're connected to.

Please be sure to choose a time that you can definitely attend (check your class and work schedules to be sure!) and that you can be on time for ... if you are late or do not show up, you may not be allowed to reschedule.

Note that if you do not sign up for and attend the in-lab session, you will not be eligible for research credit.

Please click the 'NEXT' button below to continue to the scheduling system ...

[NEXT]

Appendix C: Interview Guide

The interview guide consisted of three questions that were asked regarding each strong tie presented on the visualization. After the participants marked his/her answers on the printed out visualization, the final question was given to the participant to complete in regards to their five presented strong ties.

Q1: *How would you characterize your relationship with this person? Please use one word to describe how you're connected.*

Question one was asked in order to find out if the strong ties on Twitter fall into the categories typically used to predict tie strength or if they have different labels than generally used in research. The following two questions are probe questions. For instance, if the participant categorized the ties by their existence on Twitter, a probe question was asked because the existence of the tie on digital and physical spaces was addressed in question two. The third probe question was meant to address the potential for a user to represent a cluster by itself.

Q1a: *How would you characterize the quality/nature of the relationship?*

Q1b: *Would you consider this user a friend, acquaintance, co-worker, best friend, or family member, or some other kind of connection?*

Q1c: *Is this user a group, an organization, or some other sort of represntation of multiple people?*

Question two was posed in order to find out if the ties articulated in the visualization were strictly strong ties in digital spaces or across digital and physical spaces.

Q2: *One of the things I am interested in is if you interact with these users in other digital spaces like Facebook, online games, Reddit and/or in physical spaces like home, work, school. In what spaces do you interact with this user? a) Twitter only b) Twitter and other digital spaces*

c) Twitter and physical spaces d) Multiple digital and physical spaces

The third question was asked to see how salient the ties are when the user experiences evaluation apprehension. This question also contributed to post-hoc analyses addressing which ties are more salient to the user when tweeting.

Q3: *On a scale of one to five, how much do you think of this person's opinion when you tweet? One being you don't think of their opinion at all and five indicating that the only thing you can think about is that user's opinion.*

The participant was then be given the Perceived Interpersonal Closeness scale (Popovic, Milne, & Barret, 2003) on which the participant will place each of the strong ties. This was used as a validation for mentions as an indicator of tie strength, and specifically, relational closeness.

Q4: *Please place each user on the diagram in relation to how close you feel to them.*

Appendix D: In-lab Post Survey

This survey is live at **https://tinyurl.com/hj6a64p**

Social Ties and Experiences on Twitter (pt. 2)

In the following section, you will be presented with three different sample tweets. After you read each tweet, please answer the questions that follow. Some of the tweets may make you feel

uncomfortable, but you are able to leave at any given moment.

1) Switched from watching the #trump rally to Indian Jones. Would rather see someone who punches Nazis than someone who quotes them.

	1 - Definitely not (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 - Definitely yes (7)
Do you think your Twitter audience would enjoy this tweet? (1)	❍	❍	❍	❍	❍	❍	❍
How likely would you be to send this tweet? (2)	❍	❍	❍	❍	❍	❍	❍

2) Get rid of #Narcan and let the people stupid enough to overdose on heroin actually die.

	1 - Definitely not (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 - Definitely yes (7)
Do you think your Twitter audience would enjoy this tweet? (1)	❍	❍	❍	❍	❍	❍	❍
How likely would you be to send this tweet? (2)	❍	❍	❍	❍	❍	❍	❍

3) Is it just me, or are there gays everywhere #MakesMeSick

	1 - Definitely not (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 - Definitely yes (7)
Do you think your Twitter audience would enjoy this tweet? (1)	❍	❍	❍	❍	❍	❍	❍
How likely would you be to send this tweet? (2)	❍	❍	❍	❍	❍	❍	❍

Great! Thank you for filling those out. This is the final part of the survey. Please answer these final items to the best of your ability and you will be done!

4) I feel anxious or nervous when I...

	1 - Strongly disagree (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 - Strongly agree (7)
Send a tweet. (1)	❍	❍	❍	❍	❍	❍	❍
Retweet. (2)	❍	❍	❍	❍	❍	❍	❍
Like someone's tweet. (3)	❍	❍	❍	❍	❍	❍	❍
Start following someone. (4)	❍	❍	❍	❍	❍	❍	❍

Appendix E: Protocol and Session Script

Social Ties and Experiences on Twitter

Protocol & Session Script

Recruitment

1. Potential participants will be solicited via in-class announcements in WVU Communication Studies courses. The students will be asked to participate in a study regarding their Twitter social network. Eligibility will also be stated, indicating that participants must be at least 18 years of age, have an active Twitter account, and must have sent a tweet within the past two weeks. Interested students will be invited to visit a URL with informed consent information (that will have to be acknowledged before proceeding) followed by an initial screening survey. At this point, participants will be informed of both stages of the study (the survey and the in-person session) and that a visualization of their Twitter social network will be created so they may make an informed decision about participation in the study as a whole and the information being accessed.
2. Per the departmental IRB procedures, the recruitment announcement will be posted to the public board outside Armstrong 108 and on the department's research opportunity web site.

Initial Online Survey

1. Upon visiting the initial survey URL (as communicated in the in-class and public announcements), potential participants will be presented with an informed consent cover

sheet (delivered electronically as a web-page text) that must be acknowledged before being exposed to survey content.

2. After acknowledging the cover sheet and indicating consent to continue and inclusion criteria, participants will be asked to complete a series of quantitative measures assessing if the participants meet the inclusion criteria, capturing demographic information, measuring evaluation apprehension, measuring computer-mediated communication apprehension, measuring communication self-esteem, Twitter handle (which will be deleted from the data after the study is complete) and Twitter use characteristics.
3. After completion of the survey questions, the survey completion page will direct participants to the SONA research session scheduling site (via a secure URL, as described below).

Session Scheduling

1. Participants will be directed to a secure URL directing them to WVU's SONA research scheduling system (https://wvucomm.sona-systems.com/default.aspx) where they can, if consenting, register for any available research session timeslot.
2. Once a participant has registered for a designated 30-minute time slot, the session will be formally scheduled and confirmed with participants via email (this is conducted through the SONA scheduling system so there is no direct research-participant communication unless initiated by the participant).
3. Participants will receive a SONA-initiated e-mail 24 hours before their session as a reminder.

In-person Lab Session

1. Prior to the arrival of the participant, an app like Mentionmapp.com will be opened on the lab's MondoPad (a large touchscreen monitor) and ready for the participant to sign in using their Twitter information. The MondoPad will be placed in front of the couch at which the participant will be situated.
2. Each participant should arrive at 221 Armstrong Hall at the start of his/her scheduled research time. The participant is greeted, and given an Informed Consent document to read and consider; the researcher will review the key points in the Consent document (the purpose of the study, voluntary participation, and what they'll be asked to do). Notably, this information will also be made available in the initial online survey's cover letter so participants will be aware of the full nature of the study before beginning. They can grant consent by signing the document and giving it to the investigator. Should they not wish to participate or grant written consent, the participant will be told s/he may not participate and will be free to leave without penalty.
3. If consent is granted, the investigator will read to the participant the following prompt: *"Thanks for agreeing to participate in this study. Over the next 30 minutes, you will be asked to sign into Mentionmapp.com, a website that creates a visual map of the top five people who mention you on Twitter. After the visualization is displayed on this screen, you will be asked a few questions about the map and then you will complete, answer a few questions for me, then complete a short survey. Do you have any comments or concerns before we get started?"*
4. After the researcher confirms that the participants feels comfortable and understands the study activities, the participant will be instructed the following:

"Please remind me of your Twitter handle."

After the participant provides his/her Twitter handle, the researcher will input the handle into the application to bring up the network map.

5. Once the information is entered, the visualization of the top five people who mentioned the participant on Twitter will be displayed. The researcher will screen capture the visualization, print it, and save a copy of it to the application. The account is password protected and the map will be kept only as a backup during the initial analysis. Then, once the study is complete, the electronic copies will be deleted.

"These five accounts are the ones who mentioned you most. I'm going to ask you some questions about each user."

6. The print-out will be given to the participant in order for the participant to answer the interview questions. There will be three questions asked about each user on the visualization and the participant will answer them accordingly on the print-out.

*"*Q1: *How would you characterize your relationship with this person? Please use one word to describe how you're connected or the type of relationship you have.*

Q2: *One of the things I am interested in is if you interact with these users in other digital spaces like Facebook, online games, Reddit and/or in physical spaces like home, work, school. In what spaces do you interact with this user? a) Twitter only b) Twitter and other digital spaces c) Twitter and physical spaces d) Multiple digital and physical spaces*

Q3: *On a scale of one to five, how much do you think of this person's opinion when you tweet? One being you don't think of their opinion at all and five indicating that the only thing you can think about is that user's opinion."*

7. After the participant answers each question for each user, the participant will be given a copy of the perceived interpersonal closeness scale (PICS).

   "Please place each user on the diagram in relation to how close you feel to them."

8. Upon completion of the PICS, the participant will be given a tablet with a Qualtrics survey open. The researcher will say:

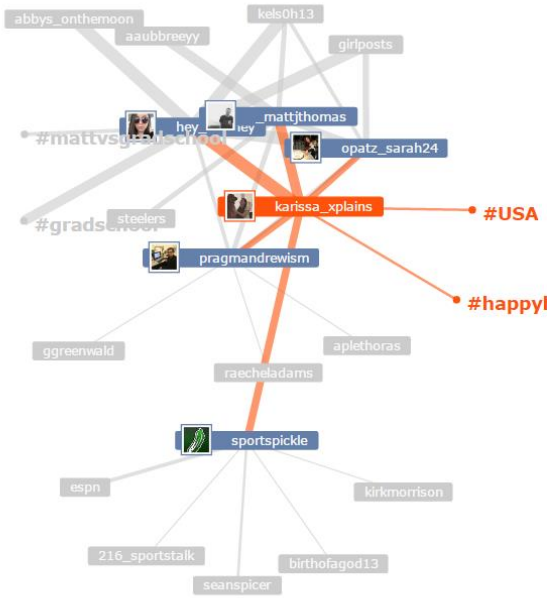
   "The last step in this study is this survey. Please fill it out to the best of your ability and let me know when you have finished."

9. Once the researcher is notified of the completion of the study, the participant will be told that their participation in the study is complete:

   "That's it! You successfully participated in the study. Now that your participation is complete, do you have any questions at this current time?" [Pause and address any questions or concerns].

10. The researcher will then read the following promp:

    "As we wrap up, I do have one more favor to ask: as we're still in the process of collecting data, we would very much appreciate if you could refrain from talking about the study with anyone else. You might have friends or classmates who have signed up for the study, and if they know about the details of the study, it might change the way they approach the questions. Once we finish data collection in early April, it will be okay to talk about the study then. And with that, you have completed your participation in this study. Thank you so much for your time."

11. A receipt for extra credit will be given to the participant at this time for participation in the study.

Appendix F: Sample Visualization