“Think Leader – Think…”: Examining the centrality of being male and masculine within the ideal leader concept

Abstract

The “Think Leader – Think Male” paradigm has largely shaped scholarship surrounding how individuals sex-type and conceptualize leadership. In support of this position, research finds that individuals generally view leadership as a male dominated role, whereby leadership has become associated with being male or masculine. Drawing on implicit leadership theories (ILTs), we challenge this perspective by proposing that a leader being male or masculine occupies a decentral position within individuals’ ideal ILTs. Replicating across three samples, we provide empirical support for this position, alongside demonstrating psychological network analysis (PNA) as a more nuanced and theoretically aligned methodological approach to modeling ILTs. Results from our study indicate that the “Think Leader – Think Male” paradigm fails to appropriately describe how individuals conceptualize their ideal leader. Along with making this contribution, our results also introduce new avenues for future research. Notably, we encourage future research to reconcile the results found in this study with the known difficulties and biases faced by women when seeking to gain or maintain leadership positions.

Keywords: Implicit leadership theories; Psychological network analysis; Ideal leaders

"Think Leader – Think…": Investigating the Centrality of Being Male and Masculine Within the Ideal Leader Concept

Considerable evidence and theorizing has suggested that, in general, individuals view leadership as a male or masculine role (e.g., Eagly & Karau, 2002; Schein, 1973; 1975; 2001), whereby leaders are expected to exhibit characteristics traditionally ascribed to males or that males are assumed to be more suitable for leadership positions. Although some research has suggested perceptions could be shifting towards a more androgynous view of leadership (Jackson et al., 2007), the "Think Leader – Think Male" paradigm has remained firmly entrenched in the leadership literature and supported in empirical research, manifesting itself in discrimination towards women seeking to gain or currently working in leadership positions (e.g., Badura et al., 2018; Koenig et al., 2011).

Both role congruity theory and social role theory (Eagly & Karau, 2002; Eagly et al., 2000; Eagly, 1987) have been posited as potential explanations for these effects. According to these theoretical accounts, because men have traditionally held more visible leadership positions, we develop from childhood through adulthood an acceptance that this is the norm and encode the behaviors we witness as being normative for that role. Because male leaders are more likely to display agentic behaviors, such as displays of dominance and anger, we come to associate those characteristics with leadership even if they are not necessarily the most effective or well-suited to the current circumstances. Women, who are more prone to display more communal behavioral patterns, such as nurturing and displays of empathy, may in fact be better suited to leadership positions. However, the lack of exposure to leaders displaying these styles means that males are often seen as being role-congruent with leadership positions, while females are often seen as being role-*in*congruent. This results in women often facing an uphill battle when taking on and maintaining leadership positions due to a perceived lack of fit between stereotypical female characteristics and the agentic characteristics associated with leadership (Heilman, 1983; 2001).

A central tenet of these theories is the notion that being male or masculine is predominate within an individual's ideal leader concept, as this represents the normative expectation of leadership. Hoyt describes this assumption (2005) in stating, "the insidious perception that women are stereotypically feminine and do not fit the image of an ideal leader is still pervasive" (p.2). However, given shifts in societal perceptions of leadership and gender more broadly, does this assumption that the image of an ideal leader is best represented as being male or masculine still hold? More specifically, what is the importance or centrality of being male and masculine within the ideal leader concept?

To answer this question, we draw on implicit leadership theories (ILTs) and the connectionist model of leadership (e.g., Lord et al., 2001) to investigate the importance and centrality of being male and masculine within the ideal leader concept. While past studies have identified male and masculine as characteristics within the structure of ideal ILTs (e.g., Offermann & Coates, 1994), we argue that the existence of male and masculine within ideal ILTs does not necessarily imply the relative importance or centrality of these characteristics within individuals' ideal leader concept.

Consequently, to address this discrepancy between theory and current empirical research, we employ psychological network analysis (PNA) to empirically model individuals' ideal ILTs. In doing so, we replicate across three samples that the "Think Leader – Think Male" assumption embedded in current theory definitively fails to appropriately describe how individuals conceptualize their ideal leader. We further strengthen these findings by demonstrating that individuals' age and sex fail to significantly influence the centrality of a leader being male or masculine within an individual's ideal ILT.

These findings contribute to the broader leadership literature by refuting the "Think Leader – Think Male" paradigm with regards to the centrality of male and masculinity in individual's ideal leader conceptualizations, and to the ILTs literature more specifically by introducing a novel and theoretically grounded methodological technique for modeling ILTs. This provides both new theoretical and methodological avenues for future research involving how individuals conceptualize leaders and the centrality of specific leader characteristics within that concept.

Implicit Leadership Theories

How individuals conceptualize leaders plays a critical role in determining the perceived effectiveness of leader behaviors and the ability of leader behaviors to improve organizational outcomes (e.g., Lord et al., 2020). These conceptualizations often follow working implicit mental models or schemas of how leaders typically differ from non-leaders, which are referred to in the leadership literature as implicit leadership theories (ILTs; Eden & Leviathan, 1975; Epitropaki & Martin, 2005; Foti et al., 2017; Lord et al., 2001; Offerman et al., 1994; Rush et al., 1977; Schyns et al., 2020).

Based on categorization theory (Rosch, 1975; 1978), ILTs are understood to function as cognitive prototypes, representing specific characteristics used for the purpose of categorizing novel stimuli. When exposed to a new stimulus, individuals use prototypes to determine the match between the new object and their existing descriptive cognitive categories. The more similar the new object is to a particular prototype, the stronger the perceived association is between the object and its category membership (Rosch, 1973; 1978). In relation to ILTs, when an individual interacts with a potential leader, the individual has a specific set of characteristics that he or she has deemed representative of the ideal or typical leader. These characteristics comprise the individual's activated prototype (i.e., the individual's ILT). How well a potential leader matches these characteristics determines the degree to which the individual categorizes that person as a leader.

The connectionist perspective and application of adaptive resonance theory (Brown & Lord, 2001; Hanges et al., 2000; Lord et al., 2001) have further elaborated on this process by proposing that ILT prototypes are fluid and may change over time and when in particular settings or contexts. Based on this assumption, the importance placed on various characteristics within ILT prototypes used for categorization are likely to fluctuate given an individual's environmental inputs and relationship with the potential leader (e.g., Junker & Van Dick, 2014; Shondrick et al., 2010). Although variations exist in terms of the particular values placed on different characteristics within a specific individual's ILT, the structure of these leader prototypes appear to be relatively stable both within and across individuals (e.g., Offermann & Coats, 2018)

Male and Masculine within ILTs

In support of the "Think Leader – Think Male" paradigm, male and masculine have consistently been found as two stable characteristics within ILTs. For example, Offerman et al. (1994) found Masculinity, comprised of the items male and masculine, to be one of eight dimensions within individuals' ILTs. Masculinity was found to be positive correlated with the Strength, Attractiveness, and Tyranny dimensions. This result was replicated by Epitropaki and Martin (2004); however, after reducing the items measured, Masculinity was identified as a dimension under the second-order factor of leader anti-prototype instead of leader prototype, aligning with the structure used by Lord et al. (1984). In a more recent study, Offermann and

Coats (2018) similarly identified Masculinity, comprised of the items male, masculine, tall, and attractive, to be a stable dimension within individuals' ILTs and positively correlated with the Strength, Charisma, and Tyranny dimensions. Reflecting on these results, Offermann and Coats (2018) noted that, "…'think leader, think male,' still appears to persist in terms of naïve conceptions of leadership." (p.520). Therefore, while researchers have categorized the dimension differently, the results of several studies converge in clearly demonstrating that male and masculine are present within individuals' ILT.

The Centrality of Male and Masculine within ILTs

While the presence of male and masculine characteristics within individuals' ILTs has been well established, very little is actually known concerning the relative importance or centrality of these characteristics within ILTs. The significance of this shortcoming can be understood through the lens of categorization theory and the connectionist model of leadership (e.g., Lord et al., 2001), which underpin the majority of research involving ILTs. According to this perspective, the characteristics within a leadership prototype (i.e., an individual's ILT) can be viewed as a network of interconnected nodes. Within the network, nodes are connected by weights, or paths, which indicate how well information flows through the network, where a stronger weight indicates a higher connectivity. Therefore, theoretically, certain nodes (or characteristics) are more or less likely to be connected to other nodes, and the strength of that connection is likely to vary. Further, certain nodes are more or less likely to be central to the network; meaning, they have a stronger influence on other nodes in the network.

Traditional approaches to examining ILTs (e.g., regression and comparison of means; Shen, 2019), as well as more modern approaches (e.g., polynomial regression and conjoint analysis; Riggs & Porter, 2017; Tavares et al., 2019), have provided valuable insight into the structure of ILTs and its associated outcomes. However, these approaches fail to directly model the neural-network pattern of interconnected nodes that comprise ILTs. This empirical shortcoming is noteworthy, particularly given the network concept is embedded in the ILT literature (e.g., Lord et al., 2020), such that it is often used in the definition of ILTs: "ILTs are represented by relatively stable patterns of connections in a neural-like network" (Shondrick et al., 2010; p. 964). Here, we propose that PNA is a viable method to address this shortcoming, and further can be used to determine the centrality of male and masculine characteristics within individuals' ILTs.

Psychological Network Analysis (PNA)

PNA is uniquely designed to empirically estimate and visually reproduce node networks. Psychological networks estimated from this type of analysis represent the dynamic and causal connection between nodes, where psychological constructs are represented as the system or network of these interconnected nodes (e.g., Schmittmann et al., 2013; Borsboom & Cramer, 2013; Kossakowski & Cramer, 2017). Empirically, psychological networks "consist of nodes representing observed variables, connected by edges representing statistical relationships." (Epskamp et al., 2018; p.195). In this way, psychological networks closely align with the connectionist model of leadership (e.g., Lord et al., 2001), as the psychological network perspective proposes that constructs (e.g., ILTs) are best represented as a network of variables (Schmittmann et al., 2013). Similarly, the psychological network approach aligns with the person- and pattern-focused approach to examining ILTs by estimating individuals' ILT full node network as opposed to examining characteristics in isolation, which "allows researchers to gain a more in-depth examination of the interplay between content and structure of implicit theories" (Foti et al., 2017; p.264).

Notably, PNA differs from the more commonly employed social network analysis, where nodes represent individuals and the edges connecting nodes represent social ties (e.g., Carter et al., 2015; Kwok et al., 2018; Khattab et al., 2020). While similarities exist between the two approaches (e.g., the estimation of centralities), psychological networks differ due to (a) the focus on relationships between items or attributes that comprise psychological constructs as opposed to relationships between people, and (b) the reliance on statistical estimation to create the network, compared to social networks where the relationships between individuals are observable (Jones et al., 2018).

While PNA is novel within the leadership literature, as well as the broader organizational behavior literature, this approach has been established in other domains. In particular, psychological networks have been used extensively in psychopathology (e.g., Borsboom & Cramer, 2013; Robinaugh et al., 2020). Within this context, nodes often represent symptoms that are interconnected causes of mental disorders (Fried et al., 2017), such as depression and anxiety (McElroy et al., 2018; Aalbers et al., 2019), posttraumatic stress disorder (Bryant et al., 2017; Birkeland et al., 2020), schizotypal personality (Dodell-Feder et al., 2019), and anorexia (Elliott et al., 2020). More general psychological constructs have also been examined using PNA, including empathy (Briganti et al., 2018), hopelessness (Marchetti, 2019), emotion (Lange et al., 2020), and personality (Cramer et al., 2012).

Contributing to the remarkable growth in the application of PNA is the availability of software and accompanying tutorials (e.g., Costantini et al., 2015; 2019; Jones et al., 2018; Dalege et al., 2017; Epskamp & Fried, 2018; Epskamp et al., 2018; Hevey et al., 2018). Therefore, while not directly related to ILTs, we encourage interested researchers to explore these informative and valuable resources. Below, we briefly introduce the key network components needed to transition PNA into the ILT context.

Key Components of Psychological Networks. In order apply PNA to the ILT context, it is critical to identify and define the key network components. While our understanding of psychological networks and their applications are still evolving (e.g., Robinaugh et al., 2020), two key components are found in all psychological networks. The first is *nodes*, which represent psychological variables, for example, an individual's attitudes, moods, or perceptions (e.g., Epskamp & Fried, 2018). In the context of ILTs, nodes represent the specific characteristics that comprise the ILT prototype (e.g., "Intelligent"). The second common component is *edges*, which indicate the connection between nodes, as well as the transfer of information between notes (Hevey et al., 2018). Edges can be weighted to represent the strength of the connection between nodes, where stronger relationships have a thicker edge and weaker relationships have a thinner edge; edges can also be directional indicating a causal-order. Similar to correlations, edges can also be positive or negative, indicating how the relationship between nodes might covary. Applied to ILTs, edges represent the strength of the association between characteristics within the ILT prototype. Subsequently, this also represents the transfer of information across the network, such as the occurrence of gap-filling, where non-observed characteristics are inferred due to an association with observed characteristics (Lord et al., 2001). As an example, if extraverted and dominant characteristics have a strong positive edge, when an individual perceives someone as extraverted, they are more likely to also view that person as dominant.

While not consistently found in all psychological networks, two other key components to aid in the interpretation of ILT networks are *communities* and *centralities*. Communities represent clusters of interconnected nodes that have strong edges within the cluster and weak edges outside the cluster (Hevey et al., 2018). Often, communities are estimated using the walktrap algorithm (Dalege et al., 2017; McElroy et al., 2018; Briganti et al., 2018). This algorithm is based on the concept that if a community exists, a "walker" randomly following the edges between nodes would spend more time (or be "trapped") within the community due to the higher density of edges (Pons & Latapy, 2005). Using this concept, Pons and Latapy (2005) developed an algorithm for estimating communities, which has received strong empirical support (e.g., Golino & Epskamp, 2016) and is recommended for smaller networks (Yang et al., 2016). Often, communities will resemble the factor structure of a construct; however, they are conceptually distinct in that communities represent interconnected subnetworks within a larger network as opposed to grouping distinct indicators of a construct.

In addition to community identification, centrality estimates are also often used to aid in the interpretation of psychological networks and help identify the importance of different nodes within the network (e.g. Briganti et al., 2018). However, the type of centrality estimate used can vary widely across studies and is often the focus of discussion involving psychological networks (e.g., Bringmann et al., 2019). Despite the different centralities estimates available, the three most commonly estimated centralities are *closeness, betweenness,* and *strength* (Epskamp & Fried, 2017). In addition to these three, *expected influence* is also commonly used (e.g., Marcus et al., 2018).

Closeness is the "inverse of the average distance from all other nodes" (Boccaletti et al., 2006; p.9), which represents the distance between one node and all other nodes in the network. A node with a high degree of closeness can more easily influenced by other nodes in the network. *Betweenness*, in comparison, is the number of times the node lies on the shortest path between two nodes (e.g., Epskamp et al. 2018). Nodes with a high degree of betweenness are most likely to transmit information between other nodes within the network, similar to functioning as a mediating variable (McElroy et al., 2018). *Strength* is estimated as the absolute sum of the direct edge weights a node has within the network (Jones et al., 2018; Epskamp & Fried, 2018; Epskamp et al. 2018). Nodes with a high degree of strength are more likely to activate other connected nodes in the network, and has been proposed as the centrality estimate best used for identifying points of intervention within the psychopathology literature (Fried et al., 2017). *Expected influence* is similar to strength, in that it is estimated using the sum of a node's direct edge weights; however, it accounts for the directionality of the weights (e.g., Robinaugh et al., 2016) and is likely the more appropriate estimate for ILT networks given the existence of both positive and negative edge weights.

The combination of these four centrality estimates, alongside communities and the more basic network components of nodes and edges, significantly advances the ability of researchers to investigate and model ILTs as originally envisioned in the connectionist model of leadership.

Hypotheses and Research Questions

By integrating PNA and current perspectives on the "Think Leader – Think Male" paradigm, we can begin to formulate basic network hypotheses involving ideal ILTs. Based on role congruity theory and social role theory (e.g., Eagly & Karau, 2002), the male and masculine characteristics should be highly connected to other characteristics and centrally located within the ideal ILT network. The rationale behind this assumption is that leadership is traditionally sex-typed as being a male or masculine role, meaning these characteristics play a leading role in how individuals conceptualize their ideal leader (e.g., Hoyt, 2005). More directly, if you ask an individual to describe their ideal leader, they are likely to "Think Male", along with its associated agentic characteristics.

In this way, the male and masculine nodes should be highly connected to other characteristics, and therefore central, within the ideal ILT network. This would indicate that the degree to which an individual identifies their ideal leader as having male or masculine characteristics will strongly influence their preferences for other characteristics (e.g., dominance). We can formally hypothesize these relationships by identifying their associated components within psychological networks. The first involves edge weights, indicating the connections between the male and masculine nodes and other nodes in the network. The second involves the centrality of the two nodes, which indicates the degree to which the male and masculine nodes influence other nodes, and subsequently shape how an individual conceptualizes their ideal leader.

Hypothesis 1: The male and masculine nodes will have stronger edge weights (i.e., connections) with other nodes in the ideal ILT network when compared to nodes with corresponding edge weights.

Hypothesis 2: The male and masculine nodes will have higher centrality estimates (closeness, betweenness, strength, expected influence) than other nodes in the ideal ILT network.

In addition to these two hypotheses, there is also evidence that ideal ILT networks differ based on the characteristics of the individual providing the ratings. In particular, age has been found in past studies to influence ideal ILT ratings (e.g., Junker & van Dick, 2014). This could be particularly true for male and masculine ratings, as studies have found college students more closely hold to the "Think Leader – Think Male" paradigm (e.g., Duehr & Bono, 2006; Schein & Mueller, 1992). This could be explained by college students having limited interaction with female managers or having less exposure to formal diversity training provided by organizations (Duehr & Bono, 2006).

Another potential influence on the ideal leader concept is sex. For instance, Offermann and Coats (2018) found that the factor loadings for the ILT Masculinity dimension were lower for females, and that the covariances between dimensions differed for females and males. Significant sex differences were also found by Epitropaki and Martin (2004) for ratings on the general anti-prototype dimension, which includes the Masculinity dimension. In a similar manner, research has indicated that females have started to move away from the "Think Leader – Think Male" paradigm, taking on a more egalitarian view of leadership (e.g., Jackson et al., 2007; Schein, 2001). These results suggest that the characteristics associated with male and masculine could differ between males and females, as well as the centrality of the male and masculine nodes. While some evidence suggests that differences might exist for age and sex specific to ideal ILT male and masculine ratings, this area of research is relatively underdeveloped. Therefore, we present two research questions to guide our analysis following our hypothesis testing.

Research Question 1: Does age influence the edge weight(s) and centrality estimates of the male and masculine nodes?

Research Question 2: Does sex influence the edge weight(s) and centrality estimates of the male and masculine nodes?

Method

Samples and Participants

To ensure diverse samples, we collected data from three sources. Given the role of contextual factors on the value placed on characteristics within ILT structures (Lord et al., 2001), both multiple and diverse samples were needed to evaluate the generalizability of findings. Therefore, the first sample consisted of undergraduate and graduate students from two universities, with one located in the Southeastern United States and the other in the Northeastern United States (*N*=554). The second sample consisted of Amazon Mechanical Turk (MTurk) workers located within the United States (*N*=1426). As a final sample, we collected data using Qualtrics' panel data collection service (*N*=351). For each sample, we followed best practices for improving overall data quality by utilizing response speed-per-item (SPI; Wood et al., 2017) and an instructed item (DeSimone et al., 2015) to screen participants. Specifically, participants were removed from the data if they completed the 21-item ideal ILT measure faster than one second per item (1-SPI) or failed the instructed item.

Sample 1: Students. While concerns exist regarding the use of student data (e.g., Landy, 2008), the sample was determined to be appropriate given 80% of the final sample indicated currently working part-time or full-time. Additionally, prior research suggests that the conceptualization of the ideal leader develops at an early age (Ayman-Nolley & Ayman, 2005); therefore, a traditionally younger sample could provide unique insight and enhance the generalizability when examined within the context of the overall findings. Six participants failed the 1-SPI check, 31 failed the instructed item. The final sample consisted of *N*=517 participants: 49% male and 51% female, with a mean age of 23 (*SD*=6).

Sample 2: Mechanical Turk. Researchers have used data from Amazon's Mechanical Turk in a number of studies involving leadership (e.g., Kocoglu & Mithani, in press; Offermann & Coats, 2018). Despite its widespread use in the literature, data quality concerns have been raised (Harms & DeSimone, 2015). To account for these concerns, we utilized the 1-SPI data quality check (Wood et al., 2017), an instructed item, and requiring the Human Intelligence Task

(HIT) to only be available to participants in the United States who had an overall HIT approval rating of at least 80%. Following these procedures, 252 participants failed the 1-SPI check, and 70 failed the instructed item check. An additional seven were removed for listing their location as outside of the United States at the end of the survey. The final sample consisted of *N*=1120 participants: 56% male and 44% female, with a mean age of 37 (*SD*=11).

Sample 3: Qualtrics. Similar to the use of MTurk, Qualtrics' data collection service has been used in a number of leadership related studies (e.g., Dust et al., in press). While MTurk is touted as providing access to a diverse sample (Landers & Behrend, 2015), we specifically collected data from Qualtrics as this form of online panel data has been found to be a valid representative of more traditional organizational data collections (Walter et al., 2019). To aid in this objective, we utilized the Qualtrics prescreening option to allow for only participants who were both a full-time employee and had a direct supervisor to complete the survey. We removed 30 participants for failing the 1-SPI check; all participants passed the instructed item. The final sample consisted of *N*=321 participants: 42% male and 58% female, with a mean age of 40 (*SD*=11).

Measures

Implicit Leadership Theories (ILTs). Ideal ILTs were measured using the 21-item Epitropaki and Martin (2004) measure, which is commonly used in the ILT literature (e.g., Coyle & Foti, 2015; Epitropaki & Martin, 2005; Shen, 2019). The measure is comprised of both prototypical and anti-prototype leader characteristics, and is based on the 41-item measure developed by Offermann et al. (1994). The instructions given to participants were, "To what degree are the following attributes characteristic of your ideal leader?" Items were rated on a 7-point Likert scale.

Results

Estimating the Ideal ILT Networks

All analyses were conducted using R version 1.2.5001. Given the use of continuous variables (i.e., the 21-item ILT attribute ratings), we utilized a partial correlation network and *graphical lasso* (glasso) methodology to estimate the networks (e.g., Costantini et al., 2015; Epskamp & Fried, 2018). Specifically, we used the *EBICglasso* function within the qgraph package[1] (Epskamp et al., 2012) to create the weight adjacency matrices for each sample. The threshold argument was set to true to ensure appropriate specificity. Statistical comparisons between the strength of edge weights were estimated using the *differencetest* function within the bootnet package[2], with the *p*-value set at .05 (Supplementary Materials; SM1; Epskamp et al., 2018). Communities were identified using the *cluster_walktrap* function within the igraph package[3] (Amestoy et al., 2015; Pons & Latapy, 2005). The data used for estimating communities was the absolute value of the weight adjacency matrix, which was identified as both undirected and weighted. Edge stability was estimated using the *bootnet* function within the *bootnet* package using *EBICglasso* and the nonparametric bootstrap with 1000 samples (SM2). Results indicated strong stability for the estimated edge weights for the student and MTurk networks. However, the edge weight stability of the Qualtrics network was notably less, likely due to the smaller sample size. To plot the networks we used the *qgraph* function within the qgraph package (Figure 1).

Network for Sample 1. Results provided in Figure 1a suggest that the Male and Masculine nodes are distal from the network center. This is supported by the limited number of

[1] https://cran.r-project.org/web/packages/qgraph/qgraph.pdf
[2] https://cran.r-project.org/web/packages/bootnet/bootnet.pdf
[3] https://cran.r-project.org/web/packages/igraph/igraph.pdf

edge weights connecting the Male and Masculine nodes to other nodes in the network. Along with the direct connection between the Male and Masculine nodes (*w*[4]=.73), the Masculine node was also connected to the Strong node (*w*=.16). However, this connection was not significantly stronger than the connection between Energetic and Strong (*w*=.19). Therefore, while the degree to which an individual characterizes their ideal leader as Masculine will covary with characterizing their ideal leader as Strong, the significance of this covariance is no greater than that of Energetic and Strong. In this way, Masculinity is not uniquely driving the degree to which individuals characterize their ideal leader as Strong. No other edge weights were found for the Male and Masculine nodes; therefore, based on the estimated edge weights of the student network, hypothesis 1 was not supported.

Network for Sample 2. Aligning with the connectionist model of leadership (Lord et al., 2001), the MTurk sample was found to have a different network structure (Figure 1b), suggesting contextual differences between the two samples. However, despite the different network structure, results largely replicated those found for the student sample. The direct connection between the Male and Masculine nodes had a similar edge weight (*w*=.69). In terms of other connections, the Male node was also connected to the Manipulative node (*w*=.06); however, this edge weight was not significantly stronger than other connections with Manipulative, and was significantly weaker than the connection between Knowledgeable and Manipulative (*w*=-.14), Conceited and Manipulative (*w*=.25), and Pushy and Manipulative (*w*=.25).

The Masculine node also was connected to Motivated (*w*=.07), but was not significantly stronger than other connections with Motivated; further, it was significantly weaker than the connection between Dedicated and Motivated (*w*=.32). Outside of these edge weights, no other

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[4] *w* is used to indicate the edge weight between two nodes

connections were found for the Male and Masculine nodes. These results suggest that while the Male and Masculine nodes were found to have more connections with other nodes than in the student sample network, the two nodes failed to have a significantly stronger influence on how individuals characterize their ideal leader than other node connections within the network. Therefore, similar to the results for sample 1, the estimated edge weights of the MTurk network failed to support hypothesis 1.

Network for Sample 3. The Qualtrics sample was also found to have a different network structure (Figure 1c). However, unlike the student and MTurk networks, the Qualtrics network was notably denser, having more connection between nodes. The edge weight between the Male and Masculine nodes was (w=.63) similar to the estimates for the student and MTurk samples. The Male node was connected to Understanding (w=.18), Sincere (w=-.13), Dedicated (w=-.12) Manipulative (w=.19), Conceited (w=.11), and Selfish (w=-.14). However, none of the edge weights were significantly stronger than other connections with these nodes, and five of the six edge weights were found to be significantly weaker than other connections.

The Masculine node was also connected to Intelligent (w=.12), Dedicated (w=.11), Hard-working (w=-.14), and Loud (w=.14). However, similar to the Male node, none of the edge weights were significantly stronger than other connections; additionally, the edge weight between Masculine and Hard-working was significantly weaker than the edge weight between Dedicated and Hard-working (w=.28). Similar to the other two samples, these results indicate that while more connections were found between the Male and Masculine nodes and other nodes, none of these connections had a significantly stronger influence on how individuals characterize their ideal leader than other node connections in the network. Therefore, results from the estimated edge weights of the Qualtrics network failed to provide support for hypothesis 1.

Estimating Ideal ILT Network Centralities

Centrality estimates for closeness (c_c), betweenness (c_b), strength (c_s), and expected influence (c_{ei}) were created using the *centralityPlot* function also within the qgraph package (Figure 2; values provides in SM3). The estimates were standardized to improve interpretability (e.g., Dodell-Feder et al., 2019). Centrality stability was estimated using the *estimateNetwork* function in the bootnet package using *EBICglasso* and the nonparametric bootstrap with 1000 samples (SM5). Male and Masculine node centrality estimates will be inflated due to the strong edge weight between the two nodes. To account for this, and to isolate the influence of the Male and Masculine nodes on other nodes in the network, their edge weight was set to zero. This ensures the centrality estimates accurately reflect how these two nodes relate to broader network as opposed to each other. Centralities estimates without this adjustment are provided in SM4.

Aligning with prior applications of psychological networks, strength and expected influence demonstrated a high level of stability (Epskamp et al., 2018), while closeness and betweenness showed less stability. Similar to the edge stability estimates, the Qualtrics sample demonstrated notably weaker stability for closeness and betweenness than the other two samples, likely due to the sizable difference in sample sizes.

Sample 1 Centralities. For the student sample, the Male and Masculine nodes were found to have low closeness (c_c=.0017; c_c=.0037), indicating the two nodes are distally located relative to other nodes within the network. The node with the highest closeness was Knowledgeable (c_c=.0041). In a similar fashion, the Male and Masculine nodes were found to have low betweenness (c_b=0; c_b=0), with the Knowledgeable node having the highest betweenness (c_b=36). This indicates that the Male and Masculine nodes rarely lie on the shortest path between other nodes in the network, limiting their transition of information and influence on how individuals characterize their ideal leader.

Due to the negative and positive edge weights found within the network, we focus on expected influence; however, strength is provided in Figure 2 for completeness. For expected influence the Male and Masculine nodes had moderate estimates (c_{ei}=.058; c_{ei}=.065), with Pushy having the highest expected influence (c_{ei}=.1.043). This indicates that the Male and Masculine nodes have little to no influence on other nodes in the network. Therefore, based on the centrality estimates, hypothesis 2 was not supported for the student sample.

Sample 2 Centralities. The centrality estimates for the MTurk sample aligned with those of the student sample. The Male and Masculine nodes were found to have low closeness (c_c=0; c_c=.0023) and betweenness (c_b=0; c_b=0). The node with the highest value for these two centrality estimates was Helpful (c_c=.0051; c_b=59). These results suggest that the Male and Masculine nodes are distally located and rarely lie on the shortest path between other nodes in the network.

For expected influence, the Male and Masculine node estimates were also similar to the student sample (c_{ei}=.0; c_{ei}=.158). The Intelligence node had the highest expected influence (c_{ei}=1.169). These results align with those in the student sample, indicating that the Male and Masculine nodes have limited to no influence on other nodes in the network. Therefore, the MTurk sample failed to support hypothesis 2.

Sample 3 Centralities. The centrality estimates for the Qualtrics sample were more distinct from the prior two samples. The Male and Masculine nodes were found to have higher closeness (c_c=.0043; c_c=.0040). While notably larger estimates than the student and MTurk samples, this is likely due to the general increase in connectivity across the nodes in the network. Therefore, while the estimates are higher, the overall influence on the network is still minimal compared to other nodes. This is demonstrated by the Male and Masculine node closeness estimates being lower than 18 of the other 19 nodes in the network. Further supporting this position, the Male and Masculine nodes had low betweenness estimates (c_b=0; c_b=0). The Loud node had the highest closeness (c_c=.0060) and betweenness (c_b=28) estimates.

For expected influence, the Male and Masculine nodes also had low estimates (c_{ei}=.086; c_{ei}=.231). The Helpful node was found to have the highest expected influence (c_{ei}=1.306). Similar to the other samples, these results failed to provide support for hypothesis 2. Relative to other nodes in the network, the Male and Masculine nodes were found to have minimal influence on the network.

RQ1: Does Age Influence the Edge Weight(s) and Centrality of the Male and Masculine Nodes?

Results from the hypothesis testing suggests that the Male and Masculine nodes are not central to how individuals characterize their ideal leader; further, they have limited influence on other nodes within the ideal ILT network. However, the degree to which individuals characterize their ideal leader as Male and Masculine and their associations with other characteristics might be influenced by a participant's age.

To maintain an appropriate sample size, we selected the MTurk sample to conduct the analysis. Specifically, we split the sample into two subsamples based on the sample mean, those under 38 years old (*N*=655) and those over 38 years old (*N*=425). These subsamples also roughly divide the sample into pre-millennials/millennials (under 38yo) and post-millennials (over 38 yo).

The analysis was done using the *NCT* function within the NetworkComparisonTest package[5] (van Borkulo et al., 2016). We specified 1,000 permutations to test invariance for global strength, network strength, and edge weights. The difference in global strength, which is the sum of all the edge weights within the network and represents overall connectivity, was non-significant ($network_{diff}$=.003; p=.996). This means that the nodes within the under 38yo and over 38yo networks had similar levels of connectivity. Similarly, the difference in network structure was non-significant ($network_{diff}$=.183; p=.476), suggesting the clustering of nodes is relatively consistent for the under 38yo and over 38yo networks.

However, in terms of specific edge weights, three connections involving the Male and Masculine nodes were significantly different. A negative edge weight between Male and Sincere was found for the over 38yo network, but not the under 38yo network (w_{diff}=.07; p<.05). Additionally, a positive edge weight was found between the Masculine and Selfish nodes for the over 38yo network, but not the under 38yo network (w_{diff}=.08; p<.05). Lastly, a positive edge weight was found between the Male and Knowledgeable nodes for the under 38yo network, but not the over 38yo network (w_{diff}=.02; p<.05). These results suggest that significantly different associations exist between Male and Masculine and other ideal leader characteristics for those under and over the age of 38.

In terms of centrality estimates, no significant differences were found for the Male and Masculine nodes for closeness, betweenness, strength, or expected influence. This suggests that while significantly different associations exist, the centrality or influence that the Male and Masculine nodes have on the networks is consistent across the under 38yo and over 38yo samples.

[5] https://cran.r-project.org/web/packages/NetworkComparisonTest/NetworkComparisonTest.pdf

RQ2: Does Sex Influence the Edge Weight(s) and Centrality of the Male and Masculine Nodes?

Similar to the question regarding age, gender might influence the centrality of Male and Masculine within individuals' ideal ILT. We used the MTurk sample to maintain an appropriate sample size to conduct the analysis. We first separated the sample into those who identified as male (N=620) and female (N=498), and then followed the analytical procedure used above. The differences in global strength ($network_{diff}$=.092; p=.808) and network structure ($network_{diff}$=.176; p=.528) were not significant; however, five significant differences were found for specific edge weights related to the Male and Masculine nodes.

The positive edge weight between the Male and Masculine nodes was significantly stronger for females than males (w_{diff}=.18; p<.01), suggesting females have a stronger association between being Male and being Masculine than males. Additionally, the female network contained positive edge weights between Male and Knowledgeable (w_{diff}=.01; p<.05) and Male and Conceited (w_{diff}=.06; p<.05), which were edge weights unique to the female network and absent in the male network. The negative edge weight between Male and Motivated (w_{diff}=.03; p<.05), and the positive edge weight between Masculine and Domineering (w_{diff}=.12; p<.05), were unique to the male network and not found in in the female network. Similar to RQ1, these results suggest that males and females hold some significantly different associations between Male and Masculine and other ideal leader characteristics.

However, no significant differences were found in the centrality estimates for the male and female network. Aligning with prior results, this suggests that differences exist in what characteristics are associated with Male and Masculine, but the influence of these two nodes on the broader ideal leader network is the same for males and females.

Discussion

The importance of being male and masculine has long dominated the discussion surrounding leadership and ideal leader characteristics. Summarized by Ayman and Korabik (2010), “The image of a leader is strongly associated with men and masculinity” (p.161). In this study, we empirically tested this assuming by applying a novel and theoretically grounded methodological technique to examine the associations and centrality of a leader being male and masculine within individuals’ ideal leader concept. Replicating across three samples, results demonstrate that the leader characteristics of male and masculine are distally located within the ideal ILT network, and that they have limited to no influence on other characteristics within the network. This provides strong evidence that “Think, Leader – Think, Male” is inaccurate when describing individuals’ ideal leader characteristics. Further, while different associations were found between being male and masculine with other ideal leader characteristics based on age and gender, the centrality of being male and masculine within the ideal leader concept was not significantly different across groups. These results suggest that age and sex differences exist in how individuals make associations between ideal leader characteristics; however, these differences entail the associations as opposed to the centrality or importance of ideal characteristics.

Implications

By employing PNA, our findings refute the notion that “Think Leader – Think Male” applies to how individuals conceptualize their ideal leader. This result contributes to the leadership literature in a number of significant ways. Most notably, we strongly encourage a revaluation of the “Think Leader – Think Male” paradigm. In the current study, we demonstrate that this paradigm does not appropriately reflect individuals’ actual ideal leader concept.

However, this does not discredit or refute past studies that have consistently found that women are negatively influenced when attempt to gain or maintain leadership positions (e.g., Badura et al., 2018; Koenig et al., 2011). Instead, it suggests that cognitive processes or biases exist that distort the matching process which occurs when an individual compares a female leader with their ideal ILT. As a result, while individuals' ideal ILTs have little to no connection with "Think Leader – Think Male", female leaders are still rarely categorized as an ideal leader.

Aligning with the connectionist model (e.g., Lord et al., 2001), this distortion could suggest that situational or environmental factors (e.g., Epitropaki et al., 2013) have a significantly stronger influence on the type of leader characteristics that individuals prefer than previously thought. Future research should seek to explore under what circumstance and why this distortion occurs to advance our understanding of why being male or masculine has limited influence on ideal ILTs, yet females continue to face difficulties when being identified as a leader or holding leadership positions.

We also make the notable contribution of introducing PNA to the leadership literature, and to organizational behavior and management research more broadly. This answers calls for integrating methodologies outside of leadership into the leadership literature and continuing to develop our understanding of the cognitive and perceptual aspects of leadership (e.g., Gardner et al., 2020). PNA provides a theoretically congruent methodology for examining the structure of ILTs and the value placed on individual attributes within that structure. Such approach is needed to adequately understand how cognition and perception relate to leadership (Fiske & Taylor, 2013), as opposed to examining attributes in isolation. This allows for more nuanced theory testing, and ultimately theory building. In the current study, we introduce the key components of PNA and direct researchers towards the various resources and tools available to conduct PNA (e.g., Dalege et al., 2017). Therefore, we encourage researchers to utilize PNA to test and expand our understanding of ILTs, as well as other forms of organizational relevant implicit theories.

Think Leader – Think What?

If being male and masculine have little to no influence on individuals' ideal ILTs, then what are the leader characteristics that are central individuals' ideal ILTs. In support of the connectionist model of leadership (e.g., Hanges et al., 2000; Lord et al., 2001), results suggest that while some characteristics generalize, the centrality of leader characteristics is also influenced by the sample. For the student sample, the most central ideal leader characteristics were Knowledgeable (betweenness, closeness, and strength) and Pushy (expected influence). This result suggest that for university students, the degree to which they conceptualize their ideal leader as knowledgeable and pushy will have the largest impact on the value they place on other characteristics within their ideal ILT network.

In comparison, for the MTurk sample, the most central characteristics were Helpful (betweenness and closeness) and Intelligent (strength and expected influence). Aligning with these results, for the Qualtrics sample, the most central characteristics were Loud (betweenness and closeness), Helpful (strength), and Intelligent (expected influence). Therefore, outside of the university context, the degree to which individuals conceptualize their ideal leader as loud, helpful, and intelligent will largely determine their ideal ILT network. Despite these differences, "Think Leader – Think Intelligent" is likely the most generalizable paradigm due to being the only characteristics within the top five for expected influence across all three samples. This suggests that how an individual values intelligence in their leader will have the strongest influence on the degree to which they value other leader characteristics. However, future research should seek further explore the ideal leader concept, particularly across contexts.

Limitations and Future Research

While this study provides notable theoretical and methodological advancements, it does contain limitations that warrant mention. First, the PNA stability estimates for the Qualtric sample are notably worse than the student and MTurk samples. This is likely due to sample size, and therefore results from this sample should be viewed with a degree of caution. Second, Lord et al., (2020) suggest that ILTs are a dynamic process. In the current study, we used cross-sectional data. Recent advancements in psychological network analysis allows for the examination of longitudinal data (e.g., Epskamp, 2018). Therefore, future research should seek to explore ILT network stability and factors that induce change. This line of research could be explored by using manipulations and quasi-experimental designs. By understanding how ILT networks change, it could provide valuable insight for improving leadership training programs (Lan,) and other forms of training that target implicit theories or biases (e.g., stereotypes).

As another limitation, and potential for future research, PNA is still a developing methodological technique. This means many opportunities exists for organizational and management researchers to draw on their methodological and statistical expertise to improve PNA. As a direct example, improvements are needed to allow for the use of controls within PNA for comparing networks with an unequal number of nodes. Additionally, researchers should seek to integrate PNA with methods for estimating person-supervisor fit (e.g., Astakhova, 2016) to determine how network overlap influences work outcomes. As with any field of research, concerns such as endogeneity require investigation (e.g., Antonakis et al., 2010). We encourage researchers to integrate current approaches to examining endogeneity into the PNA context, while accounting for its distinct theoretical underpinnings. In light of these issues, we call on researchers to expand and further develop PNA within organizational and management research as a novel approach to theory testing and theory building.

Furthermore, the current study focuses on the ideal leader. Future research should seek to investigate actual ILT networks, as well as context specific ILTs (e.g., ideal manager or ideal CEO). Another potential avenue for research is to examine how including sex identifiers within the instructions alter ILTs networks (e.g., to what degree do these characteristics describe your ideal *male* leader?). This could provide information on how the sex of the target influences attribute associations and centrality within ideal ILTs. Lastly, the current study used a binary measure of sex for our second research question. Future studies should utilize specific measures of gender (e.g., Bem, 1974) to further instigate how an individuals' degree of masculinity or femininity influences their ideal ILT network.

Conclusion

The current study provides strong evidence that "Think Leader – Think Male" does not accurately portray how individuals conceptualize their ideal leader. This evidence was replicated across three studies comprising diverse samples. Additionally, this study is the first to introduce PNA to the leadership literature, providing a significant methodological contribution and opening a broad avenue for future research. We encourage researchers to continue to leverage and develop PNA to examine ILTs and continue to develop our understanding of how individuals conceptualize their ideal leader.

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Tables

Table 1. Student Sample Descriptives, Correlations, Edge Weights, and Community Membership

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. Helpful (2)	-	.25	.00	.00	.00	.00	.15	.00	.00	.12	.18	.00	.00	-.15	.00	.00	.00	.00	-.13	.00	.00
2. Understanding (6)	.36	-	.36	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
3. Sincere (6)	.30	.42	-	.00	.00	.00	.00	.14	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
4. Intelligent (4)	.32	.25	.22	-	.32	.22	.45	.00	.00	.17	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
5. Educated (4)	.31	.28	.25	.48	-	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
6. Clever (4)	.20	.17	.16	.37	.25	-	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
7. Knowledgeable (2)	.37	.29	.20	.58	.37	.31	-	.18	.00	.00	.00	.00	.13	.00	.00	.00	.00	.00	.00	.00	.00
8. Dedicated (2)	.30	.30	.29	.39	.31	.18	.43	-	.44	.34	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
9. Motivated (2)	.29	.26	.22	.33	.27	.15	.37	.53	-	.15	.14	.00	.00	.00	.00	.00	.00	-.13	.00	.00	.00
10. Hard-working (2)	.31	.23	.23	.39	.25	.15	.39	.51	.41	-	.00	.00	.13	.00	.00	-.18	.00	.00	.00	.00	.00
11. Energetic (1)	.29	.16	.19	.27	.24	.21	.23	.21	.28	.19	-	.19	.00	.00	.00	.00	.29	.00	.00	.00	.00
12. Strong (1)	.12	.04	.14	.24	.19	.25	.23	.11	.19	.13	.26	-	.00	.00	.00	.00	.00	.00	.00	.00	.16
13. Dynamic (2)	.24	.17	.20	.28	.18	.27	.34	.32	.22	.29	.23	.18	-	.00	.00	.00	.00	.00	.00	.00	.00
14. Domineering (5)	-.17	-.11	-.17	-.02	.01	.05	-.03	-.06	-.02	-.02	-.03	.07	.01	-	.00	.00	.00	.19	.00	.00	.00
15. Pushy (3)	-.08	-.08	-.11	-.06	-.03	.05	-.04	-.05	-.07	-.07	.03	.00	.01	.19	-	.26	.00	.00	.00	.00	.00
16. Manipulative (3)	-.10	-.18	-.17	-.05	-.07	.05	-.12	-.13	-.13	-.18	.02	.02	-.08	.15	.31	-	.00	.00	.30	.00	.00
17. Loud (1)	-.09	-.02	-.03	-.07	-.03	.06	-.06	-.03	-.01	-.06	.21	.00	-.02	.19	.19	.07	-	.00	.00	.00	.00
18. Conceited (5)	-.22	-.26	-.29	-.18	-.10	-.11	-.19	-.21	-.23	-.18	-.07	-.05	-.11	.27	.19	.23	.14	-	.19	.00	.00
19. Selfish (3)	-.29	-.24	-.23	-.17	-.10	-.09	-.22	-.24	-.28	-.27	-.12	-.13	-.14	.18	.27	.38	.10	.35	-	.00	.00
20. Male (7)	-.07	-.07	-.05	.02	-.07	.07	-.02	.03	-.07	-.01	-.05	.02	.04	.06	.09	.13	.02	.11	.06	-	.73
21. Masculine (7)	-.10	-.05	-.06	.01	-.07	.11	.04	.00	-.02	-.01	-.05	.12	.06	.13	.13	.13	.00	.11	.10	.69	-
Mean	4.68	4.63	4.53	4.52	4.49	4.18	4.63	4.72	4.73	4.79	4.19	4.19	4.24	2.45	2.18	1.58	2.67	1.86	1.61	2.82	2.80
SD	.52	.61	.68	.63	.65	.78	.55	.55	.52	.48	.77	.86	.79	1.08	1.06	.89	1.06	1.00	.87	1.21	1.04

Note. N=517; p<.05 for r values above .09, p<.01 for r values above .12. Values above the diagonal are estimated edge weights. Numbers in parentheses indicate community membership.

Table 2. MTurk Sample Descriptives, Correlations, Edge Weights, and Community Membership

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. Helpful (4)	-	.25	.16	.00	.00	.00	.12	.06	.00	.15	.12	.00	.00	.00	.00	.00	.00	.00	-.08	.00	.00
2. Understanding (4)	.53	-	.26	.11	.00	.00	.00	.00	.09	.00	.00	.00	.00	.00	.00	.00	.00	-.14	.00	.00	.00
3. Sincere (4)	.51	.53	-	.00	.00	.00	.00	.00	.00	.00	.00	.09	.00	.00	.00	-.07	.00	.00	-.14	.00	.00
4. Intelligent (2)	.48	.49	.44	-	.21	.10	.29	.00	.00	.24	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
5. Educated (2)	.36	.31	.33	.47	-	.00	.14	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
6. Clever (2)	.28	.27	.25	.34	.29	-	.15	.00	.00	.00	.00	.00	.00	.00	.13	.00	.00	.00	.00	.00	.00
7. Knowledgeable (2)	.51	.48	.44	.60	.45	.34	-	.09	.13	.07	.00	.00	.00	.00	.00	-.14	.00	.00	-.08	.00	.00
8. Dedicated (1)	.48	.46	.45	.50	.36	.29	.53	-	.32	.30	.00	.00	.15	.00	-.06	.00	.00	.00	.00	.00	.00
9. Motivated (1)	.46	.46	.45	.49	.39	.31	.54	.60	-	.10	.12	.10	.00	.00	.00	.00	.00	.00	-.09	.00	.07
10. Hard-working (1)	.51	.46	.42	.58	.39	.28	.55	.59	.55	-	.00	.14	.00	.00	.00	.00	.00	.00	.00	.00	.00
11. Energetic (1)	.35	.29	.28	.31	.26	.31	.31	.35	.40	.33	-	.14	.17	.00	.00	.00	.00	.00	.00	.00	.00
12. Strong (1)	.26	.28	.30	.37	.32	.30	.35	.36	.41	.38	.39	-	.11	.11	.00	.00	.00	.00	.00	.00	.00
13. Dynamic (1)	.36	.30	.32	.37	.33	.31	.36	.41	.39	.34	.40	.38	-	.00	.00	.00	.00	.00	.00	.00	.00
14. Domineering (3)	-.22	-.22	-.26	-.16	-.08	.02	-.18	-.16	-.10	-.17	.06	.10	-.02	-	.23	.17	.17	.00	.09	.00	.00
15. Pushy (3)	-.24	-.27	-.29	-.21	-.11	.05	-.26	-.22	-.17	-.20	.02	.02	.00	.59	-	.25	.15	.15	.20	.00	.00
16. Manipulative (3)	-.36	-.38	-.41	-.33	-.25	-.08	-.42	-.33	-.32	-.34	-.07	-.07	-.13	.52	.62	-	.08	.25	.14	.06	.00
17. Loud (3)	-.19	-.22	-.24	-.23	-.10	.01	-.23	-.17	-.12	-.16	.02	.03	.02	.51	.54	.51	-	.20	.08	.00	.00
18. Conceited (3)	-.31	-.39	-.36	-.33	-.20	-.04	-.34	-.29	-.27	-.31	-.05	-.05	-.07	.49	.59	.64	.53	-	.21	.00	.00
19. Selfish (3)	-.41	-.41	-.46	-.38	-.26	-.13	-.43	-.37	-.36	-.37	-.13	-.10	-.14	.45	.56	.62	.46	.59	-	.00	.00
20. Male (5)	-.14	-.13	-.15	-.06	-.05	-.01	-.09	-.07	-.07	-.07	-.01	.07	.02	.29	.24	.29	.22	.25	.26	-	.69
21. Masculine (5)	-.09	-.08	-.11	-.02	-.01	.04	-.06	-.03	.02	-.05	.04	.14	.09	.32	.25	.28	.23	.24	.25	.71	-
Mean	4.57	4.50	4.53	4.58	4.39	4.15	4.63	4.55	4.54	4.60	4.12	4.10	4.14	2.27	1.91	1.67	2.15	1.75	1.59	3.09	3.02
SD	.69	.73	.71	.69	.77	.86	.65	.70	.69	.68	.85	.88	.86	1.23	1.14	1.08	1.14	1.11	1.00	1.05	1.03

Note. N=1120; p<.05 for r values above .06, p<.01 for r values above .08. Values above the diagonal are estimated edge weights. Numbers in parentheses indicate community membership.

Table 3. Qualtrics Sample Descriptives, Correlations, Edge Weights, and Community Membership

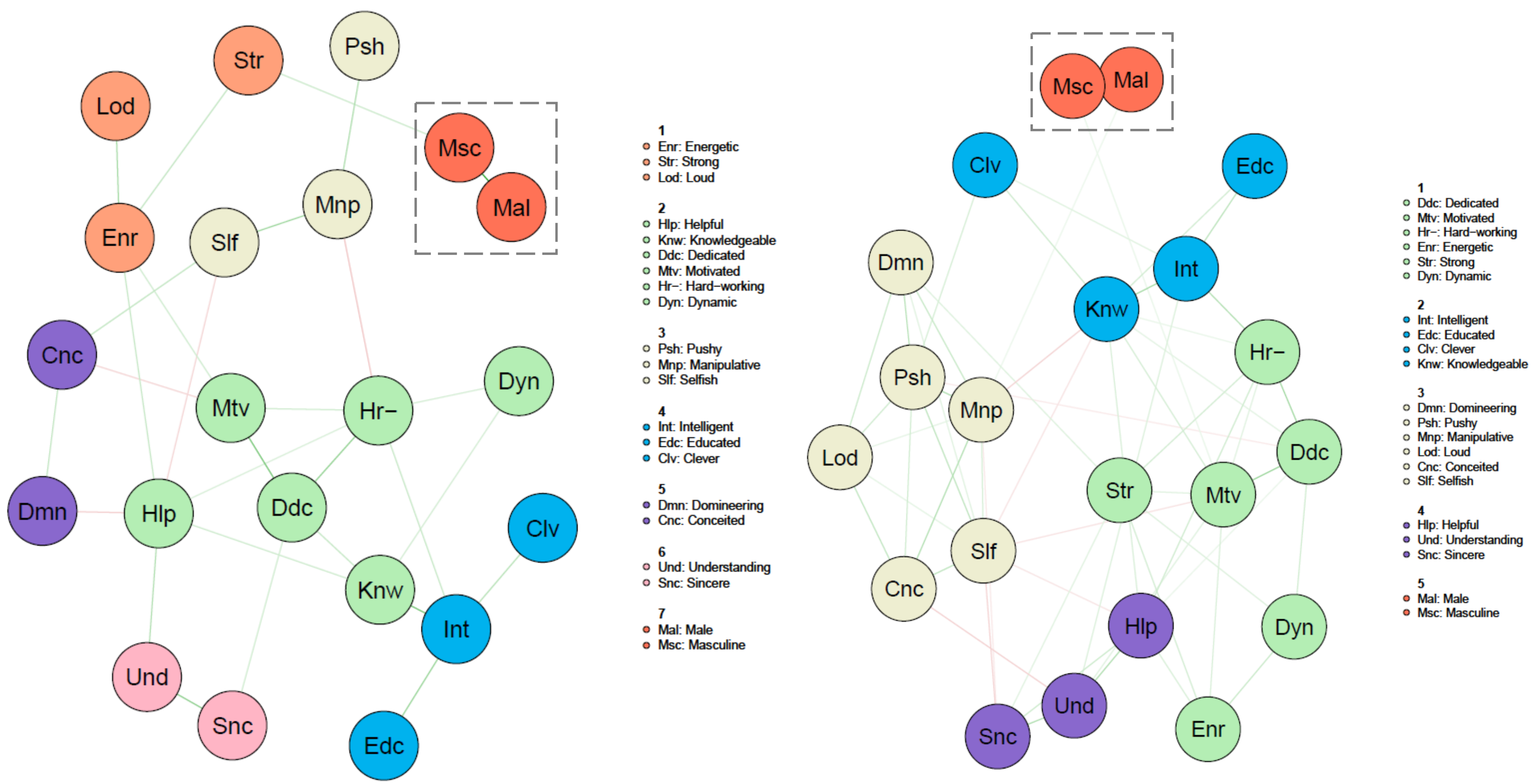
Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. Helpful (3)	-	.16	.19	.19	.00	.14	.00	.00	.00	.14	.00	.31	.00	.00	.00	.00	.17	.00	.00	.00	.00
2. Understanding (2)	.52	-	.28	.00	.00	.00	.00	.11	.00	.00	.16	.00	.00	.00	.00	.00	-.19	.00	.00	.18	.00
3. Sincere (2)	.52	.54	-	.11	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	-.23	.00	.00	.00	-.13	.00
4. Intelligent (1)	.56	.54	.52	-	.25	.22	.20	.00	.09	.13	.00	.00	-.12	.12	-.14	.00	-.15	.00	.00	.00	.12
5. Educated (5)	.36	.34	.35	.51	-	.00	.27	.00	.16	.00	.00	.00	.00	.00	.00	.00	.00	.13	.00	.00	.00
6. Clever (1)	.48	.40	.36	.52	.42	-	.00	.20	.00	.00	.00	.00	.00	.00	.00	.10	.00	.00	.00	.00	.00
7. Knowledgeable (5)	.48	.44	.40	.56	.50	.40	-	.00	.00	.00	.00	.00	.00	.00	.00	.00	.22	.00	-.10	.00	.00
8. Dedicated (1)	.48	.51	.46	.52	.34	.44	.43	-	.31	.28	.00	.00	-.17	.00	.00	.00	.00	-.20	.00	-.12	.11
9. Motivated (1)	.44	.48	.47	.57	.47	.48	.47	.59	-	.10	.24	.00	.20	.00	.00	.00	.00	.00	-.10	.00	.00
10. Hard-working (1)	.54	.49	.50	.58	.41	.39	.50	.60	.57	-	.00	.00	.00	.11	.00	.00	.00	.00	-.16	.00	-.14
11. Energetic (1)	.33	.37	.31	.44	.40	.45	.38	.36	.50	.39	-	.00	.17	.00	.00	.00	.16	.00	.14	.00	.00
12. Strong (3)	.45	.33	.27	.34	.26	.40	.30	.33	.35	.37	.31	-	.00	.00	.00	.00	.00	.18	.00	.00	.00
13. Dynamic (1)	.34	.35	.27	.32	.37	.40	.30	.27	.43	.33	.41	.29	-	.00	.00	.00	.00	.00	.00	.00	.00
14. Domineering (4)	-.08	-.14	-.12	-.09	.02	.08	-.10	-.09	-.07	-.09	.11	.13	.08	-	.21	.16	.24	.00	.13	.00	.00
15. Pushy (4)	-.12	-.21	-.16	-.22	-.04	.02	-.17	-.18	-.14	-.18	.06	.04	.08	.64	-	.27	.14	.26	.00	.00	.00
16. Manipulative (4)	-.22	-.28	-.32	-.29	-.06	-.01	-.25	-.25	-.25	-.29	-.03	.03	-.02	.60	.68	-	.00	.13	.27	.19	.00
17. Loud (4)	.02	-.15	-.05	-.08	.03	.10	.01	-.05	-.04	-.07	.18	.16	.09	.60	.61	.52	-	.21	.00	.00	.14
18. Conceited (4)	-.12	-.21	-.16	-.19	.01	.05	-.16	-.23	-.17	-.20	.05	.12	.06	.61	.70	.68	.60	-	.29	.11	.00
19. Selfish (4)	-.26	-.35	-.30	-.32	-.15	-.11	-.32	-.32	-.32	-.37	-.07	-.05	-.11	.50	.57	.66	.44	.63	-	-.14	.00
20. Male (2)	-.02	.02	-.10	-.02	.09	.13	-.05	-.09	-.02	-.06	.08	.12	.11	.39	.38	.44	.35	.46	.26	-	.63
21. Masculine (2)	.01	.00	.00	.05	.09	.19	-.03	.01	.07	-.06	.15	.14	.19	.42	.43	.40	.45	.46	.27	.69	-
Mean	4.61	4.53	4.53	4.51	4.43	4.18	4.57	4.62	4.55	4.64	4.24	4.29	4.09	2.47	2.24	1.96	2.55	2.11	1.76	3.17	3.02
SD	.68	.75	.77	.73	.77	.88	.71	.68	.69	.60	.81	.82	.87	1.44	1.33	1.30	1.29	1.38	1.20	1.39	1.26

Note. N=321; p<.05 for r values above .11, p<.01 for r values above .15. Values above the diagonal are estimated edge weights. Numbers in parentheses indicate community membership.

Figures

Figure 1. Ideal ILT Psychological Network for (a) Student, (b) MTurk, and (c) Qualtrics Samples; colors indicate community membership. Red edges indicate a negative relationship between nodes; green indicates a positive relationship. Dashed box used to identify the Male and Masculine nodes.

(a) Student Ideal ILT Network (*N*=517) (b) MTurk Ideal ILT Network (*N*=1,120)



(c) Qualtrics Ideal ILT Network (*N*=321)

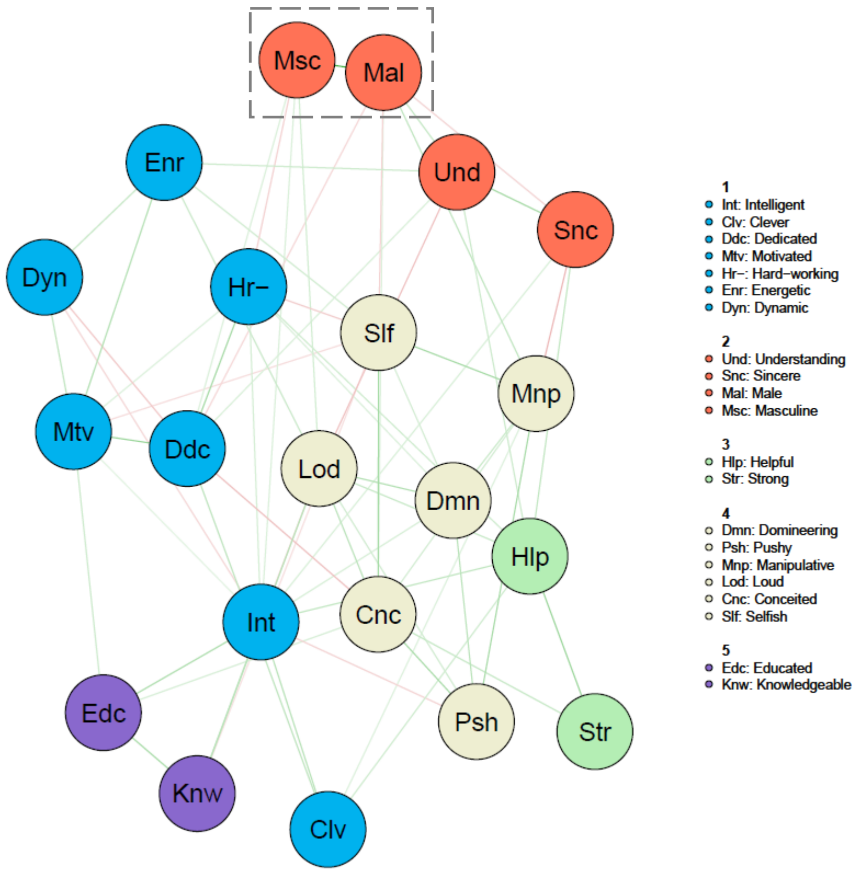
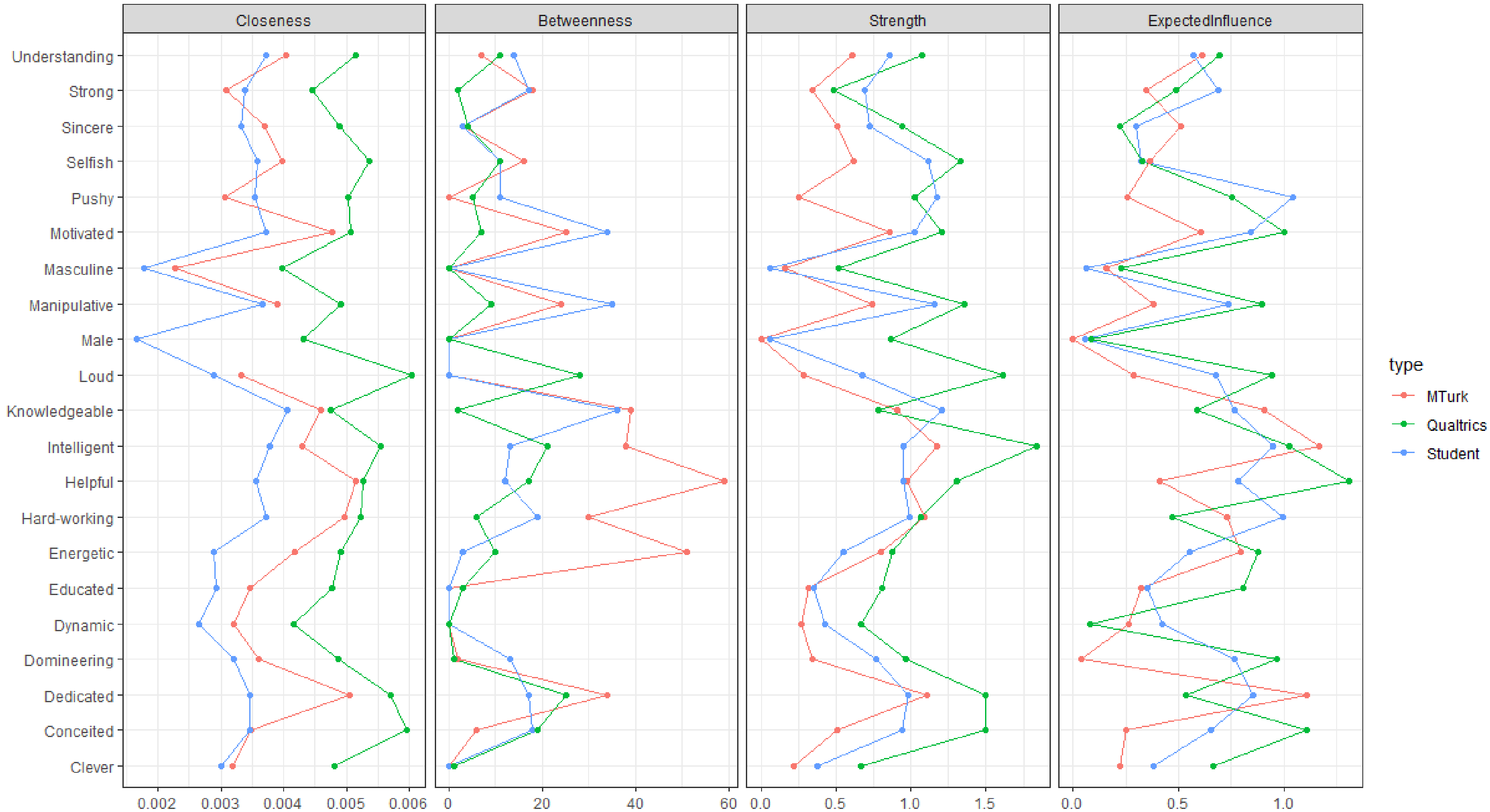


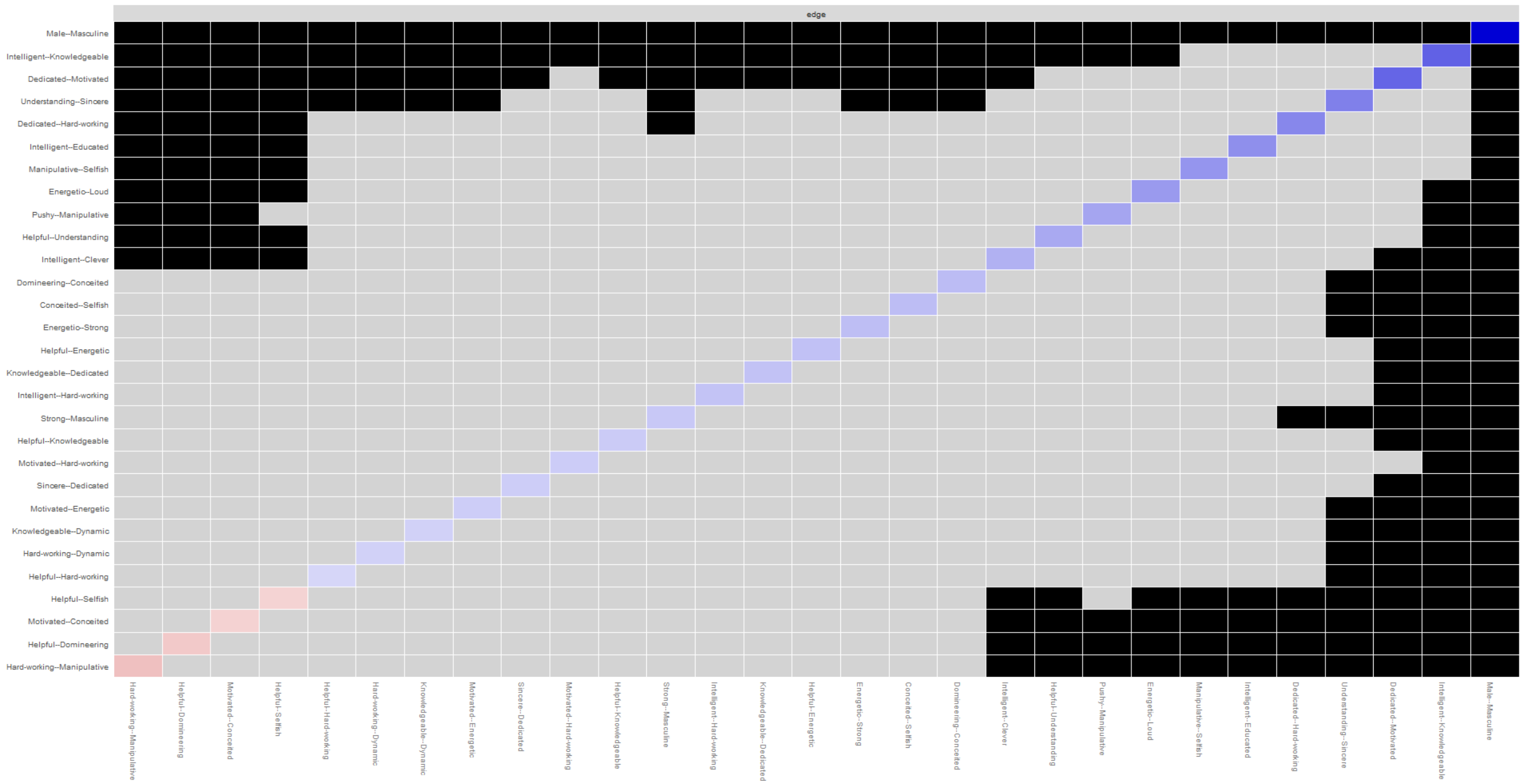
Figure 2. Student, MTurk, and Qualtrics Sample Ideal ILT Network Centralities.



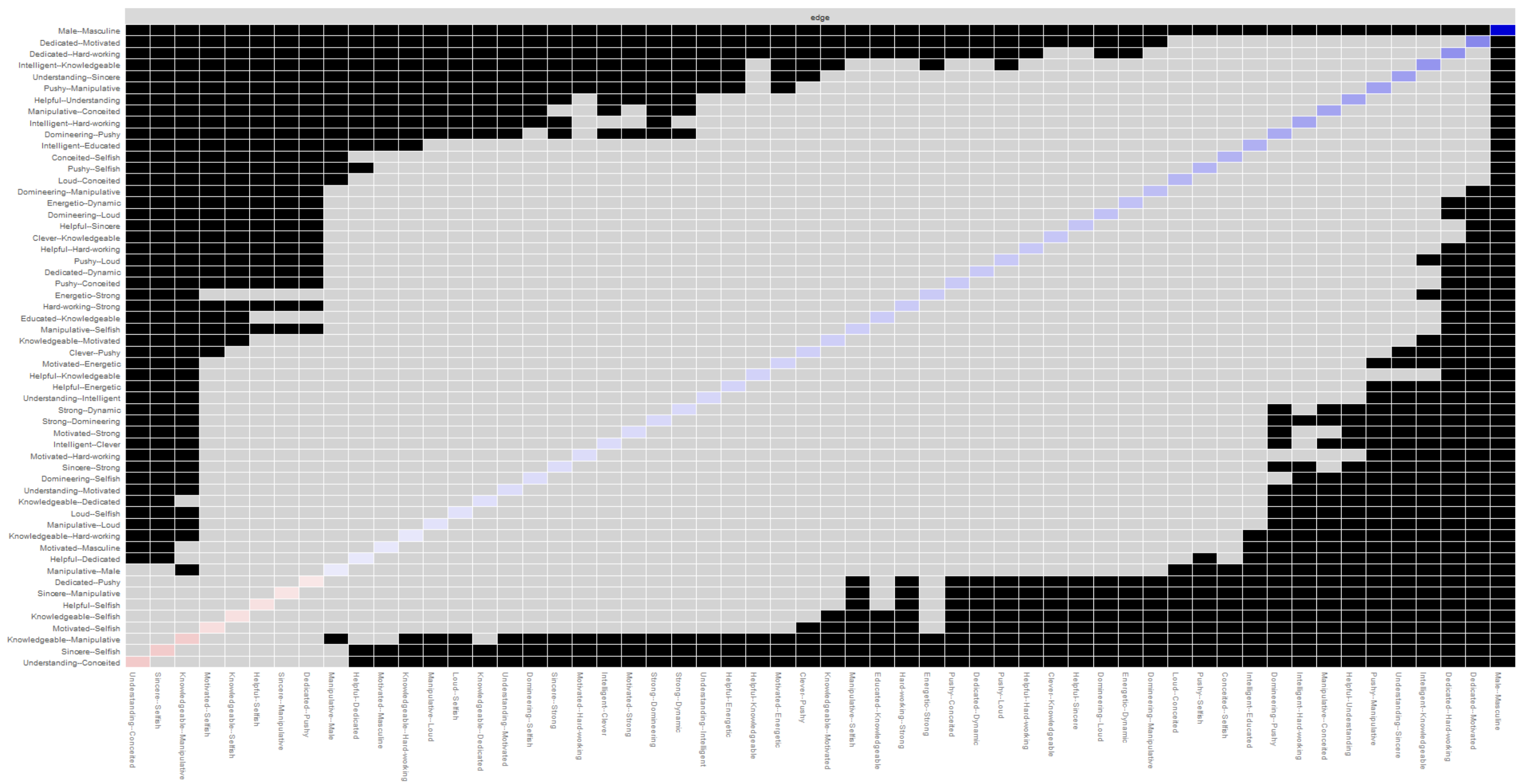
Supplementary Materials

SM1: Significant Differences between Edge Weights.

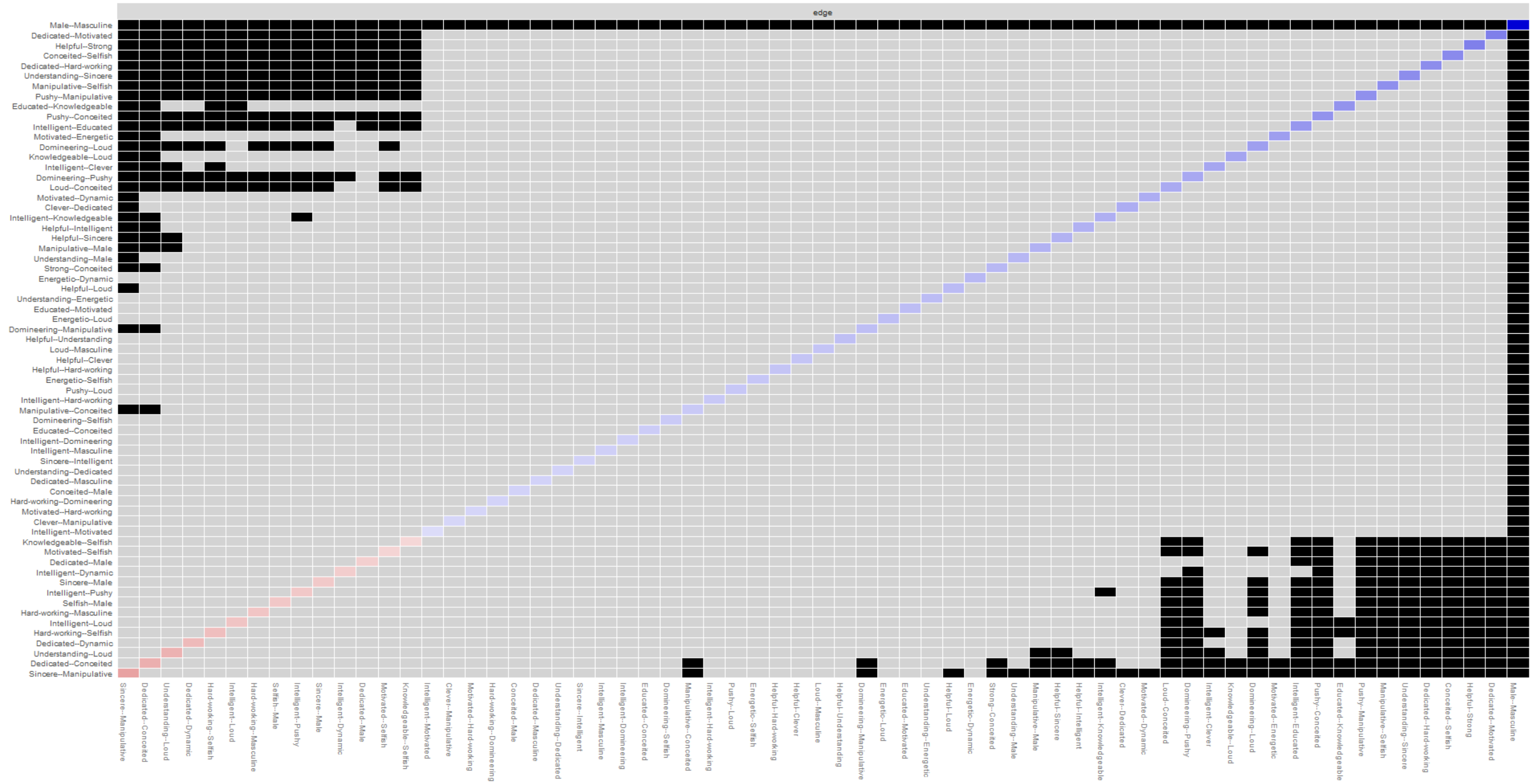
Student Sample



MTurk Sample

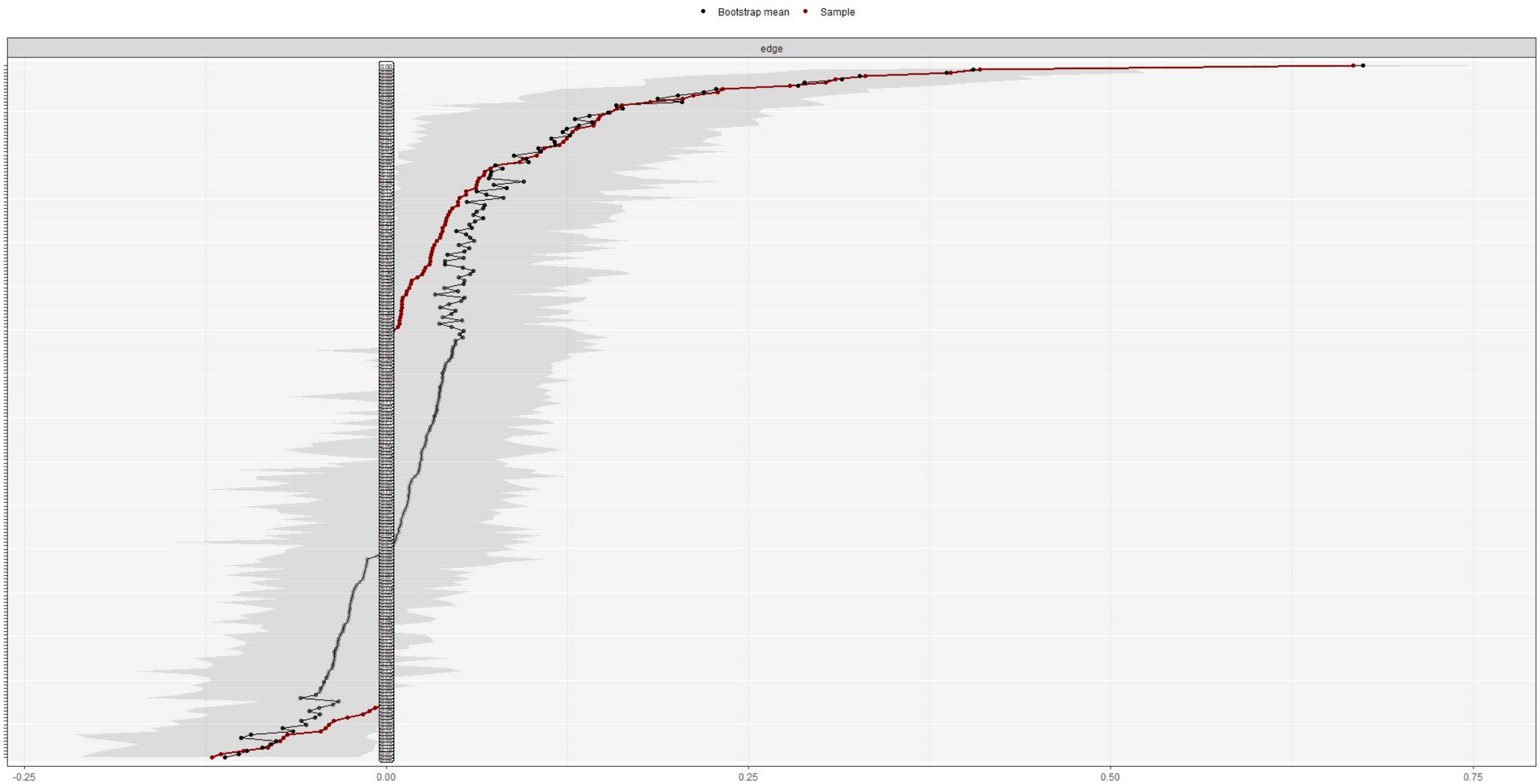


Qualtrics Sample

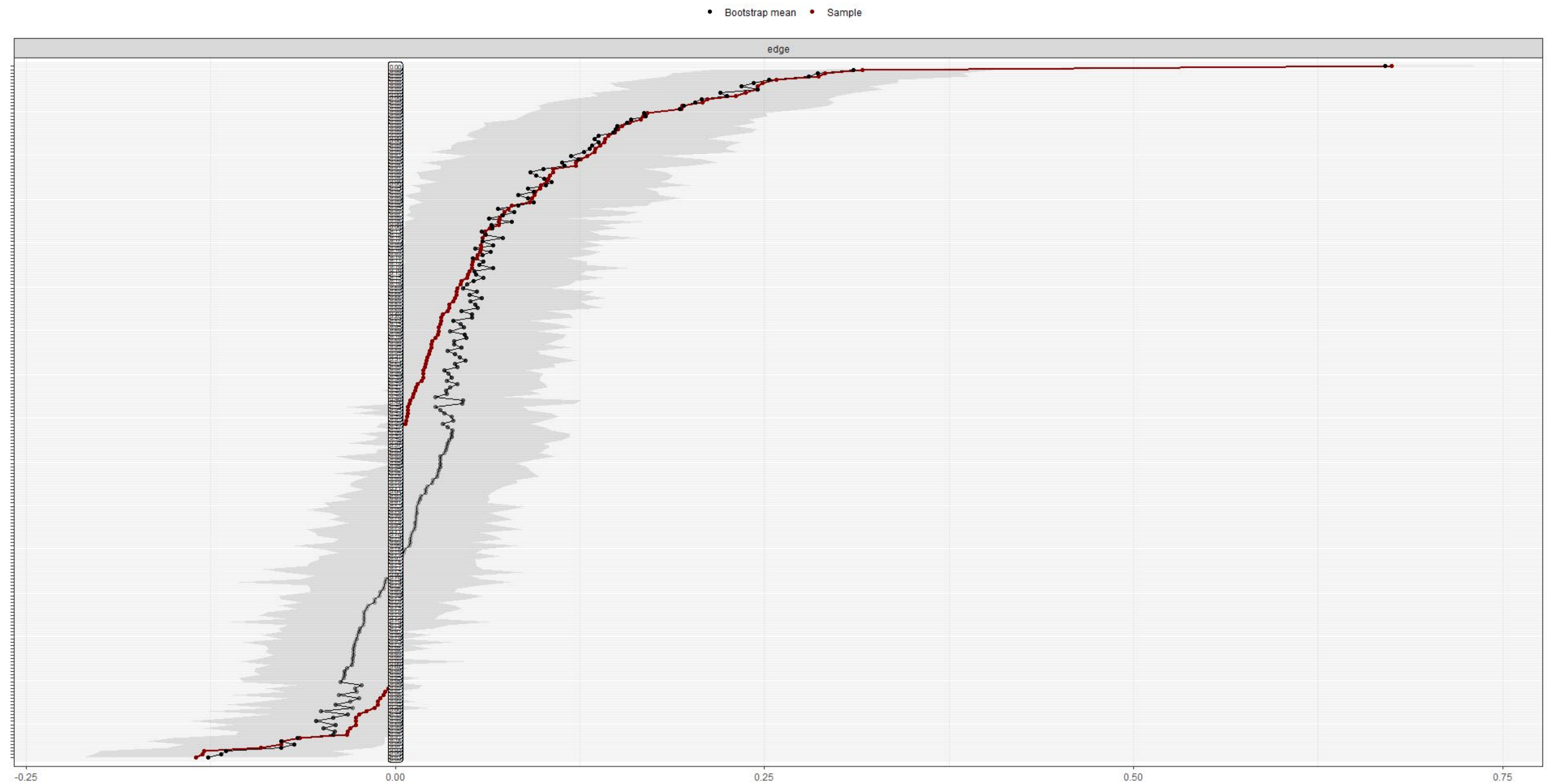


SM2: Edge Weight Stability Estimates

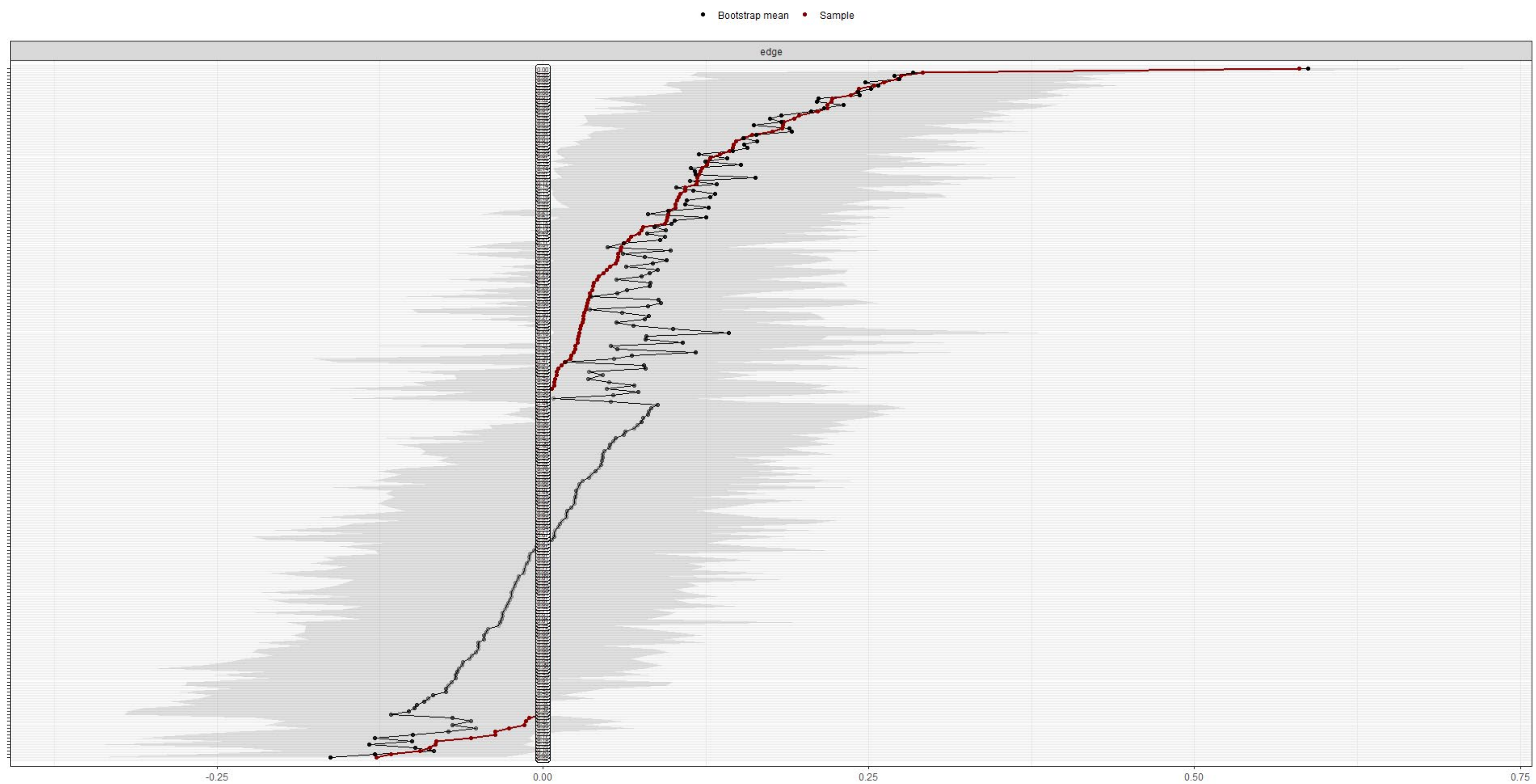
Student Sample Stability Estimates for Edge Weights



MTurk Sample Stability Estimates for Edge Weights



Qualtrics Sample Stability Estimates for Edge Weights



SM3: Centrality Estimates with Male and Masculine Edge Weight Set to Zero

Node	Betweenness			Closeness			Strength			Expected Influence		
	S1	*S2*	*S3*	*S1*	*S2*	*S3*	*S1*	*S2*	*S3*	*S1*	*S2*	*S3*
Understanding	14	7	11	.0037	.0051	.0040	.855	1.075	.612	.569	.612	.697
Strong	17	18	2	.0034	.0045	.0031	.690	.487	.344	.690	.344	.487
Sincere	3	3	4	.0033	.0049	.0037	.729	.943	.509	.301	.509	.221
Selfish	11	16	11	.0036	.0054	.0040	1.114	1.329	.620	.322	.365	.331
Pushy	11	0	5	.0035	.0050	.0031	1.173	1.023	.256	1.043	.256	.752
Motivated	34	25	7	.0037	.0051	.0048	1.021	1.209	.862	.841	.604	1.000
Masculine	0	0	0	.0018	.0040	.0023	.065	.514	.158	.065	.158	.231
Manipulative	35	24	9	.0037	.0049	.0039	1.157	1.354	.741	.735	.379	.897
Male	0	0	0	.0017	.0043	.0000	.058	.863	.000	.058	.000	.086
Loud	0	0	28	.0029	.0060	.0033	.674	1.612	.288	.674	.288	.943
Knowledgeable	36	39	2	.0041	.0047	.0046	1.207	.785	.910	.764	.910	.589
Intelligent	13	38	21	.0038	.0055	.0043	.950	1.834	1.169	.950	1.169	1.028
Helpful	12	59	17	.0036	.0053	.0051	.945	1.306	.973	.782	.410	1.306
Hard-working	19	30	6	.0037	.0052	.0050	.994	1.069	1.093	.994	.731	.468
Energetic	3	51	10	.0029	.0049	.0042	.552	.877	.797	.552	.797	.877
Educated	0	0	3	.0029	.0048	.0035	.354	.808	.322	.354	.322	.808
Dynamic	0	0	0	.0027	.0041	.0032	.423	.666	.266	.423	.266	.084
Domineering	13	2	1	.0032	.0049	.0036	.768	.964	.347	.768	.039	.964
Dedicated	17	34	25	.0035	.0057	.0050	.983	1.498	1.106	.853	1.106	.533
Conceited	18	6	19	.0035	.0060	.0035	.938	1.497	.510	.652	.253	1.106
Clever	0	0	1	.0030	.0048	.0032	.380	.663	.223	.380	.223	.663

Notes. *S1*=Student Sample; *S2*=Mechanical Turk Sample; *S3*=Qualtrics Sample

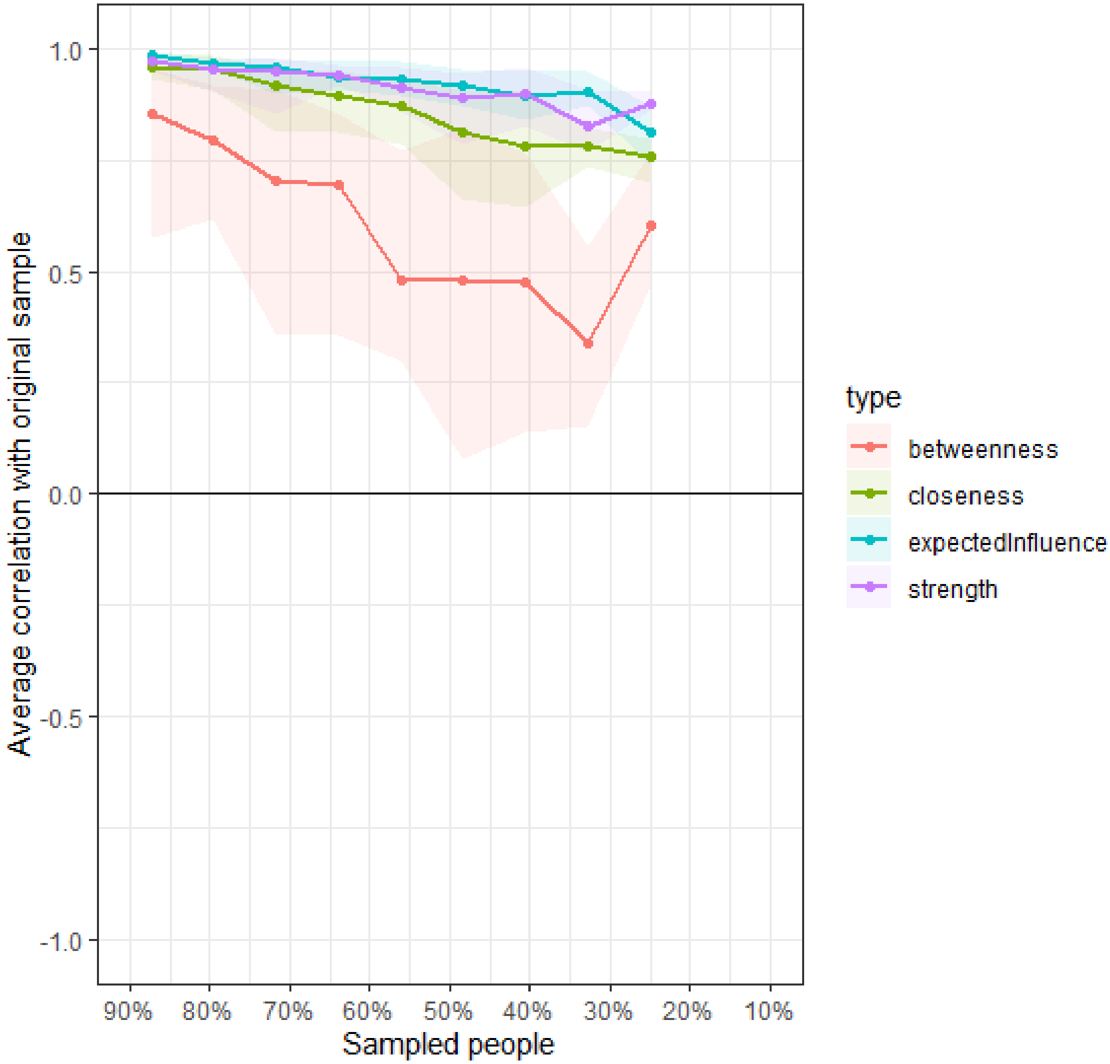
SM4: Centrality Estimates without Restricting Male and Masculine Edge Weight to Zero

Node	Betweenness			Closeness			Strength			Expected Influence		
	S1	*S2*	*S3*	*S1*	*S2*	*S3*	*S1*	*S2*	*S3*	*S1*	*S2*	*S3*
Understanding	13	8	8	.0037	.0037	.0053	.855	.612	1.075	.569	.612	.697
Strong	14	36	2	.0035	.0030	.0045	.690	.344	.487	.690	.344	.487
Sincere	3	3	4	.0033	.0034	.0051	.729	.509	.943	.301	.509	.221
Selfish	8	18	10	.0036	.0036	.0055	1.114	.620	1.329	.322	.365	.331
Pushy	11	0	4	.0037	.0028	.0051	1.173	.256	1.023	1.043	.256	.752
Motivated	36	29	7	.0039	.0044	.0051	1.021	.862	1.209	.841	.604	1.000
Masculine	11	19	5	.0021	.0023	.0049	.753	.889	1.140	.753	.889	.857
Manipulative	28	25	9	.0038	.0035	.0052	1.157	.741	1.354	.735	.379	.897
Male	6	0	6	.0021	.0021	.0050	.746	.730	1.489	.746	.730	.712
Loud	0	0	24	.0030	.0031	.0061	.674	.288	1.612	.674	.288	.943
Knowledgeable	30	42	2	.0041	.0041	.0048	1.207	.910	.785	.764	.910	.589
Intelligent	12	40	22	.0038	.0038	.0057	.950	1.169	1.834	.950	1.169	1.028
Helpful	12	69	17	.0036	.0047	.0053	.945	.973	1.306	.782	.410	1.306
Hard-working	21	31	4	.0038	.0044	.0053	.994	1.093	1.069	.994	.731	.468
Energetic	3	68	10	.0030	.0040	.0049	.552	.797	.877	.552	.797	.877
Educated	0	0	3	.0029	.0031	.0048	.354	.322	.808	.354	.322	.808
Dynamic	0	0	0	.0028	.0029	.0041	.423	.266	.666	.423	.266	.084
Domineering	10	2	1	.0033	.0033	.0049	.768	.347	.964	.768	.039	.964
Dedicated	21	36	23	.0037	.0045	.0057	.983	1.106	1.498	.853	1.106	.533
Conceited	16	6	18	.0036	.0032	.0060	.938	.510	1.497	.652	.253	1.106
Clever	0	0	1	.0030	.0029	.0048	.380	.223	.663	.380	.223	.663

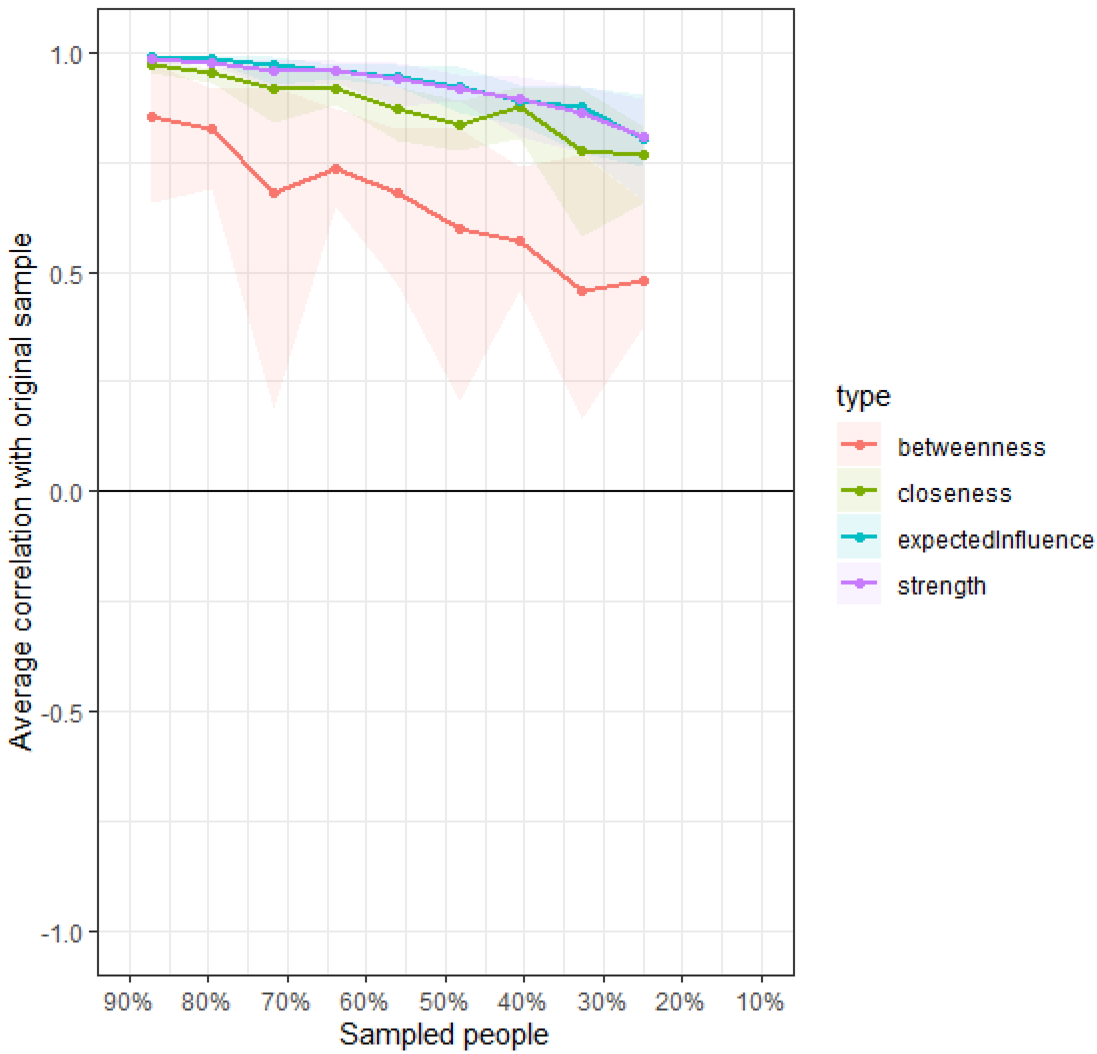
Notes. *S1*=Student Sample; *S2*=Mechanical Turk Sample; *S3*=Qualtrics Sample

SM5: Centrality Stability Estimates

Student Sample Stability Estimates for Centralities



MTurk Sample Stability Estimates for Centralities



Qualtrics Sample Stability Estimates for Centralities