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Betweenness and influence of psychological flexibility in social anxiety and fear of public speaking: A network analysis in a sample of Spanish university students

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Abstract

The increasing prevalence of social anxiety and fear of public speaking (FPS) among university students underscores the need to examine the psychological processes underpinning these difficulties. This study aimed to explore the functional organization of psychological inflexibility (PI) and related processes, including cognitive fusion (CF), self-efficacy, and self-statements. A sample of 575 university students completed an online battery of validated self-report measures, and the relationships among variables were examined using network analysis. The resulting network revealed two distinct communities: one comprising PI, CF, negative self-statements, and social anxiety, and another consisting of self-efficacy, positive self-statements, and FPS. Self-efficacy emerged as the node with the greatest strength, while PI showed the highest betweenness and expected influence, indicating its central regulatory role across the system. Overall, the findings highlight the complex interdependence among cognitive and process-based variables in FPS, supporting the relevance of contextual–functional models and network approaches for understanding these phenomena. These results provide a theoretical and empirical basis for designing process-based interventions that target structurally influential components within the network, such as PI and CF, to enhance psychological well-being in university populations.

Introduction

The increasing incidence of psychological problems among university students has become a significant public health concern **[1]**. Although higher education represents a crucial stage in the transition to adulthood, it is often accompanied by heightened levels of anxiety and depressive symptoms, and may even involve increased risk of suicidal behavior **[2]**. Among the challenges commonly faced by university students, fear of public speaking (FPS) and social anxiety stand out as particularly prevalent and impactful difficulties.

FPS is widely regarded as the most prominent social evaluative fear within the broader construct of social anxiety **[3,4]**. Social anxiety refers to a mental health condition in which individuals experience intense fear and discomfort in social situations, typically resulting in substantial disruption to everyday functioning **[5]**. Its lifetime prevalence is estimated to be approximately 4% across countries **[6]**. Individuals exhibiting high levels of FPS are at increased risk of developing social anxiety disorders **[7]**, which can significantly impair their professional, academic, and interpersonal lives **[3]**.

Prevalence data underscore the significance of FPS: in a sample of 1,135 Spanish undergraduates, 63.9% reported FPS, and nearly 90% expressed interest in public speaking training **[8]**. Consistent findings indicate that up to 75% of young people identify public speaking as their most feared social situation **[9]**, and that it acts as a conditioning factor for more than half of university students **[10]**.

FPS is a form of anxiety circumscribed to social communication contexts, in which individuals experience physiological arousal (e.g., increased heart rate), negative self-focused cognitions (e.g., “I worry about looking incompetent”), and/or observable behaviors (e.g., tremors) in response to an anticipated or actual speaking situation **[11]**. When speaking before an audience, individuals with FPS often engage in catastrophic thinking, overestimate the likelihood of negative evaluation, and underestimate their own abilities **[12,13]**. Such negative self-statements—common in socially or personally threatening situations—are well-established correlates of social anxiety in both adolescents and adults **[14]**, as well as of communication apprehension **[15]**.

To date, the relationships between various psychological variables and both social anxiety and FPS have been examined from multiple theoretical perspectives. Within traditional cognitive frameworks, particular attention has been given to the roles of negative self-statements and self-efficacy. Regarding self-efficacy, correlational evidence indicates an inverse, and potentially bidirectional, relationship between self-efficacy and anxiety **[16]**, as well as between self-efficacy and social anxiety **[17]**. Conversely, a direct association has been observed between self-efficacy and confidence in public speaking **[18]**, oral communication skills, and academic performance **[19]**. With respect to negative self-statements, higher levels have been documented among students with elevated FPS scores **[20]** and among individuals with social anxiety **[21]**. Moreover, negative self-statements have been found to partially mediate the relationship between fear of negative evaluation and public speaking performance anxiety **[22]**.

From a contextual functional perspective, the role of psychological inflexibility (PI) and its constituent processes in relation to FPS has also been examined. PI refers to rigid behavioral patterns characterized by an inability to remain in contact with the present moment and to persist or adjust one’s behavior in accordance with personal values **[23]**. Behavioral patterns marked by PI, along with a tendency to avoid physiological arousal associated with panic or anxiety, have been linked to anxiety disorders **[24,25]** and social anxiety over time **[26]**. PI encompasses six interrelated processes: lack of present-moment awareness, lack of contact with values, inaction, self-as-content, cognitive fusion, and experiential avoidance **[27]**. Psychological inflexibility processes have been identified as central

mechanisms of change within Acceptance and Commitment Therapy (ACT) **[28]**, a third-wave cognitive-behavioral approach rooted in contextual behavioral science and functional contextualism.

Among these processes, cognitive fusion (CF) involves responding literally to the content of one's thoughts, such that the relational verbal system becomes perpetuated through reinforcement of verbal coherence, which confirms and strengthens maladaptive cognitive formulations. This pattern may contribute to the maintenance of an inflexible behavioral repertoire **[29]**. Fusion with self-defeating cognitions often co-occurs with maladaptive avoidance—a rigid behavioral pattern that restricts participation in public speaking contexts and limits opportunities for personal and professional development. CF has demonstrated a direct relationship with experienced anxiety and stress **[30]**, as well as negative associations with psychological well-being. Indeed, CF has been proposed as a significant intermediary mechanism linking psychological well-being with anxiety-related symptomatology **[31]**.

The relevance of adopting a psychological flexibility (PF; the functional opposite of PI **[32]**) framework in clinical practice is underscored by empirical evidence. Interventions designed to enhance PF are associated with clinically significant reductions in anxiety and FPS **[33–35]**, as well as improvements in attentional bias, awareness, emotion regulation, and avoidance behaviors in social anxiety **[36]**. Several studies have examined the clinical relevance of specific PF processes. For instance, training in cognitive defusion—the psychological process through which individuals gain distance from their thoughts, viewing them as transient mental events rather than literal truths that dictate behavior—has been shown to reduce public speaking discomfort **[33]**; values-based interventions have been linked to increased engagement in valued public speaking activities **[37]**; and brief acceptance-based interventions have demonstrated beneficial effects on experiential avoidance among socially anxious individuals **[38]**.

In sum, current evidence indicates that cognitive variables—such as self-efficacy and negative self-statements—and processes associated with psychological inflexibility, particularly cognitive fusion, are closely linked to social anxiety and fear of public speaking (FPS). These variables have traditionally been examined using latent variable models or regression-based approaches, which typically assume directional or hierarchical relations among constructs **[39]**. From a contextual-functional perspective, however, FPS and social anxiety may be better understood as emergent patterns arising from dynamic interactions among processes such as cognitive fusion, avoidance, negative self-statements, and self-efficacy, in line with process-based accounts of psychopathology **[40,41]**.

Within this framework, network analysis provides a methodological approach aligned with this systems-oriented view. Rather than conceptualizing psychological flexibility as a latent entity exerting causal influence on downstream symptoms, the network perspective models psychological phenomena as systems of mutually interacting processes. Constructs are represented as nodes connected through unique associations, allowing for the identification of highly interconnected or bridging components that may carry particular functional relevance **[42,43]**. This approach emphasizes patterns of conditional interdependence among variables. Moreover, network analysis allows for the identification of highly connected or bridging nodes that may represent promising intervention targets within process-based therapy, offering added clinical utility beyond traditional global model-fit indices.

In line with this perspective, prior research has begun to conceptualize psychological phenomena as dynamic systems of interrelated processes rather than manifestations of underlying latent variables **[32]**. For example, Baker and Berghoff **[44]** used network analysis to show that psychological flexibility and inflexibility processes form coherent clusters, display inverse relations with their counterparts, and exhibit differential associations with psychiatric symptoms and quality of life. More recently, Parker et al. **[45]** applied network analysis to multiple dimensions of psychological flexibility, finding that flexibility processes were more strongly linked to wellbeing, inflexibility processes to distress, and that cognitive fusion, inaction, contact with values, and self-as-context emerged as central nodes within the system

Method

Design

A cross-sectional correlational design was used. Participants completed an online questionnaire that collected sociodemographic data and included self-report measures assessing variables such as social anxiety, self-efficacy, FPS, positive and negative self-statements, psychological flexibility, and CF.

Participants

The sample consisted of 575 university students, aged between 17 and 52 years, with a mean age of 21.5 years (SD = 5.2). A more exhaustive description of the sociodemographic characteristics of the sample is provided in Table 1. The inclusion criteria for this study were: being a university student, having Spanish as a first language, and agreeing to participate in the study by signing the informed consent form.

Table 1

Sociodemographic characteristics of the descriptive and correlational study sample.

Sociodemographic Data		
Sex	Women	70%
	Men	30%
Degree	Psychology	56,6%
	Physiotherapy	20,5%
	Physiotherapy and Sports Science	10,9%
	Others	12%
Nationality	Spain	82.5%
	Latin America	12.8%
	Rest of Europe	3.6%

Instruments

Acceptance and Action Questionnaire – AAQ-II **[46]**. The AAQ-II measures the degree of PI . Studies have shown sufficient validity and reliability in its Spanish version **[47]**, with very similar data to the original version. Internal consistency was assessed across 6 samples of a total of 712 participants, obtaining results of a Cronbach's alpha ranging from .75 to .93, indicating good internal consistency. In our sample, the scale exhibited excellent internal consistency (α = .92). Higher scores indicate higher levels of PI.

Cognitive Fusion Questionnaire – CFQ **[48].** This questionnaire assesses the extent to which individuals are psychologically entangled with or dominated by the form and content of their thoughts. The CFQ has shown sufficient validity, reliability, internal consistency and sensitivity to treatment effects. The Spanish version, validated by Ruiz et al. **[49]**, produced results similar to the original, with a high internal consistency index (Cronbach's alpha between .89 and .93). In the present study, reliability estimates were similarly high, with a Cronbach's alpha of .92 in our sample. Higher scores indicate higher levels of CF.

Personal Report of Confidence as Speaker-PRCS **[50].** It assesses fear and confidence in public speaking. Bados **[51]** reported the questionnaire's validity and reliability in the Spanish population, with a high internal consistency (.91). Given its ease of application, this study employed the short version of the questionnaire, which reduces its items from 30 to 12 and uses a Likert-type scale ranging from 1 to 5 points. Méndez et al. **[52]** validated this short version in Spanish, achieving sufficient results for internal consistency (.84) and test-retest reliability (.81). In our sample, the instrument demonstrated strong internal consistency (Cronbach's alpha = .93).

Public Speaking Self-efficacy and Fear Questionnaire – CAHP/CIHP **[51].** This questionnaire evaluates two aspects: the degree of confidence in performing 12 specific public speaking activities (CAHP), and the degree of FPS (CIHP). Montesinos et al. **[53]** validated this instrument with Spanish-speaking university students, reporting very high internal consistency levels (.92 for self-efficacy and .93 for fear). Analyses were conducted using the same sample.

Liebowitz Social Anxiety Scale – LSAS **[54].** The Spanish adaptation, validated by Bobes et al. **[55]**, showed sufficient internal consistency (coefficients .72–.88), as well as convergent and discriminant validity. The scale evaluates avoidance and fear across 24 items. Reliability indices were satisfactory in this sample (α = .91 for avoidance; α = .93 for fear).

Self-Statements During Public Speaking Scale – SSPS **[56]**.The SSPS measures positive and negative self-statements about public speaking situations. Gallego et al. **[57]** administered the questionnaire to a Spanish clinical sample. Exploratory factor analysis

identified two factors: SSPS-P and SSPS-N, both with high internal consistency (.81 and .88). Internal consistency remained adequate in this sample (α = .71 for SSPS-P; α = .87 for SSPS-N).

Procedure

The study received approval from the Research Ethics Committee of the Universidad Europea de Madrid, with code CIPI/19/159. Participants were recruited through university professors from several Spanish institutions and via social media platforms using a convenience sampling approach. Individuals who met the inclusion criteria completed the self-report measures online through the Google Forms platform, which ensured anonymity and confidentiality. Participation was voluntary, and all students began their involvement in the study after providing informed consent.

Data analysis

The statistical software package IMB SPSS Statistics (version 29.0.0.0) was used. To assess the normality of the sample distribution, frequency histograms for each variable were analyzed and the Kolmogorov–Smirnov test was performed. For the analysis of the estimated weighted network, the R program (version 4.3.2) along with the statistical packages **[58]**, bootnet **[59]**, huge **[60]**, igraph **[61]**, and networktools **[62]** were employed.Given that data followed a non-normal distribution, non-parametric statistics (such as the huge package) were used. A network was construed integrating the variables PI (AAQ-II), CF (CFQ), FPS (PRCS; CIHP), public speaking self-efficacy (CAHP), social anxiety (LSAS), positive self-statements (SSPS-P), and negative self-statements (SSPS-N) in public speaking situations. Regularized partial correlations between variables were represented in the network and calculated using the EBICglasso method **[63]**. The EBICglasso method was selected due to its robustness for estimating sparse partial correlation networks in moderately sized psychological datasets with non-normal distributions, and its ability to reduce spurious edges while preserving meaningful associations **[59,43]**. Communities between variables were identified, centrality indices were calculated to analyze the contribution of each variable in the network, and bootstrap tests (post-hoc analyses) with at least 1,000 replicate samples were conducted to evidence the stability of relationships.Finally, the stability of the node strength and expected influence was assessed by calculating the correlation stability (CS) coefficient using a case-dropping bootstrap method (1000 bootstrap samples). According to recommended guidelines **[59]**, the CS coefficient should not be lower than 0.25 and is preferably above 0.50.

Results

Table 2 presents the descriptive analysis of the sample, consisting of 575 university students, alongside the percentiles obtained for the scores of each self-report measure analyzed.

Table 2

Descriptive analysis of the scores of each scale for the entire sample of students and associated percentiles (n=575).

Variables	M	SD	Minimum	Maximum	Percentiles		
					25	50	75
AAQ-II	23.31	10.06	7	49	14	22	31
CFQ	29.09	10.69	7	49	20	30	37
LSAS	49.81	26.02	0	133	29	48	70
PRCS	36.82	11.38	12	60	28	37	46
SSPS-P	20.82	4.82	6	30	17	21	24
SSPS-N	11.31	5.83	5	30	7	10	15
CAHP	50.29	13.30	14	72	41	52	60
CIHP	39.71	13.72	12	72	30	40	48

*Not*e. M= Mean; SD= Standard deviation; Psychological inflexibility (AAQ-II); Cognitive fusion (CFQ); Social anxiety (LSAS); Fear of public speaking (PRCS), Positive self-statements (SSPS-P); Negative self-statements (SSPS-N); Self-efficacy (CAHP); Fear of public speaking

(CIHP).

Figure 1 illustrates the network structure of regularized partial correlations among the variables. Red edges represent negative partial correlations, while blue edges indicate positive partial correlations. As can be seen, the strongest relationship in the network is a negative relationship between FPS (PRCS) and public speaking self-efficacy (r =- .467). Other notable negative associations include the correlations between positive self-statements and negative self-statements (r = -.257), and between self-efficacy and FPS (CIHP) (r = -.202). On the positive side, notable partial correlations are observed between PI and CF (r = .376), between PI and negative self-statements (r = .360), and between FPS (PRCS) and FPS (CIHP) (r = .283).

In addition, an empirical analysis of the network's substructures or communities was conducted, represented by the yellow and green colors in Figure 1. As can be seen in Figure 1, two distinct communities of variables are more densely interconnected internally than with [1]the rest of the network. One community includes PI, CF, social anxiety, and negative self-statements, while the other community comprises positive self-statements, self-efficacy and FPS.

Figure 2 shows the standardized centrality indices of each variable. These indices are all on the same measurement scale and are standardized (z-scores), which allows comparison between them. As can be seen, self-efficacy is the variable with the greatest strength in the network, and negative self-statements is the closest. However, due to the presence of both positive and negative edges in the network, expected influence is a more suitable measure. In this case, PI emerges as the variable with the highest betweenness and expected influence, indicating a greater likelihood of influencing the behavior of the other variables in the network, even if they are not directly connected to it.

To conclude whether the differences in centrality estimates are interpretable or not, bootstrapped techniques were employed. These involve repeatedly estimating a model with simulated data generated from the original sample using replacements. A resampling of 1,000 samples was performed. Figure 3 illustrates the accuracy of the strongest associations in the network, since the estimates from the study sample (sample) align with those from the resampling (black line).

Figure 4 highlights the pairs of edges that differ statistically from others. Gray boxes indicate correlations that do not differ significantly in the centrality estimates, while black boxes represent correlations that do differ significantly from each other. The colored boxes correspond to the color of the edge, with red indicating negative correlations and blue indicating positive ones (darker shades represent stronger connections). As shown, most edges differ significantly from one another, particularly the correlations between PI (AAQ-II) and CF (CFQ); PI (AAQ-II) and negative self-statements (SSPS-N); FPS (PRCS) and public speaking self-efficacy (CAHP); as well as positive self-statements (SSPS-P) and negative self-statements (SSPS-N), and self-efficacy (CAHP) and FPS (CIHP). These correlations differ significantly from most other edges in the network, especially highlighting the distinctiveness of the correlation between AAQ-II and CFQ compared to other variables.

According to the graphs in Figure 5, most variables do not show significant differences in their betweenness and closeness measures, as indicated by the prevalence of gray boxes over black ones. However, it is notable that PI still has the highest betweenness levels and is significantly more central than the rest of the variables. In terms of strength, CF (CFQ) and positive self-statements (SSPS-P) exhibit significantly lower strength in the network compared to most other variables.

As shown in Figure 6, both strength and expected influence demonstrated high stability, with average correlations remaining close to 1.0 ever after the removal of approximately 70% of cases

Discussion

The main purpose of this study was to analyze the existing relationships between PF, CF, social anxiety, FPS, positive and negative self-statements, and self-efficacy in university students. The goal was to expand the existing knowledge framework and examine the role that PI plays in various psychological variables, with particular interest in its relationships with FPS and social anxiety. The study provides a comprehensive examination of the interplay among PI, cognitive processes, and fear and anxiety-related responses in public speaking situations among university students. Overall, the findings reveal a coherent and theoretically meaningful network structure in which PI, cognitive fusion, negative self-statements, and social anxiety form a tightly interconnected community, whereas self-efficacy, positive self-statements, and FPS cluster together in a second community. Self-efficacy emerged as the node with the greatest strength, while PI showed the highest betweenness and expected influence, underscoring its central regulatory role across the system.

Overall, the results obtained support the hypothesis in general terms, although with some nuances. First, as expected, the variables associated with psychological inflexibility (PI), cognitive fusion (CF), negative self-statements, and social anxiety clustered around positive associations with each other, with the strong relationship between PI and CF, as well as between PI and negative self-statements, being particularly noteworthy. Similarly, self-efficacy and positive self-statements showed negative relationships with fear of public speaking (FPS) and other indicators of distress, with the inverse association between FPS and self-efficacy being particularly consistent. Regarding the second hypothesis, the centrality indices support the prominent role of PI within the network, making it the node with the highest betweenness and expected influence. However, CF did not reach the highest strength values; although it showed solid connections with key variables, partially supporting its central position in the system. Finally, in line with the third hypothesis, self-efficacy showed clear negative associations with the FPS and differentiated relationships with respect to the processes linked to PI. Furthermore, it emerged as the strongest node, indicating a strong direct connection with other variables, particularly with FPS and self-statements.

This study advances the use of network analysis as an effective framework for clarifying the structural organization and interrelations among PI/PF components. As noted by **[32]**, its capacity to identify the most central and influential elements within a system enhances the understanding of these processes and supports more targeted applications of ACT. The results align with current scientific literature: exploratory network analyses focusing on PI processes have demonstrated strong associations with psychiatric symptomatology and quality of life **[44]**, psychological distress **[45]**, and even suicidal ideation **[64]**. Similarly, the present findings are consistent with those reported by **[65]**, who showed that the PI network highlighted the prominent role of cognitive fusion among students, particularly emphasizing how the process captured by “Thoughts Hinder Performance in School” contributes to the development of social anxiety symptoms.

In line with this literature, the present study modeled PI processes and related cognitive variables, with cognitive fusion (CF) emerging as a meaningfully connected component within the network. Although other indicators of social anxiety demonstrated higher centrality, CF showed consistent associations with other key variables in the system. These findings are consistent with previous research linking CF to psychological well-being **[31]**, general anxiety **[30]**, and fear of pain symptoms **[66]**.

While PI showed the highest expected influence and betweenness, an important complementary finding concerns the prominent role of self-efficacy within the network. Self-efficacy emerged as the node with the greatest strength, indicating strong direct connections with both FPS and self-statements. This pattern suggests that self-efficacy may operate as a locally central, symptom-proximal process closely tied to performance-related cognitions and affective responses. The data further suggest that higher perceived self-efficacy in one’s competencies is associated with lower FPS and reduced social anxiety. These findings align with previous evidence reported in the scientific literature **[16,18]**.

This could support the application of traditional cognitive frameworks aimed at improving self-efficacy to increase approach behaviors toward anxiety-provoking stimuli. However, from a contextual functional perspective, self-efficacy can be conceptualized as an understandable assertion shaped by a history of contingencies within social contexts, and therefore may be better understood as a consequence of interactional behaviors rather than a causal determinant. In this sense, the therapeutic focus from a contextual functional standpoint should instead emphasize procedural and core variables that are systematically linked to psychological well-being, such as psychological flexibility **[67]**, which over time may lead to reduced suffering **[68]** and improvements in self-efficacy.

In contrast to the results related to self-efficacy, PI appears to occupy a more globally integrative role, bridging multiple communities of variables (process-related and symptom-related). From a contextual–functional perspective, this distinction is clinically meaningful: whereas self-efficacy may serve as an accessible and motivational entry point for intervention, targeting PI and CF may yield broader and more durable downstream effects across multiple domains of functioning. This interpretation aligns with ACT’s emphasis on modifying the functional context of private events rather than directly targeting symptom-level constructs.

Therefore, considering the above and after confirming significant differences in the PI–CF correlation compared to the other analyzed correlations, it becomes particularly relevant to design prevention and intervention programs aimed at reducing PI and CF. Such programs should promote social approach behaviors by addressing language fusion or literality, reducing experiential avoidance, and fostering flexible responses to contextual contingencies. These training strategies may help reduce FPS and social anxiety, as suggested by recent research **[33,34]**.

It is worth noting that this study has several limitations. First, external variables such as gender, age, and academic degree were not fully controlled and may have influenced the results, given that the sample predominantly consisted of women and first-year psychology

students. Future studies should strive for more balanced and heterogeneous samples to reduce biases associated with the overrepresentation of specific groups and to enhance external validity. Second, self-report measures are inherently subject to limitations such as social desirability bias, subjective interpretation, and potential inaccuracies in participants' recall, all of which may affect the reliability and precision of the data collected. Third, because the questionnaire was administered online, the study lacked control over the conditions under which participants completed the assessment, introducing possible environmental variability. Fourth, due to the cross-sectional design and reliance on data collected at a single time point, it was not possible to establish temporal or causal relationships among the variables, which restricts the strength of the inferences that can be drawn. Additionally, the use of self-administered questionnaires via Google Forms during the COVID-19 pandemic and associated lockdown represents a further limitation. To address these issues, future research should conduct post-pandemic replications, incorporate controlled laboratory settings when feasible, and compare results across different data collection modalities to assess the stability and generalizability of the findings

Conclusion

In conclusion, this study provides novel and integrative evidence regarding the functional organization of PI, CF, self-efficacy, self-statements, social anxiety, and FPS in a large sample of Spanish university students. By adopting a network analysis, the findings highlight PI as a structurally central process that permeates multiple cognitive, emotional, and behavioral domains relevant to social-evaluative anxiety. The identification of two distinct yet interconnected communities—one process-focused and one symptom-proximal—offers a more refined understanding of how these variables co-occur and mutually influence one another. Rather than assuming latent common causes, the network perspective conceptualizes FPS and social anxiety as emergent properties arising from dynamic interrelations among processes and symptoms. This work contributes to advancing scientific knowledge by demonstrating the utility of a contextual–functional and network-based approach for modeling the architecture of psychological difficulties in university students. Furthermore, the results underscore the relevance of targeting PI and CF in preventive and therapeutic interventions, thereby informing more precise, process-based strategies to support university students' psychological well-being.

Abbreviations

AAQ-II: Acceptance and Action Questionnaire

ACT: Acceptance and Commitment Therapy

CAHP: Public Speaking Self-efficacy Questionnaire

CF: Cognitive fusion

CFQ: Cognitive Fusion Questionnaire

CI: confidence intervals

CIHP: Public Speaking Fear Questionnaire

FPS: Fear of public speaking

LSAS: Liebowitz Social Anxiety Scale

M: Mean

PF: Psychological flexibility

PI: Psychological inflexibility

PRCS: Personal Report of Confidence as Speaker

SD: Standard deviation

SSPS-N: Negative Self-statements during Public Speaking Scale

SSPS-P: Positive Self-statements during Public Speaking Scale

Declarations

Ethics approval and consent to participate

The study received approval from the Research Ethics Committee of the Universidad Europea de Madrid, with code CIPI/19/159. All participants initiated their involvement in the study only after duly providing informed consent.

Consent for publication

Not applicable

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

On behalf of all authors, the corresponding author states that there is no conflict of interest.

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Authors' contributions

CC: Writing-Original Draft, Data Collection, Data Curation, Resources, Review & Editing.
MMM: Methodology, Validation, Formal analysis, Resources, Writing - Original Draft, Writing - Review & Editing, Visualization.
EP: Methodology, Validation, Formal analysis, Resources, Writing - Review & Editing, Visualization.
DL: Methodology, Data Collection, Review & Editing, Visualization.
FM: Conceptualization, Validation, Investigation, Resources, Data Collection, Data Curation, Writing - Original Draft, Writing - Review & Editing, Supervision, Project administration, Funding acquisition.
All authors read and approved the final manuscript.

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Figures

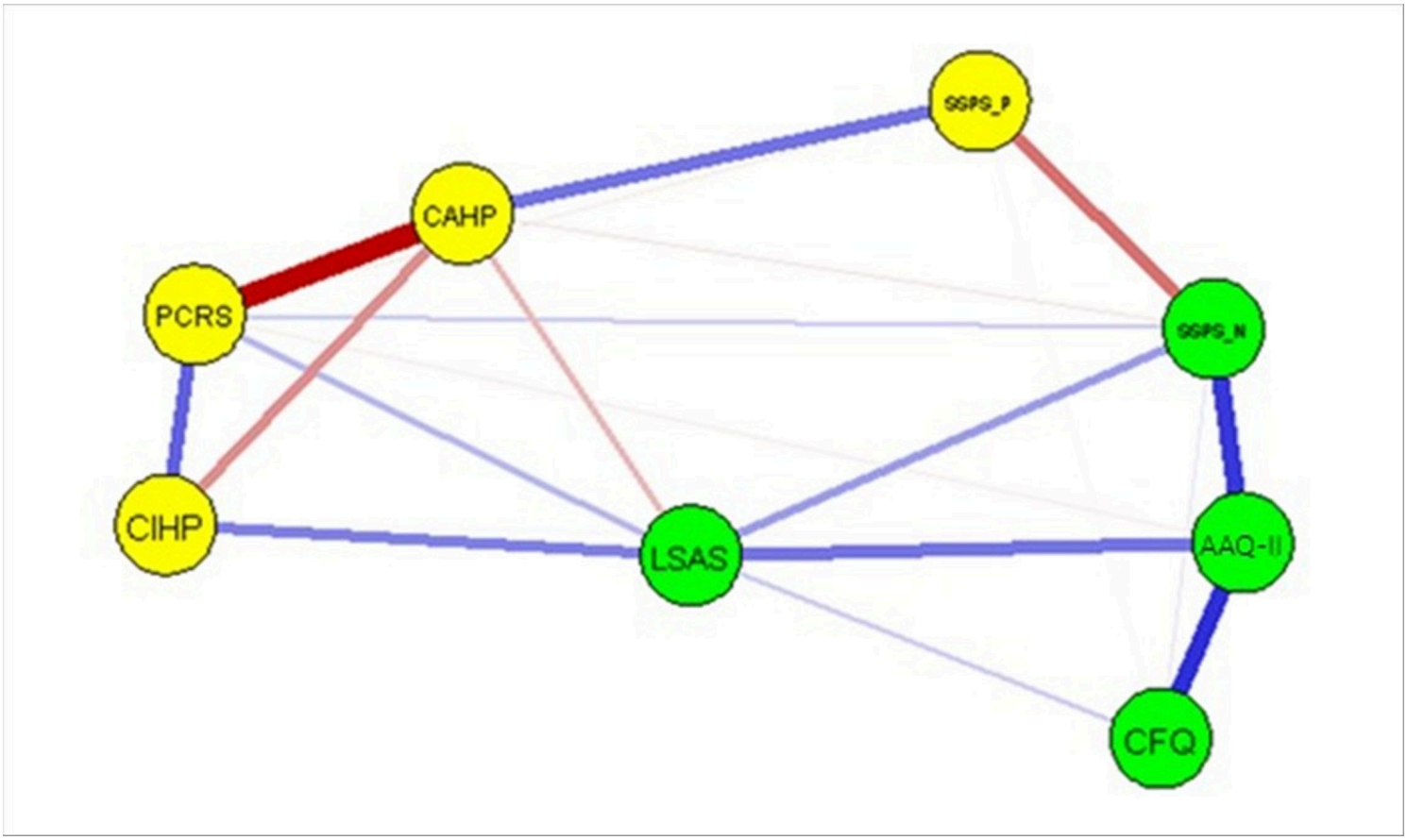


Figure 1

Empirical network model between psychological inflexibility (AAQ-II), cognitive fusion (CFQ), fear of public speaking (PRCS; CIHP), public speaking self-efficacy (CAHP), social anxiety (LSAS), positive self-statements (SSPS-P), and negative self-statements (SSPS-N) in public speaking situations. Red edges represent negative partial correlations, while blue edges indicate positive partial correlations

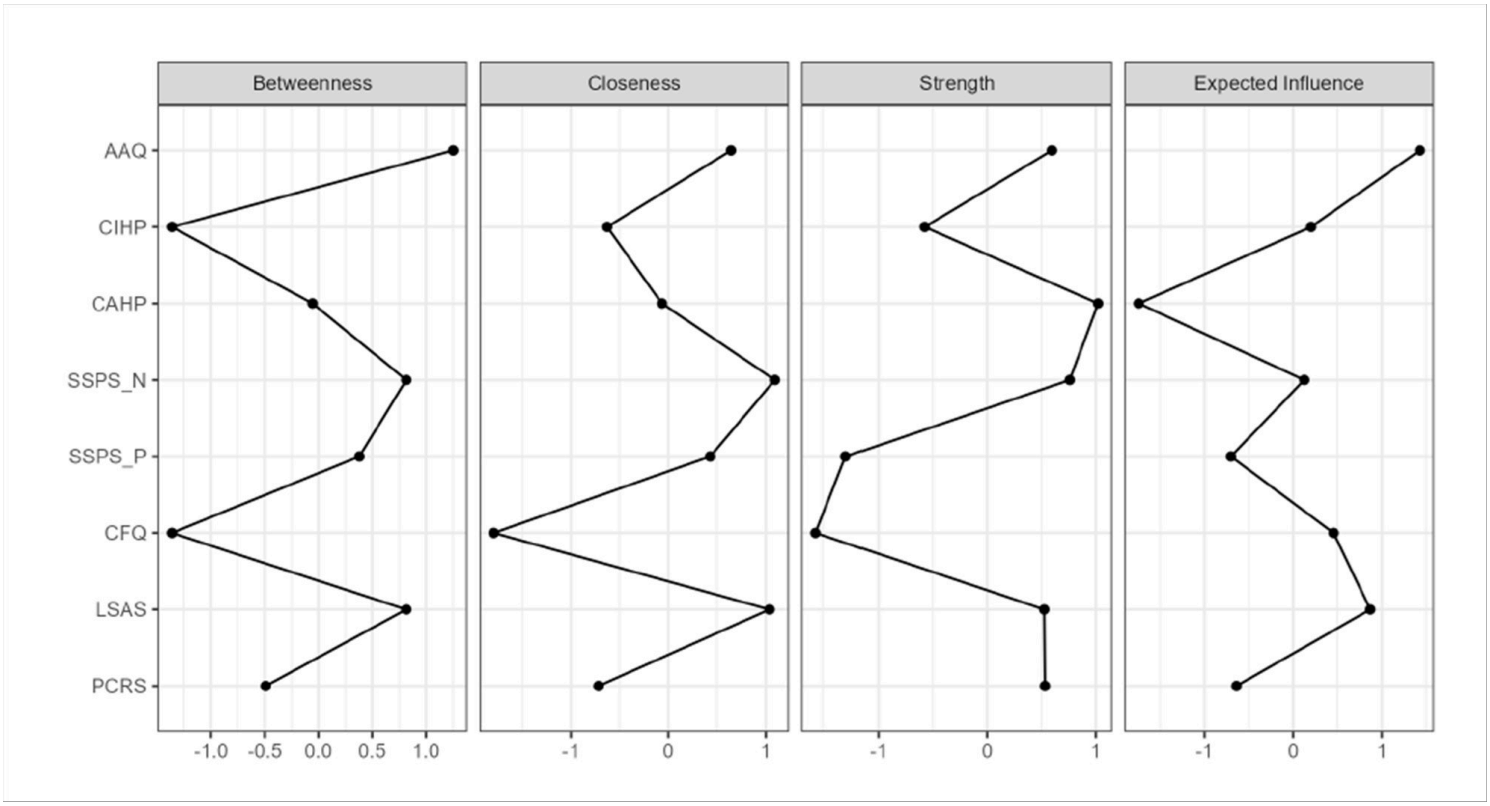


Figure 2

Centrality measures for the variables. The X-axis[2] shows centrality indices as standardized z-scores. Psychological inflexibility (AAQ-II), cognitive fusion (CFQ), fear of public speaking (PRCS), public speaking self-efficacy (CAHP), fear of public speaking (CIHP), social anxiety (LSAS), positive self-statements (SSPS-P) and negative self-statements (SSPS-N) in public speaking situations.

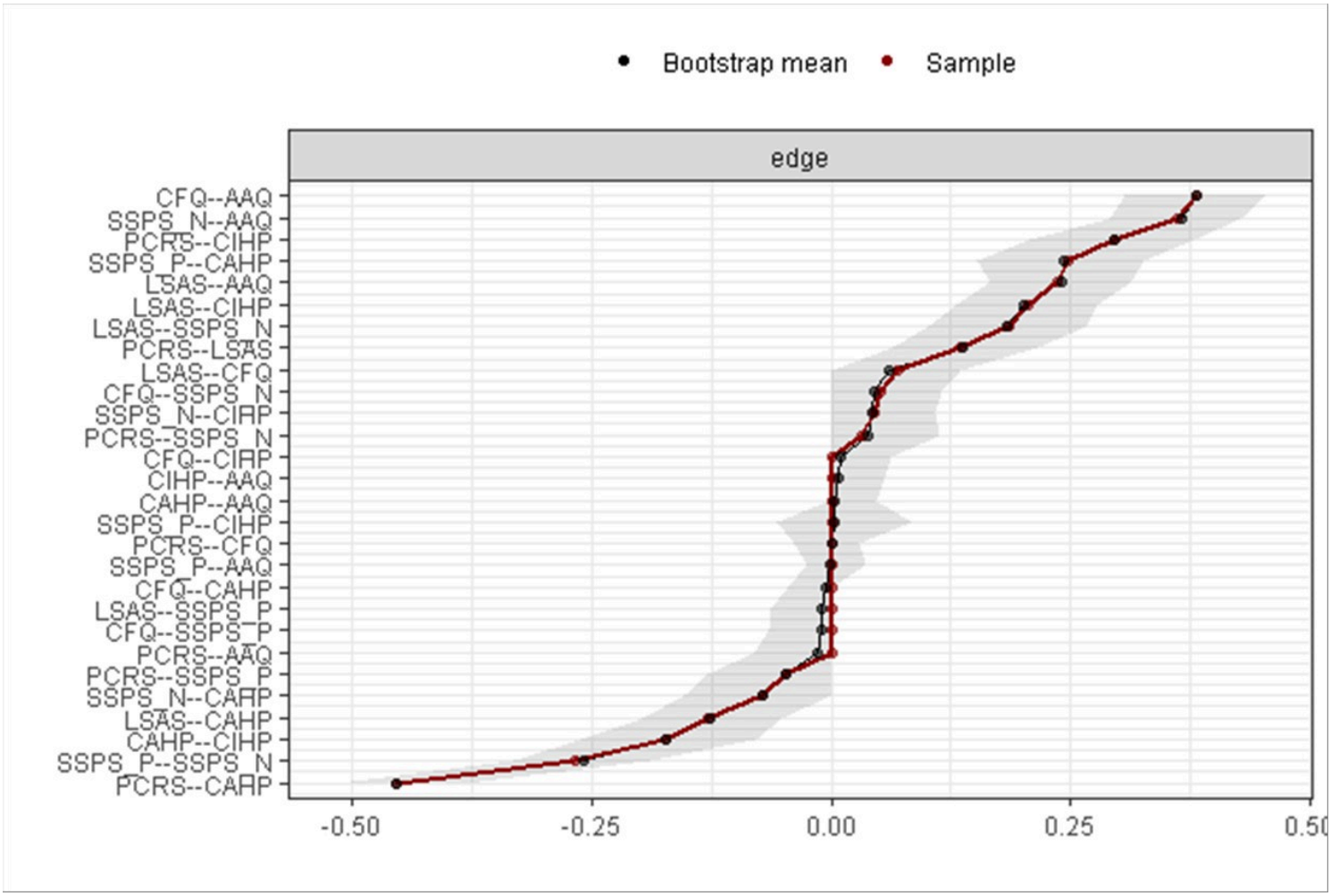


Figure 3

Bootstrap confidence intervals (CI) of edge weights for the estimated network of eight variables. The X-axis shows z-scores, while the Y-axis represents network edges ordered from highest to lowest weight. The red line indicates the sample values, while the gray area represents the bootstrapped CIs.

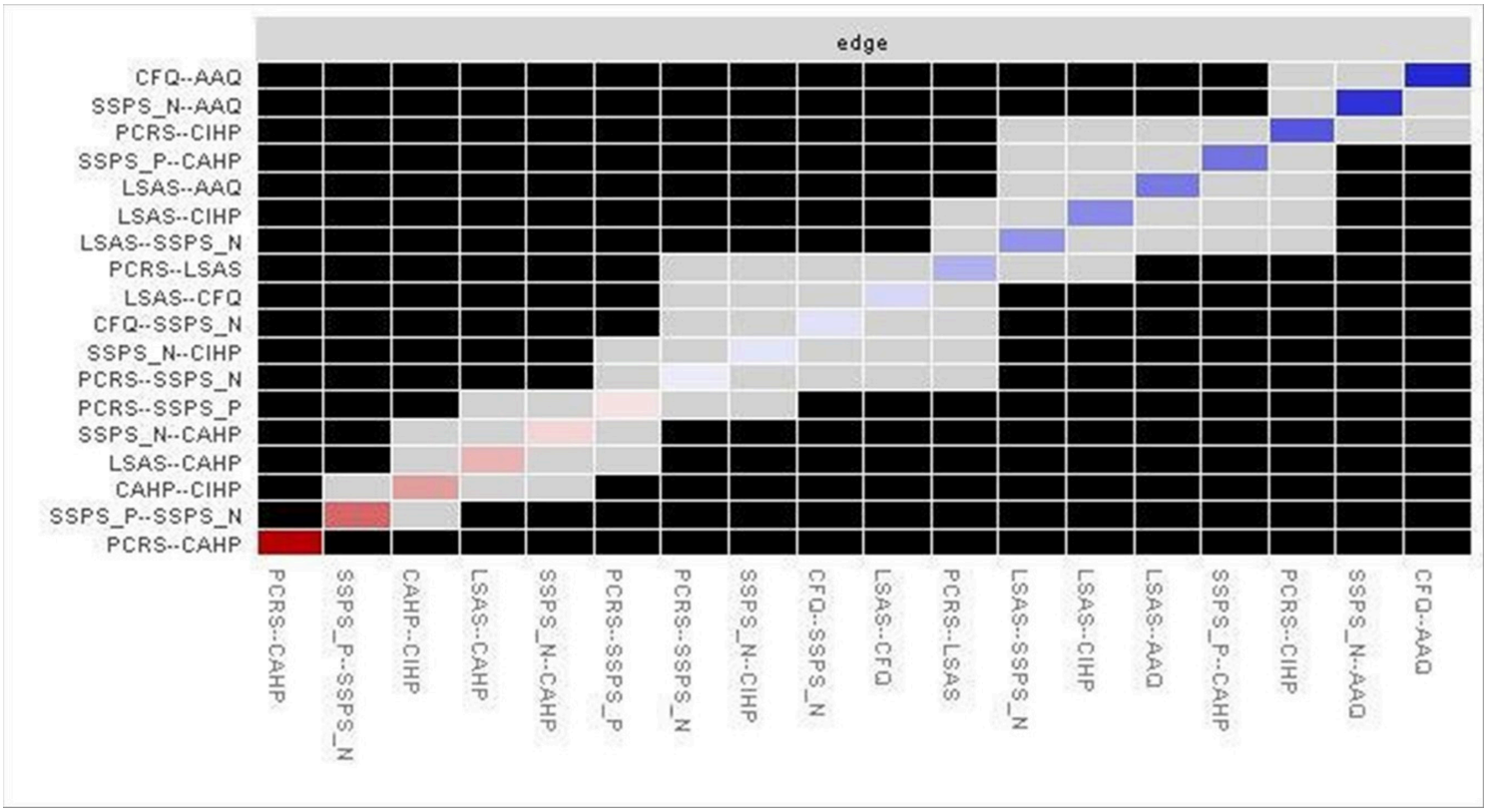


Figure 4

Bootstrapped difference tests (α = 0.05) between edge weights that were not zero in the estimated network. Significant differences are represented by black squares, non-significant differences by gray squares, and diagonal-colored squares correspond to the strength of the edge weight in the network diagram (darker blue or red indicates a stronger connection).

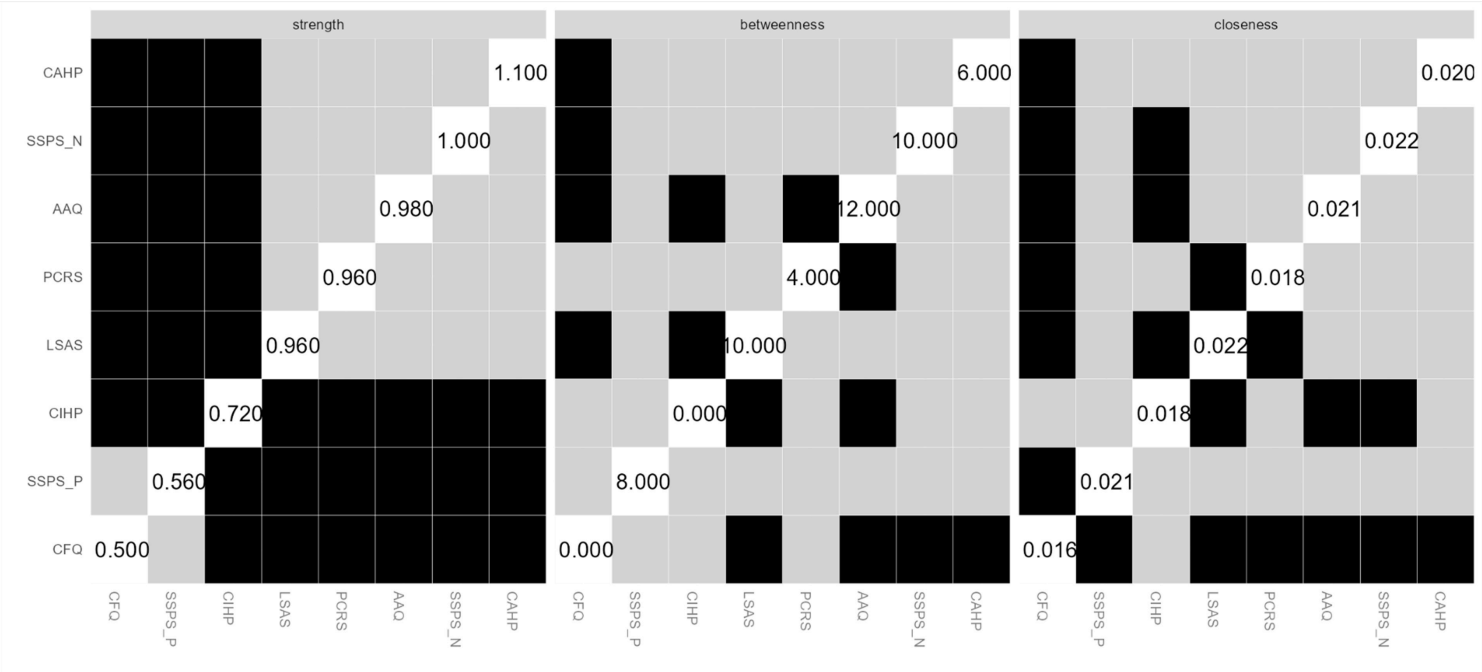


Figure 5

Bootstrapped difference tests (α = 0.05) on the centrality indices between variables. The values on the diagonal represent the strength/betweenness/closeness values for each variable. Significant differences are represented by black squares, while non-significant differences are indicated by gray squares.

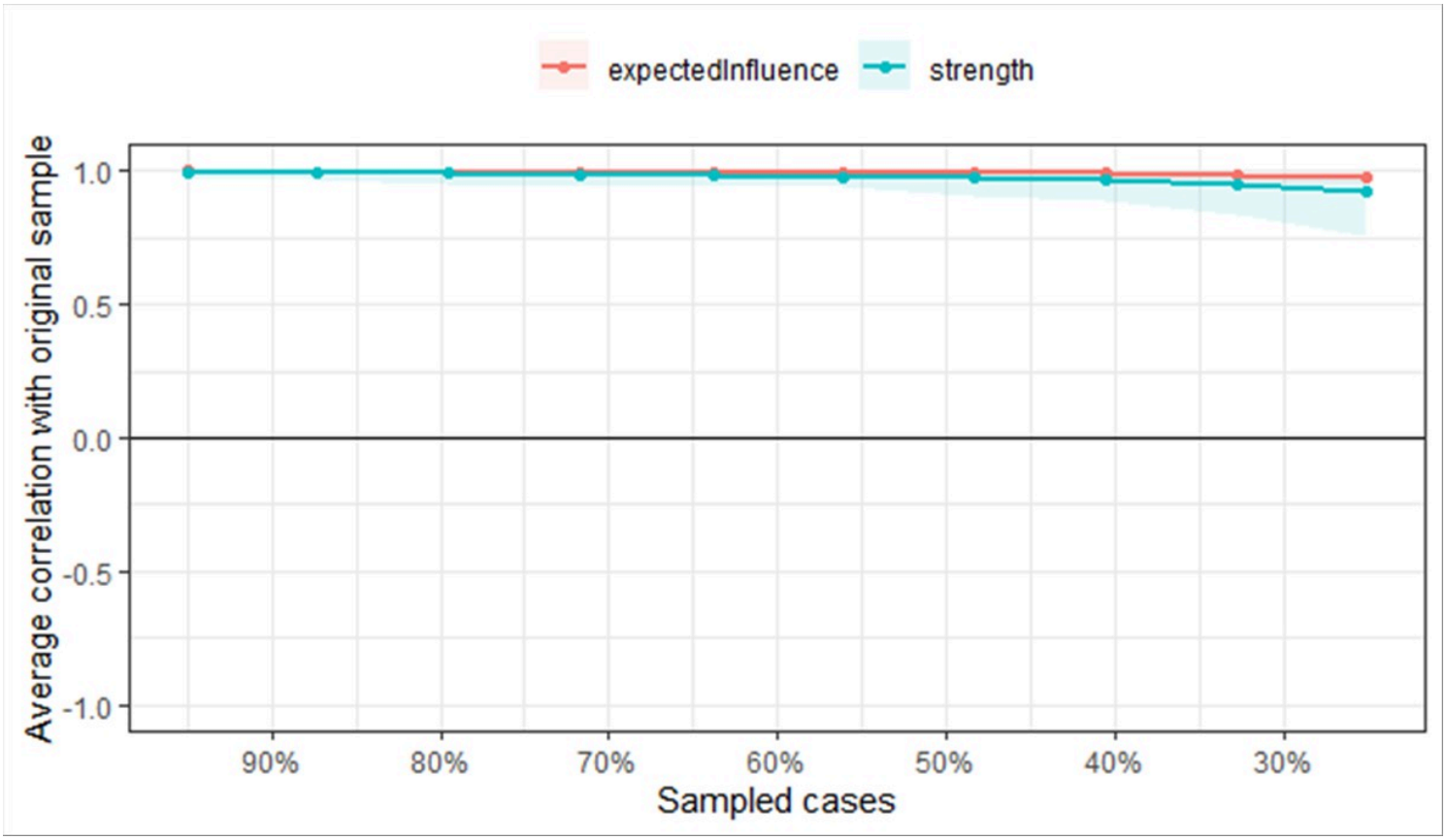


Figure 6

Coefficient Stability of strength and expected influence