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The heart of humor: A network analysis of the temperamental basis of humor and humor personality traits

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ABSTRACT

The present study investigated the structure and facet-to-facet systematic links (controlled for other links) across the temperamental basis of humor along with humor traits using network analysis. Undergraduate students (N = 747) completed the state-trait cheerfulness inventory and humor trait measures (e.g., comic styles, benevolent and corrective humor, humor styles, gelotophobia). The EBICglasso estimator was used to conduct partial correlations between facets in the network. Results showed cheerfulness, seriousness, and bad mood were largely interconnected to humor-related traits, further providing evidence for criterion validity of the temperamental basis of humor model. The nodes humorlessness in cheerful evoking situations (i.e., SE6), cheerful interactive style (CH5), verbal humor, laughter, katagelasticism, humor in everyday life, prevalence of sadness (i.e., BM2), and gelotophobia were strength central personality traits. The correlation stability-coefficients were 0.75 for strength, edge weight, and expected influence, suggesting that centrality indices were highly stable. Implications regarding the theoretical model for the temperamental basis of humor and meaningful components that emerge visually in the network (e.g., laughing at others, laughing with others, mixed styles) are discussed.

1. Introduction

Strelau (1996) proposed that temperament is characterized through individual differences in formal aspects of behavior. Specifically, Strelau's Regulatory Theory of Temperament (RTT) emphasize that systematic links of temperament traits in adults may have different adaptive functions and urged researchers to explore links between biology, temperament, and personality. As a tribute to Strelau's work in advancing theory in adult temperament and personality, the associations between the temperamental basis of humor and humor-related traits are explored.

Personality psychology defines humor as cognition, behavior, and affect that constitute amusement, mirth, and exhilaration experienced by the individual and expressed to the surrounding environment (Ruch et al., 1996). Ruch et al. (1996) postulated that interindividual differences would predispose individuals to enjoy and engage in humor-related activities. The constructs described in this model represent the temperamental basis of the sense of humor (i.e., the predisposition of experiencing humor in everyday life). High trait cheerfulness predicts engagement in humor-related activities, but the frequency and intensity of engagement in these social interactions are affected by seriousness and bad mood (Ruch et al., 1996). Research suggests that trait cheerfulness accounts for most of the variance in humor-related traits, while seriousness and bad mood also demonstrated incremental validity (Ruch & Carrell, 1998). Furthermore, Wagner and Ruch (2020) found unique variance in cheerfulness, seriousness, and bad mood that predicted frequency of humor behaviors and well-being beyond demographic variables and the five-factor model of personality. Specifically, cheerfulness and seriousness contributed unique variance to a description of humor behaviors while cheerfulness and bad mood showed unique variance for well-being (Wagner & Ruch, 2020).

While the temperament basis of humor has focused on the predisposition of exhilaration, multidimensional trait-based humor models were investigating differing personality styles of humor that predict appreciation, comprehension, and production in humor (Ruch, 2008). Some researchers proposed individual differences in humor styles may be adaptive or maladaptive with respect to the actor's subjective well-being (Martin et al., 2003). Martin et al. (2003) proposed two beneficial (i.e., self-enhancing and affiliative) and two detrimental (i.e.., aggressive and self-defeating) styles of humor that may promote well-being through witty banter or alternatively, increase interpersonal tension, respectively (Martin et al., 2003). Heintz et al. (2019) proposed two

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Table 1
Reliabilities, descriptive statistics, skewness, and kurtosis of the temperamental basis of humor and humor trait variables.

Variables	Description	Mean (SD)	Skewness	Kurtosis	Omega
CH1	Cheerful mood prevalence	2.88 (0.56)	−0.40	0.18	0.89
CH2	Smiling, laughter	3.29 (0.51)	−0.70	0.22	0.71
CH3	Composed view of adverse life circumstances	2.75 (0.39)	−0.24	0.26	0.64
CH4	Active elicitors of cheerfulness and smiling/laughter	3.11 (0.41)	−0.31	−0.11	0.68
CH5	Generally cheerful interaction style	3.35 (0.44)	−0.78	0.46	0.84
SE1	Prevalence of serious states	2.56 (0.42)	0.02	0.07	0.53
SE2	Everyday happenings as important	2.67 (0.43)	0.15	0.39	0.67
SE3	Plan ahead and set long-range goals	2.97 (0.51)	−0.34	0.11	0.75
SE4	Tendency to prefer activities for which concrete, rational reasons can be produced	2.29 (0.49)	0.19	0.40	0.54
SE5	Preference for a sober, object-oriented communication style	2.46 (0.43)	0.03	0.20	0.55
SE6	Humorlessness attitude about cheerfulness-related behavior, roles, persons, stimuli, situations, and actions	1.84 (0.50)	0.41	−0.11	0.70
BM1	Prevalence of bad mood	2.17 (0.53)	0.27	0.06	0.72
BM2	Prevalence of sadness	2.42 (0.59)	0.10	−0.22	0.83
BM3	Sad and ill-humored behavior in cheerfulness evoking situations, the attitudes toward such situations and the objects, persons, and roles involved	1.97 (0.58)	0.41	−0.30	0.73
BM4	Prevalence of ill-humoredness	2.27 (0.56)	0.30	−0.06	0.78
BM5	Ill-humored individual's behavior in cheerfulness evoking situations	1.97 (0.55)	0.42	−0.07	0.67
Pho	Gelotophobia	2.32 (0.47)	0.07	−0.23	0.83
Phi	Gelotophilia	2.55 (0.49)	0.03	−0.05	0.85
Kat	Katagelasticism	2.17 (0.47)	0.18	−0.10	0.84
Ben	Benevolent humor	5.12 (0.79)	−0.50	0.58	0.67
Cor	Corrective humor	4.09 (1.04)	−0.21	−0.07	0.77
Fun	Fun	4.93 (1.06)	−0.50	0.04	0.80
Iro	Irony	4.63 (0.97)	−0.23	−0.19	0.74
Wit	Wit	4.86 (0.99)	−0.33	−0.06	0.83
Sar	Sarcasm	3.75 (1.05)	0.09	−0.19	0.78
Hum	Humor	5.05 (0.84)	−0.25	−0.13	0.72
Sat	Satire	4.12 (1.08)	−0.14	−0.14	0.82
Non	Nonsense	5.09 (0.96)	−0.42	0.08	0.80
Cyn	Cynicism	3.82 (0.97)	0.08	0.16	0.75
Soc	Social fun	4.63 (0.99)	−0.29	<0.01	0.76
Mok	Mockery	3.80 (1.07)	0.14	−0.29	0.76
Inp	Humor ineptness	4.09 (0.81)	−0.18	0.03	0.45
Cog	Cognitive/reflective humor	4.95 (0.77)	−0.31	0.48	0.63
Enj	Enjoyment of humor	4.94 (0.90)	−0.37	0.17	0.74
Lgh	Laughter	4.95 (0.88)	−0.23	−0.04	0.74
Vrb	Verbal humor	5.11 (0.95)	−0.42	<0.01	0.87
HEL	Finding humor in everyday life	5.32 (0.89)	−0.61	0.30	0.88
Lau	Laughing at the self	4.89 (1.04)	−0.54	0.40	0.86
Str	Humor under stress	4.78 (1.09)	−0.38	−0.23	0.90
Aff	Affiliative humor	4.01 (0.60)	−0.70	0.31	0.81
Slf	Self-enhancing humor	3.39 (0.63)	−0.36	0.02	0.77
Agg	Aggressive humor	2.74 (0.62)	0.08	0.33	0.70
SeD	Self-defeating humor	3.04 (0.72)	−0.01	−0.19	0.80

All standard deviation values are: 0.09 for skewness, 0.18 for kurtosis. Facet scores are averages in item scores.

styles of humor demonstrating structural validity across 22 countries: benevolent humor which treats human weaknesses and wrongdoings compassionately and corrective humor which aims to better human weaknesses. Moreover, researchers have conceptualized differential displays of humor as comic styles (e.g., fun, wit, irony, satire, cynicism), sense of humor variables (e.g., laughter, verbal humor), and factors of humor (e.g., social fun, mockery, humor ineptness; Heintz, 2019; Ruch & Heintz, 2018; Ruch et al., 2018). Ruch and Proyer (2008) proposed three dispositions toward ridicule and laughter, including gelotophobia (i.e., the fear of being laughed at), gelotophilia (i.e., the joy of being laughed at), and katagelasticism (i.e., the joy of laughing at others; Ruch & Proyer, 2008). Clearly, there is a movement toward capturing comprehensive psychological styles of humor in the form of multidimensional traits.

The temperamental basis of humor and aforementioned humor traits may be linked in conceptually sound ways to humor appreciation and creation. Affect, cognitions, and behaviors stimulate or inhibit each other within an ecosystem, and structural covariance may indicate systematic links (controlled for other links) between assessed variables (Costantini et al., 2015). Martin et al. (2003) found that cheerfulness is positively associated with affiliative and self-enhancing humor and seriousness is negatively associated with affiliative humor and aggressive humor. Moreover, bad mood is negatively associated with affiliative humor and self-enhancing humor and positively associated with self-defeating humor (Martin et al., 2003). Heintz et al. (2019) revealed that comic styles covered the affective components (i.e., cheerfulness, bad mood) of the temperamental basis of a humorous personality style. This study showed that, in terms of humor traits, large overlaps and redundancies between affiliative, self-enhancing, and aggressive humor, and between fun, benevolent humor, and sarcasm, respectively. These results suggest some commonalities between the proposed models of humor traits. The limitation remains that it is unclear how the temperamental basis of humor interacts with specific styles with humor in a system with many other links to humor traits (controlled for other links).

While these traits may reveal common and unique qualities in humor, the question of the core of the humor-related traits remains unanswered. The present study applies network analysis to investigate the facet-to-facet systematic links (controlled for other links) across the temperamental basis of humor along with humor traits as a network through a comprehensive, data-driven approach. The latent trait model does not account for attitudes, cognitions, and behaviors that form an

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ecosystem in which specific characteristics associated with a trait may form excitatory or inhibitory relationships with other characteristics. Network analysis, which quantitatively provides the centrality of variables, provides a novel technique to allow structural covariation and direct association between elements in a model to occur, thus addressing the limitations of the common cause model (Costantini et al., 2015). Thus, it becomes imperative to explore the trait-by-trait systematic links (controlled for other links) across the temperament basis of humor and humor traits.

2. Materials and methods

2.1. Participants

Undergraduate students (N = 747; 71.5% females) enrolled in a large university in Canada were recruited to participate in the study online using Qualtrics, a web-based survey tool. Most of the sample identified as European White (n = 316; 42.3%) and Asian/Pacific Islander (n = 293; 39.2%). Students' ages ranged from 17 to 54 years (M = 18.41, SD = 2.01). Participation in the study was voluntary for a credit toward a psychology course and participants provided informed consent and were debriefed.

2.2. Materials and procedure

2.2.1. State-Trait Model of Cheerfulness – Trait Version

The international version of the State Trait Cheerfulness Inventory – Trait Version (STCI-T106; Ruch et al., 1996) measures three dimensions of cheerfulness, seriousness, and bad mood using 106 items. Participants rated their level of agreement of each item using scales ranging from 1 (strongly disagree) to 4 (strongly agree). For cheerfulness, Ruch et al. (1996) identified the five theoretical subfacets include prevalence of cheerful mood (i.e., CH1), low threshold for smiling and laughter (i.e., CH2), composed view of adverse life circumstances (i.e., CH3), broad range of active elicitors of cheerfulness and smiling/laughter (i.e., CH4), and generally cheerful interactive style (i.e., CH5). For seriousness, the theoretical subfacets include prevalence of serious states (i.e., SE1), perception of even everyday happenings as important and taking it into consideration thoroughly and intensively (i.e., SE2), tendency to plan ahead and set long-range goals (i.e., SE3), tendency to prefer activities for which concrete, rational reasons can be produced (i.e., SE4), preference for a sober, object-oriented communication style (i.e., SE5), and "humorless" attitude about cheerfulness-related behaviors (i.e., SE6). For bad mood, the five theoretical subfacets include prevalence of bad mood (i.e., BM1), prevalence of sadness (i.e., BM2), response of sadness in cheerfulness-evoking stimuli (i.e., BM3), prevalence of ill-humoredness (i.e., BM4), and ill-humored behavior in cheerfulness-evoking stimuli (i.e., BM5). Previous findings demonstrated acceptable internal consistency, as well as factorial, convergent, and discriminant validity across versions of this measure were found (Ruch et al., 1996).

2.2.2. Humor Styles Questionnaire

The Humor Styles Questionnaire (HSQ) measures two benign styles of self-enhancing and affiliative humor and two maladaptive styles of aggressive and self-defeating humor (Martin et al., 2003). Participants indicated their agreement with each of the 32 statements on scales ranging from 1 (strongly disagree) to 5 (strongly agree). The HSQ demonstrated strong evidence of construct validity and has been used in >125 published studies in over 30 languages (Martin & Kuiper, 2016).

2.2.3. Four Dimensions of Humor Scale (4DHS)

The 4DHS (Ruch, 2012a, 2012b) is a 24-item measure that evaluates social fun, mockery, humor ineptness, and cognitive/reflective humor (Ruch, 2012a, 2012b; Ruch & Heintz, 2019). Each item is evaluated on a seven-point Likert scale from 1 (strongly disagree) to 7 (strongly agree). The measure has demonstrated convergent and discriminant validity.

2.2.4. Comic style markers

The comic style markers measures eight expressions of fun, humor, nonsense, wit, irony, satire, sarcasm, and cynicism using 48 items (Ruch et al., 2018). Each item is evaluated based on a seven-point Likert format (1 = "strongly disagree" to 7 = "strongly agree"). Ruch et al. (2018) indicated these markers can be characterized by laughing with another (e.g., lighter styles of fun, benevolent, nonsense), laughing at others (e.g., sarcasm, cynicism), and mixed styles (e.g., wit, irony, satire). This measure demonstrated strong reliability and structural and concurrent validity (Ruch et al., 2018).

2.2.5. Revised BenCor

The revised version of the BenCor is a 12-item measure that assesses benevolent and corrective humor using a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). The internal consistency and construct validity of the BenCor were supported in several studies conducted in 22 different countries (Heintz et al., 2019).

2.2.6. Sense of Humor Questionnaire–Parallel Version

The sense of humor questionnaire is composed of 48 items measuring six humor skills (Ruch & Heintz, 2018). These six factors include enjoyment of humor, laughter, verbal humor, finding humor in everyday life, laughing at oneself, and humor under stress. The scale comprises of a seven-point Likert scale from 1 = strongly disagree to 7 = strongly agree. Research has demonstrated structural and concurrent validity for the measure (Ruch & Heintz, 2018).

2.2.7. PhoPhiKat-45

The PhoPhiKat-45 is a reliable and valid measure that assesses gelotophobia (i.e., the fear of being laughed at), gelotophilia (i.e., the joy of being laughed at), and katagelasticism (i.e., the joy of laughing at others; Ruch & Proyer, 2008). The measure has demonstrated strong reliability and structural, convergent, and discriminant validity (Ruch & Proyer, 2008).

2.3. Analytic strategy

Forbes et al. (2017) reported the replicability crisis in conditional independence networks may indicate measurement errors of single items that formulate the network. Thus, aggregate scores were integrated into the network analysis with each node representing a single facet that was theoretically derived by Ruch et al. (1996). For the STCI, each facet was presented as a separate node in the model. For humor trait measures, each latent variable will be identified for each humor scale based on the factors identified in their original publication (i.e., each factor is a separate node in the model). Centrality measures (i.e., expected influence, strength, closeness, betweenness) and the signed version of the Zhang's clustering coefficient for each adaptive LASSO network were examined to identify nodes that are important to the network structure (Costantini & Perugini, 2016; Zhang & Horvath, 2005). Strength represents the addition of correlations between the node of interest and nodes across the network. Closeness indicates the inverse between one node of interest and other nodes of the network. Betweenness represents frequency in which a node of interest is the shortest path between two different nodes. Zhang's clustering coefficient is ideal for correlational data and accounts for negative edge weights (Zhang & Horvath, 2005). The EBICglasso estimator (Extended Bayesian Information Criterion Graphical Least Absolute Shrinkage and Selection Operator) was used to conduct partial correlations between facets.

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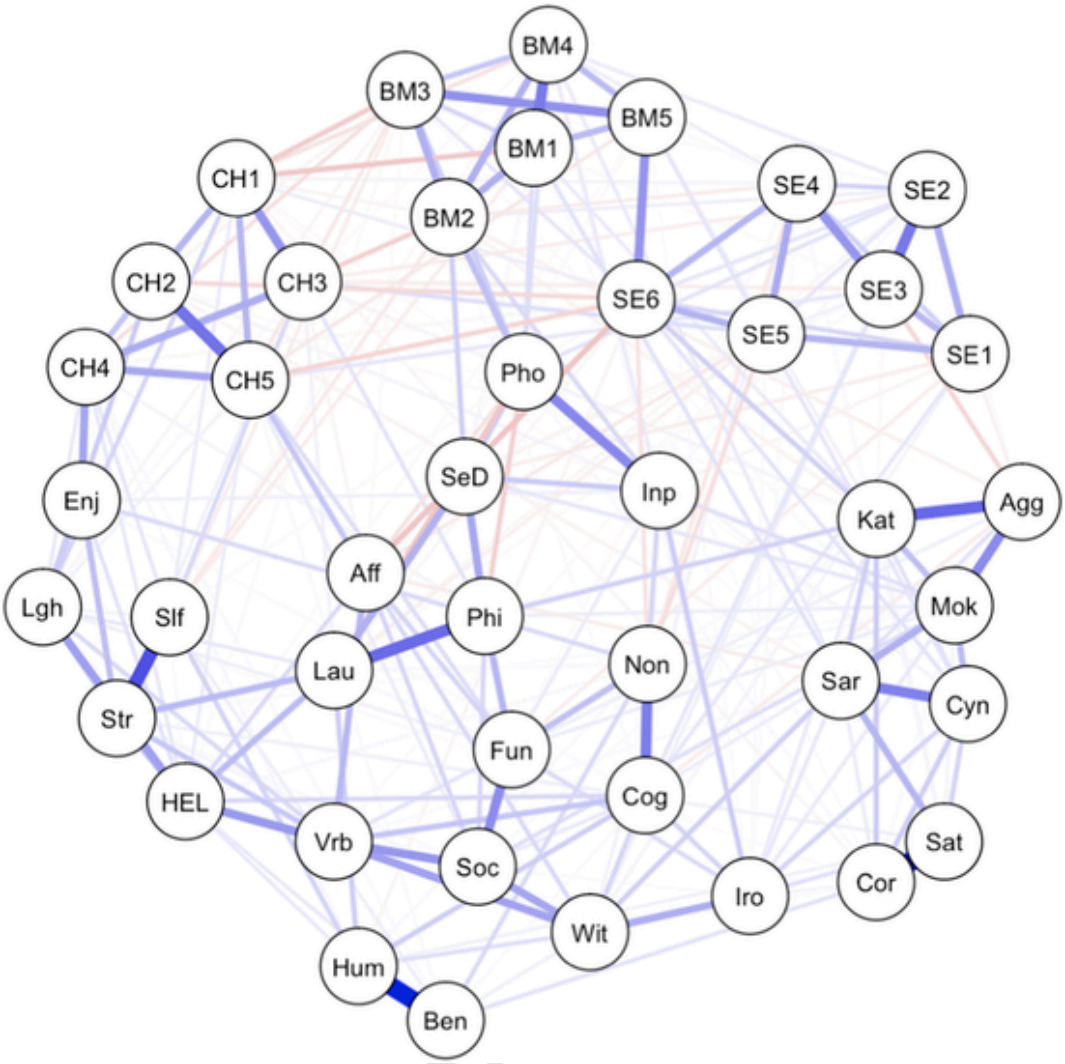

Fig. 1. EBICglasso network graphs.
Note. $N = 747$. The network structure is a Gaussian graphical model with partial correlation coefficients. The nodes represent personality traits and the edges represent the EBICglasso partial correlations between them. Thicker edges represent stronger associations, with blue edges representing positive associations and red edges representing negative associations. Abbreviations found in Table 1. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

This method allows small edge weights to shrink to zero to avoid the multiplicity problem with spurious correlations for a parsimonious network (Costantini et al., 2015; Epskamp et al., 2018).

Based on Epskamp et al.' (2018) recommendations, the accuracy of edge-weights with bootstrapped confidence intervals were estimated. Furthermore, the stability of centrality indices was evaluated to inquire replicability and bootstrapped difference tests between edge-weights and centrality measurements were calculated for significance testing. Descriptive analyses were conducted using SPSS version 26. Estimates and plots from the network analysis were conducted on JASP version 0.10.2 and R packages bootnet, networkTools, and qgraph (Epskamp et al., 2012; Epskamp et al., 2018).

3. Results

3.1. Network estimation

Table 1 reports descriptive and reliability statistics. Fig. 1 shows the visualization of the network model with strengths of the partial correlations characterized by 43 nodes. Of 903 possible edges, 283 (31.3%) were present with a sparsity value of 0.69. The small-worldness value was 1.28, reflecting no indication for small-world property (i.e., >3 represents small-world property; Humphries & Gurney, 2008). As expected, the partial correlations within traits (e.g., between CH1 and CH2) for the STCI were generally stronger than the partial correlations between traits (e.g., between CH1 and SE1) while other scales had their respective factors spread across the network. Based on Fig. 1 and examination of partial correlations, cheerfulness is linked with lighthearted humor variables (e.g., laughter, humor under stress, enjoyment of humor). Humorlessness (e.g., gelotophobia, self-defeating humor, inept) domains were clustered together in close proximity to bad mood and seriousness. Specifically, humor ineptness, gelotophobia, and self-defeating humor were associated with prevalence of sadness (i.e., BM2) and humorlessness attitude about cheerfulness-related stimuli (i.e., SE6), which may constitute a cluster of humorlessness variables. Darker humor variables which may constitute laughing at others (e.g., aggressive, mockery, sarcasm, satire, cynicism) were clustered together. All model output (i.e., bootstrapped edge-weights, centrality stability test, centrality difference test, items and subscales) are available in the supplementary materials.

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Table 2
Centrality and clustering measures for network analysis.

Variable	Betweenness	Closeness	Strength	EI	Zhang
CH1	−0.08	−0.33	0.82	−1.54	−0.28
CH2	−0.94	−0.39	−1.14	−0.97	1.76
CH3	−0.32	−0.38	−0.55	−1.22	−1.53
CH4	−0.39	−0.59	0.12	0.33	−0.38
CH5	0.26	0.30	1.52	0.22	−0.20
SE1	−1.11	−1.70	−0.93	−0.74	1.54
SE2	−1.04	−1.83	−0.69	0.02	1.34
SE3	0.05	−1.01	0.10	−0.51	0.33
SE4	−0.60	−0.77	−0.14	−0.02	0.75
SE5	−0.87	−0.19	−0.67	−1.03	0.39
SE6	3.90	1.99	2.29	−1.40	−1.08
BM1	−0.15	−0.08	0.38	−0.24	1.38
BM2	0.05	0.07	1.01	−0.80	0.32
BM3	−0.05	0.33	0.68	−1.44	0.55
BM4	−1.22	−0.59	0.44	0.49	1.68
BM5	0.88	0.69	−0.39	0.16	0.51
Pho	1.15	1.20	0.90	−1.03	−0.11
Phi	1.12	1.79	0.41	0.36	−0.05
Kat	1.77	0.62	1.15	1.29	−0.20
Ben	−0.94	−1.41	−1.45	0.11	−1.11
Cor	−0.39	−1.71	−0.38	0.52	0.11
Fun	−0.08	1.05	0.50	0.88	−1.15
Iro	−0.77	−0.42	−1.46	0.11	−0.97
Wit	0.60	0.73	0.39	1.23	−0.30
Sar	0.64	−0.31	0.73	1.17	0.60
Hum	−0.08	−0.91	0.36	1.01	−1.80
Sat	−0.67	−1.82	0.01	1.00	0.43
Non	−0.22	0.49	−0.72	−1.11	−2.04
Cyn	−1.04	−0.95	−0.39	0.32	1.21
Soc	−0.70	0.62	0.13	1.07	0.80
Mok	−0.56	−0.66	0.80	1.48	0.63
Inp	−0.46	0.31	−0.70	0.37	−1.02
Cog	−0.08	0.33	0.51	0.93	−1.30
Enj	−0.50	−0.65	−2.89	−0.75	−0.71
Lgh	−0.63	−0.13	−0.93	0.21	0.31
Vrb	1.94	1.79	1.39	1.78	0.59
HEL	0.16	1.18	1.03	1.46	−0.22
Lau	1.60	1.44	1.23	−0.16	−0.57
Str	0.60	0.29	0.65	1.39	−1.20
Aff	0.67	1.60	−0.71	−2.18	−0.23
Slf	−0.67	−0.40	−1.16	−0.94	−1.31
Agg	0.09	−0.15	−1.04	−1.40	1.01
SeD	−0.91	0.57	−1.21	−0.44	1.53

Note. Values are presented as *z*-scores. EI = expected influence. Zhang = Zhang's clustering coefficient.

3.2. Centrality indices and network stability

Table 2 shows the centrality and clustering values based on the network. Centrality difference analyses regarding the strength (available in the Supplementary Materials) has shown that SE6 (i.e., humorlessness attitude about cheerfulness-related variables), CH5 (i.e., generally cheerful interactive style), verbal humor, laughter, katagelasticism, humor in everyday life, BM2 (i.e., prevalence of sadness), and gelotophobia demonstrated the greatest strength in the network. These variables did not differ significantly from the variable of the greatest strength (i.e., SE6) and showed significantly higher strength compared to other facets in the network. With numerous negative edges within the model, expected influence (EI) was calculated to account for negative associations (Robinaugh et al., 2016). Based on EI, satire, humor, social fun, sarcasm, wit, katagelasticism, humor under stress, humor in everyday life, mockery, and verbal humor had a *z*-score above one. Highest Zhang clustering coefficient values in CH2, SE1, and BM4 suggest that this scale may be redundant and capturing information by other facets (Zhang & Horvath, 2005). Correlation stability (CS) coefficient quantifies the maximum proportion of cases that can be removed to assert a correlation with the original centrality of >0.70 with 95% certainty. Epskamp, Borsboom, and Fried (2016) recommend CS-coefficient values should preferably be above 0.50. The correlation stability coefficient was 0.75 for strength, edge weight, and expected influence, suggesting that centrality indices were highly stable.

4. Conclusions

The present study is the first to investigate the network structure of the temperamental basis of humor and humorous personality traits. Several interesting findings emerged in this study. First, the temperamental basis of humor is postulated as a multidimensional model that represents disposition to humor and laughter along with humorlessness. The network model showed cheerfulness, seriousness, and bad mood were largely interconnected to humor-related traits, further providing evidence for the criterion validity of the temperamental basis of humor model (Ruch & Hofmann, 2012). Moreover, seriousness and bad mood were linked with variables related to humorlessness in cheerful evoking situations had the highest centrality measures across strength, betweenness, and closeness. These findings support Ruch et al.' (1996) theoretical model that humorlessness should be well-represented in the temperamental basis of humor.

Second, the CS-coefficient was above 0.50, suggesting an accurate and stable network in which centrality indices were highly stable. Third, bootstrapped difference tests were conducted to evaluate central and peripheral traits within the network. The nodes humorlessness in cheerful evoking situations, cheerful interactive style, verbal humor, laughter, katagelasticism, humor in everyday life, prevalence of sadness, and gelotophobia were strength central personality traits that may largely affect the links in this system. These traits represent the temperamental basis of humor and meaningful components that emerge visually in the network. Using principal component analyses, Heintz et al. (2019) found two components of lighter comic styles with cheerfulness and darker comic styles with wit and bad mood. As Ruch et al. (2018) proposed, it appears traits regarding laughing with others (e.g., fun, laughter, enjoyment of humor), laughing at others (e.g., aggressive humor, mockery), and mixed styles (e.g., wit, cognitive humor, irony) emerged within the network.

This study has several limitations. First, most participants were undergraduate students recruited from an academic institution in Canada. Results may not be generalizable to other samples across different age groups and cultures. Second, network estimates may be affected by the high proportion of females in the sample. Hofmann et al. (2020) concluded in a systematic review that there are sources of gender differences in humor appreciation and production. Future studies should examine potential gender differences in the network. Third, albeit a small number of items per facet, the omegas values of some variables in the network (e.g., humor ineptness) were low, which may reflect problems in measurement error. Future studies should investigate the psychometric properties of these facets and whether modifications for certain items may be necessary to decrease measurement noise. Lastly, all traits in this study were based on self-report. Future studies should assess a comprehensive model encompassing self-report traits, peer-report traits, and humor comprehension and production variables.

Overall, the present study applied a network analysis approach to investigate the structure and facet-to-facet systematic links (controlled for other links) across the temperamental basis of humor and humor traits through a comprehensive and data-driven approach. This work provides implication for further investigations of the theoretical model and nomological network of temperament and humor trait constructs.

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Data availability

The data that support the findings of this study are available from the corresponding author, C.L., upon reasonable request.

CRediT authorship contribution statement

Chloe Lau: Conceptualization, Methodology, Data collection; Data analysis; Manuscript writing; Reviewing and editing
Francesca Chiesi: Conceptualization; Writing; Reviewing and editing
Donald Saklofske: Conceptualization; Writing; Reviewing and editing.

Declaration of competing interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.paid.2021.111253.

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