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Symptom-Level Networks of Youth- and Parent-Reported Depression and Anxiety in a Transdiagnostic Clinical Sample

Hannah L. Grassie[1], **Sarah M. Kennedy**[2], **Elizabeth R. Halliday**[1], **Sierra A. Bainter**[1], **Jill Ehrenreich-May**[1]

[1]Department of Psychology, University of Miami, Coral Gables FL, USA

[2]School of Medicine, University of Colorado, Aurora, CO, USA

Abstract

Background: Depression and anxiety disorders confer a significant public health concern for youth and their co-occurrence places youth at a higher risk for poorer psychosocial outcomes. In the present study, we use network analysis to investigate the role of and interactions among individual depression and anxiety symptoms in a treatment-seeking clinical sample.

Methods: We estimate regularized partial correlation networks for youth- and parent reported symptoms in a transdiagnostic sample of youth (N= 417, ages 8–18). We examined features of the symptom-level networks such as network stability, centrality, bridge symptoms, and communities in both youth- and parent-reported networks.

Results: Results indicate stable networks with disorder-specific clustering, such that symptoms were more interconnected within compared to between disorders. Symptoms related to self-comparison to peers and negative views of the future were most central in both networks. Symptoms of depression and anxiety were connected by worries for the future and hopelessness in the youth-reported network, whereas self-comparison to peers and low self-efficacy were bridge symptoms in the parent network. Distinct symptom clusters emerged in the parent- and youth-reported networks.

Conclusions: Our findings indicate that negative self-evaluation, negative views of the future, and repetitive negative thinking more generally are influential symptoms in the presentation and co-occurrence of depression and anxiety and as such may be promising targets in the treatment and prevention of depression and anxiety in youth.

Recent evidence suggests that the prevalence of youth anxiety and depression, the most common mental health concerns, has been growing over the past two decades (Beesdo et al., 2009; Ghandour et al., 2019; Twenge et al., 2019). As singular disorders, depression and anxiety are associated with worse psychosocial outcomes and increased suicide risk and thus confer a significant public health concern (Garber & Weersing, 2016). Furthermore, these disorders commonly co-occur in youth and such comorbidity is associated with greater impairment and lower levels of global functioning (Cummings et al., 2014; Garber & Weersing, 2016). Despite the prevalence of and impairment associated with such comorbidity, the etiology and maintaining factors of this co-occurrence are still largely uncertain.

Limited progress on this front may be explained by the overreliance on diagnostic categories and the common cause approach to comorbidity research, which purports the existence of a shared latent construct giving rise to co-occurring disorders (Cramer et al., 2010). Moreover, this approach assumes that all symptoms have equivalent influence as they are caused by the same underlying syndrome, and thus the role of specific symptoms is often neglected (Cramer et al., 2010; Fried, 2015). These are considerable limitations, as specific symptoms are differentially associated with risk, impairment, and treatment outcomes (Bringmann et al., 2014; Fried & Nesse, 2014). As such, myriad questions remain regarding the influential and differential roles of individual depression and anxiety symptoms in initiating and maintaining comorbidity in youth.

Conversely, clinical network theory emphasizes symptom-level interactions both within and between disorders (Cramer et al., 2010). Per this approach, symptoms meaningfully interact with one another to form a network of bidirectionally-related symptoms that constitute a given psychiatric disorder or network of multiple disorders (Borsboom & Cramer, 2013; Brosboom, 2017; Cramer et al., 2010). Symptoms play differential roles in networks, as certain symptoms (termed *central symptoms*) may be more interconnected or may have a stronger causal influence, compared to other symptoms (Borsboom & Cramer, 2013). Furthermore, the network approach poses that comorbidity arises due to *bridge symptoms*, which are symptoms that are shared by and connect the networks of two disorders (Cramer et al., 2010; Jones et al., 2019). The activation of a bridge symptom is thought to have a cascading effect, in turn activating the symptom network of another disorder (Borsboom, 2017; Cramer et al., 2010). Network analysis is a statistical and graphical methodology that quantifies and facilitates the operationalization of such central and bridge symptoms.

Past studies have used network analysis to examine depression and anxiety comorbidity in adult samples and have broadly found disorder-specific clustering with symptoms of excessive worry, sad mood, and physiological disturbances serving as bridges between the disorder-specific clusters (e.g., Beard et al., 2016; Cramer et al., 2010). Such findings have improved our understanding of the interrelation among co-occurring depression and anxiety symptoms in adults; however, few studies have investigated symptom-level anxiety and depression networks in youth and even fewer have done so in sizeable, clinical samples (Dobson et al., 2020; Konac et al., 2021; McElroy et al., 2018; Osborn et al., 2020). Broadly, the few studies that have investigated such networks have yielded similar results to the adult literature, indicating that worry about the past and future, low self-esteem, low mood, and physical symptoms of depression bridge anxiety and depression symptom networks (Dobson et al., 2020; Konac et al., 2021; McElroy et al., 2018). Importantly, such existing literature has largely been limited by non-clinical, community-based samples (e.g., Konac et al., 2021; McElroy et al., 2018; Osborn et al., 2020) or singularly disordered samples, such as youth with generalized anxiety disorder (GAD; Dobson et al., 2020). Importantly, no study has examined the symptom-level network of depression and anxiety symptoms in a transdiagnostic sample. These are considerable limitations of the existing network analysis literature, as symptoms of depression and anxiety may differentially interact not only in youth with psychopathology but also when they occur in isolation compared to when they occur simultaneously. Moreover, no study has investigated informant discrepancies in depression and anxiety symptom-level networks, which is another considerable limitation

given that discrepancies between parent- and youth-report of internalizing disorders are common (De Los Reyes et al., 2015). Lastly, the existing literature characterizes symptom-level depression and anxiety networks in distinct age groups, such as adolescents (Konac et al., 2021 & McElroy et al., 2018), thus myriad questions remain about how symptoms interrelate in youth samples that span both childhood and adolescence. Taken together, the generalizability of the existing literature is limited by samples that are not representative of the growing number of youths with co-occurring depression and anxiety.

In the current study, we used network analysis to address these limitations and to investigate the interconnection among symptoms of depression and anxiety in a large, transdiagnostic sample of treatment-seeking youth. To do so, we used both youth self-reported and parent-reported data for the same symptoms to more fully capture potential relationships between symptoms and to examine possible informant discrepancies in networks. Our aim was to explore features of parent- and youth-reported symptom networks, such as topology, communities, centrality, and bridge symptoms, to better understand the relative importance and interrelation of each symptom in the network(s). Moreover, we examined how such network characteristics differ as a function of informant. From past work in both youth and adult samples, we anticipate that symptoms of depression and anxiety will be interrelated with both cognitive and physiological symptoms of depression and anxiety serving as bridges between disorders. To our knowledge, this is the first study to examine the symptom-level network of depression and anxiety in a sizeable, transdiagnostic clinical sample of youth using both parent- and self-report, thus the analyses presented herein are largely exploratory in nature.

Methods

Participants

Participants included 417 youth aged 8–18 ($M = 12.14$, $SD = 3.04$) and their parent who presented at a University-based research clinic in a large, urban area that provides assessment and outpatient treatment of emotional disorders. Participants included youth who met diagnostic criteria for any mood, anxiety, or obsessive-compulsive spectrum disorder according to the Anxiety Disorder Interview Schedule for DSM-5, Child Version (ADIS-5-C; Silverman & Albano, in press). Inclusion criteria for the present study included being between the ages of 8 and 18 years, having a principal diagnosis of an anxiety, mood, or obsessive-compulsive spectrum disorder, and being sufficiently proficient in English to complete study questionnaires. Exclusion criteria included the presence of a cognitive or developmental disorder that would preclude questionnaire completion. Demographic and diagnostic information for participants is presented in Table 1.

Procedure

All procedures were approved by the University's institutional review board, and informed consent was obtained from all participants before beginning any study procedures. All participants in the study were youth and their caregiver(s) who presented for an initial diagnostic evaluation through a naturalistic study examining youth outcomes and mechanisms of transdiagnostic treatment. Diagnoses were established by a trained evaluator

based on youth/parent interview using the ADIS-5-C (Silverman & Albano, In press). Youth and caregiver(s) were asked to complete a battery of questionnaires as part of the initial diagnostic evaluation process. Eligible youth and their caregiver(s) were referred for the treatment component of this study. No compensation was provided for completing the initial diagnostic interview or questionnaires.

Measures

The Screen for Anxiety Related Emotional Disorders-Child and Parent Report (SCARED-C/P; Birmaher et al., 1997) is a 41-item measure of anxiety symptoms in youth. Items are rated on 3-point Likert scale ranging from 0 (*not true or hardly true*) to 2 (*very true or often true*). Total scores range from 0–82, with higher scores indicating more anxiety symptoms. The items on the SCARED-C and SCARED-P contain the same content but differ in the person referenced (e.g., “I am nervous” vs. “My child is nervous”). The SCARED-C/P has demonstrated high reliability both in terms of its internal consistency and agreement in parent- and child-ratings (Birmaher et al., 1999; Muris et al., 2004). The scale has additionally demonstrated satisfactory convergent validity, as demonstrated by significant correlations with other validated anxiety measures, such as the Child Behavior Checklist Internalizing subscale (Achenbach & Rescorla, 2001) and the State-Trait Anxiety Inventory for Children (Birmaher et al., 1999; Monga et al., 2000; Spielberger, 1970). In the current sample, the SCARED-C/P demonstrated excellent internal consistency for the total score (parent and child $\alpha = .92$). Items used as nodes are outlined in Table 2.

The Mood and Feelings Questionnaire-Child and Parent Report (MFQ-C/P; Angold et al., 1987) is a 33-item measure for the child-report and a 34-item measure for the parent-report of youth depression symptoms over the past two weeks. Items are rated using a 3-point Likert scale ranging from 0 (*not true*) to 2 (*true*) with total scores ranging from 0–66 and higher scores indicating more depression symptom. The items on the MFQ-C/P are identical besides one item (“S/he wasn’t as happy as usual, even when s/he was praised or rewarded”), which was not used in the present analyses. Past work has demonstrated excellent reliability in terms of both internal consistency and test-retest reliability (Sund et al., 2001; Thabrew et al., 2018). Furthermore, the MFQ-C/P’s convergent validity is demonstrated by significant correlations with other widely accepted measures of related constructs and significant correlations with established measures of pediatric depression, such as the Children’s Depression Rating Scale – Revised (Burleson Daviss et al., 2006; Poznanski, 1985; Thabrew et al., 2018;). In the current sample, the MFQ-C/P demonstrated excellent internal consistency for the total score (parent $\alpha = .92$; child $\alpha = .93$). Items used as nodes are outlined in Table 2.

Node Selection

Parent- and youth-reported nodes corresponded to the same items to facilitate comparisons. We selected a sub-set of items from the SCARED-C/P and MFQ-C/P that corresponded to represented DSM-5 diagnostic criteria for major depressive disorder or generalized anxiety disorder (MDD). We focused on symptoms of MDD and GAD due to the high comorbidity rates between these two disorders (compared to other anxiety disorders), their representativeness of core anxiety and depressogenic symptom clusters, and the

commonality of these two diagnoses in the sample used for subsequent analyses (Cummings et al., 2014; Garber & Weersing, 2016). Furthermore, we used a sub-set of SCARED-C/P and MFQ-C/P items, instead of all available items, to optimize the sensitivity of the networks given the sample size. As such, out of a possible 74 nodes, a total of 22 nodes were included (12 items from the MFQ-C/P and 10 items from the SCARED-C/P measures). The number of nodes was guided by results of a simulation study by Constantin and Cramer (2020), which found that Gaussian Graphical Model (GGM) with 20 nodes can be estimated in a sample of 200 participants or more with sufficient sensitivity and specificity. Moreover, we assessed for redundancy in the 22 selected nodes using the *goldbricker* function, which compares the similarity in correlations of two nodes with all other nodes in the network to identify pairs that may underlie the same construct (Jones, 2017; Levinson et al., 2018).

Analyses

All analyses were performed in R 4.0.2 and R Studio 1.3.1056 using the R *bootnet* package (Epskamp, et al., 2017). Separate networks for parent- and child-reported symptoms were estimated using identical procedures outlined by Epskamp and Fried (2018). We estimated association networks that depict partial polychoric correlations between symptoms using the GGM and regularized the network using the Graphical Least Absolute Shrinkage and Selection Operator (gLASSO) with an Extended Bayesian Information Criterion hyperparameter of 0.5 (EBIC; y = 0.5). This hyperparameter was selected to return a sparse network with fewer edges given the relatively small sample size (Epskamp et al., 2017 & Foygel & Drton, 2010).

To better understand the relative importance of individual symptoms in the network, we assessed strength centrality, or the size of the relationships between a node and all other nodes in the network. In the present study, we do not report on betweenness or closeness indices, as they may be influenced by spurious covariance among symptoms and tend to be less stable than the strength centrality index (Epskamp & Fried, 2018 & Hallquist et al., 2019). Bridge symptoms were identified using the *bridge* function in the *networktools* R package. As aforementioned, bridge symptoms are nodes that connect two symptoms either within or across disorders. Here, we focus on bridge symptoms that connect symptoms of depression and anxiety. We used the bridge strength centrality metric, which refers to the absolute sum of all edge values between a given node and all other nodes that are not in the same pre-specified community (here, there were two communities composed of either depression or anxiety symptoms). To assess the variability, accuracy, and significance of edge-weights, we used non-parametric bootstrapping with 5000 samples to assess the 95% confidence intervals for the edges. We investigated the stability of the centrality indices by computing correlation stability coefficients (CS-coefficient) using parametric case-dropping bootstrapping with 5000 samples.

To investigate the presence of communities in the networks, which are clusters of nodes with particularly dense interconnections, we used the *spin glass* function in the *igraph* R-package (y = 1, start temperature = 1, stop temperature = .01, cooling factor = .99, spins = 23; Csardi & Nepusz, 2006; Jones et al., 2018; Robinaugh et al., 2014). This function identifies sets (communities) of nodes that have more connecting edges within the

community than outside of the community (e.g., other nodes in the network). Examining communities of symptoms and the bridges that connect them are particularly relevant tasks when employing a transdiagnostic, symptom-level perspective, as such analyses can elucidate how specific symptoms interact within and across disorders. Lastly we examined differences in the parent- and youth-reported networks using a permutation-based hypothesis test, *NetworkComparisonTest*, that assesses invariances between two networks (van Borkulo et al., 2017). We examined global structure and strength invariance and performed this comparison with 5000 permutations. Just as one investigates informant effects in traditional parent- and youth-reported questionnaire scores, network comparison analyses facilitate the investigation of how symptom interrelations vary based on informant. Given that it is common to rely on either parent- or youth-reported symptom measures for youth with psychopathology, it is important to understand how symptom influence and interrelations vary based on informant.

Results

Item and measure-level descriptive statistics are presented in Table 2. Results of the goldbricker analysis indicate that there was no redundancy in the subset of 22 items selected for nodes in the parent and youth networks, thus all items in Table 2 were included. Plots of the regularized partial correlation network of parent- and youth-reported symptoms are presented in Figure 1 and 2, respectively. Centrality indices for both networks were examined and are shown in Figure 3 and 4. Stability coefficients of the parent-reported and youth-reported centrality measures indicate that strength index was moderately stable (both networks CS-coefficient = 0.44). In the parent-reported network, nodes *bad future* and *good as others* had the highest strength centrality index, indicating that they were the most strongly connected to all other nodes in the parent network. In comparison, nodes *good as others* and *things working out* had the highest strength centrality for the youth-reported network. Centrality metrics for the bridge symptoms indicated that parent network nodes *good as others* and *did wrong* had the greatest bridge strength. On the other hand, bridge nodes *past worry*, *things working*, *bad future*, and *heart* had the highest strength centrality index in the youth-reported network.

Five distinct communities emerged in the parent-reported network and are plotted in Figure 1. The following clusters emerged in the parent-reported network: Low positive affect; Depressive agitation; Evaluative worries; Anxious hyperarousal; Generalized worries. In comparison, four distinct communities emerged in the youth-reported network (Figure 2): Low positive affect; Depressive agitation; Evaluative worries; Generalized worries. The Network Comparison test indicated significant differences in the structure of the two networks, as demonstrated by a significant network invariance test ($M = 0.34$, $p < .01$). Global strength was slightly higher in the parent-reported network (10.66) compared to the youth-reported network (10.79); however, this difference was not significant ($S = 0.13$, $p = .89$).

Discussion

To our knowledge, the present study is the first to examine parent- and youth-reported symptom-level networks of depression and anxiety in a transdiagnostic clinical sample of youth. Here, we sought to elucidate the symptom-to-symptom interactions that purportedly underpin frequently co-occurring symptoms of depression and anxiety in youth. We found that, regardless of informant, symptoms of depression and anxiety were highly interconnected. Consistent with past work, analyses indicated disorder-specific clustering, such that most symptom-to-symptom relationships were stronger within as opposed to between disorders (e.g., Beard et al., 2016 & Dobson et al., 2010). Analyses of centrality indicated that certain symptoms had more connections in the network compared to others. *Good as others* was one of the most central symptoms in both parent- and youth-reported networks. Given the important role of peers to social-emotional development during childhood and adolescence, it is not surprising that distress surrounding self-comparison to peers is a highly influential and interconnected node in networks of youth symptomology. Other nodes that were central in both the youth-reported and parent-reported networks encompassed other cognitive symptoms (e.g., negative view of the future), which is consistent with centrality findings from other network analyses of youth internalizing disorders (e.g., McElroy et al., 2018) and inconsistent with centrality findings in adult networks that have found affective symptoms to be the most central (e.g., sad mood; Cramer et al. 2010 & Beard et al., 2016). These discrepant results suggest that cognitive symptoms may be more closely connected to other symptoms in youth versus adults and may be particularly important to target through intervention.

Despite these similarities between the parent- and youth-reported network, results of the network comparison test indicate there are key structural differences in the networks. These results imply that individual symptoms may play differential roles in each of the networks. Indeed, in the parent-reported network, disorder-specific clusters were connected via symptoms constituting self-evaluative worries and low self-efficacy (*good as others – did wrong*), whereas in the youth-reported network, they were connected via symptoms of worry about things working out and a pessimistic view of the future (*things working – bad future*). Such bridge symptoms can be interpreted as the symptoms that help explain the emergence of comorbidity among depression and anxiety by connecting the symptoms of the two disorders. Moreover, these results indicate that there are discrepant inter-symptom relations as a function of informant, such that the innervating symptoms between disorders varies based on reporter. This result is not surprising, as past work has found low-to-moderate rates of correspondence between informants when rating internalizing symptoms in youth (De Los Reyes et al., 2015). Albeit unsurprising, this study is the first to demonstrate an informant effect in characterizing the symptom-level networks per parent- and youth-report.

Informant discrepancies in networks extended beyond bridge symptoms, as the network community structures differed. The parent-reported network included five distinct communities; however, the distinct community representing anxious hyperarousal was not detected in the youth-reported network, as the hyperarousal symptoms clustered with generalized worries. Thus, in the current sample, youth reported that their general symptoms of worry are more closely associated with physiological feelings of worry compared to their

parents, who reported that such physiological symptoms are less associated with cognitive symptoms but rather stand alone as a unique cluster. The youth-reported association between cognitive and physiological symptoms is not surprising given past research indicating that the majority of youth experience at least one somatic complaint alongside anxiety (Beidel et al., 1991) and that somatic complaints are more common with comorbid depression and anxiety disorders compared to singular anxiety disorders (Hofflich et al., 2006).

These results may have clinical implications, such that symptoms with high centrality (e.g., *good as others*) may be fruitful therapeutic targets, as decreasing or deactivating a central node may have a domino effect whereby other connected nodes may also become deactivated (Cramer et al., 2010). Moreover, although the specific content of the bridge nodes varied as a function of informant, both networks included bridge symptoms that constitute repetitive negative thinking (RNT), a cognitive process involving perseverative focus on negative emotional content. Our results extend upon past work illustrating RNT as a transdiagnostic process (e.g., McEvoy et al., 2013; Spinhoven et al., 2015) and indicate that RNT may be a promising therapeutic target to sever the co-occurrence of depression and anxiety. Interventions such as cognitive reappraisal or mindfulness strategies could target such processes and consequently decrease the frequency or severity of related symptoms in the network. Moreover, the results of this study may inform the development of brief interventions for youth, such that central symptoms or processes may be the focus of said treatments. Although such possibilities for intervention-related outputs of this network analysis are exciting, it should be noted that there are mixed findings thus far regarding the effectiveness of targeting central and bridge symptoms in treatment (Castro et al., 2019).

Despite the novelty and potential treatment implications of the study, there are several important considerations. First, although our sample was elevated in terms of both depression and anxiety symptoms, the majority of the sample had a primary anxiety disorder. While this may limit the generalizability of these findings, the disproportionate number of anxious to depressed participants may in fact represent lower base rates of depression in self-referred clinical samples of youth. Similarly, there was a high proportion of White, Hispanic youth and low proportion of Black and Asian/Pacific Islander youth in the sample. Future work should replicate these analyses in a more ethnically and racially representative sample. Moreover, the sample in the present study included a ten-year age range and both males and females. It is possible that symptoms of depression and anxiety interrelate differently in younger children and adolescents or in males and females; however, the present study was unable to investigate the role of age and sex in the network characteristics due to sample size considerations. An additional consideration that may limit the interpretation of these findings is that depression and anxiety symptoms were each measured on two separate scales. Although item responses were standardized to facilitate cross-measure comparisons, the closer association among symptoms within, as opposed to between, disorders may in part reflect differences in measures. Lastly, while cross-sectional association networks are useful in understanding general interrelations among symptoms, they do not offer insight into the directionality of associations and therefore the temporal associations between symptoms are precluded from the present study. With these considerations in mind, there are many fruitful avenues for future work, such as elucidating temporal relations among these symptoms using timeseries data, examining demographic,

sex- and age-related differences in the networks, and investigating the change in symptom networks pre- and post-treatment.

Conclusion

This study is the first to examine the youth- and parent-reported symptom-level networks of depression and anxiety symptoms in a large, transdiagnostic clinical sample of youth. Here, we demonstrated that while depression and anxiety symptoms are strongly interconnected, the symptom-to-symptom association is generally stronger within as opposed to between disorders. We further demonstrated that cognitive symptoms are more important in the networks, both in terms of connections to other symptoms within the same disorder and in terms of cross-disorder connections. Lastly, we revealed key differences in the youth- and parent-reported network, providing additional insight into the study of emotional disorder symptom informant discrepancies in youth clinical samples.

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References

Achenbach TM, & Rescorla LA (2001). Manual for the ASEBA school-age forms & profiles. Burlington, VT: University of Vermont, Research Center for Children, Youth, & Families.

American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (5th edn.).

Angold A, Weissman MM, John K, Merikancas KR, Prusoff BA, Wickramaratne P, ... & Warner V (1987). Parent and child reports of depressive symptoms in children at low and high risk of depression. Journal of Child Psychology and Psychiatry, 28(6), 901–915. [PubMed: 3436996]

Barlow DH, Sauer-Zavala S, Carl JR, Bullis JR, & Ellard KK (2014). The nature, diagnosis, and treatment of neuroticism: Back to the future. Clinical Psychological Science, 2(3), 344–365.

Beard C, Millner AJ, Forgeard MJ, Fried EI, Hsu KJ, Treadway MT, ... & Björgvinsson T (2016). Network analysis of depression and anxiety symptom relationships in a psychiatric sample. Psychological Medicine, 46(16), 3359–3369. [PubMed: 27623748]

Beesdo K, Knappe S, & Pine DS (2009). Anxiety and anxiety disorders in children and adolescents: developmental issues and implications for DSM-V. Psychiatric Clinics, 32(3), 483–524. [PubMed: 19716988]

Beidel DC, Christ MAG, & Long PJ (1991). Somatic complaints in anxious children. Journal of Abnormal Child Psychology, 19(6), 659–670. [PubMed: 1791272]

Birmaher B, Brent DA, Chiappetta L, Bridge J, Monga S, & Baugher M (1999). Psychometric properties of the Screen for Child Anxiety Related Emotional Disorders (SCARED): a replication study. Journal of the American Academy of Child & Adolescent Psychiatry, 38(10), 1230–1236. [PubMed: 10517055]

Borsboom D (2017). A network theory of mental disorders. World Psychiatry, 16(1), 5–13. [PubMed: 28127906]

Borsboom D, & Cramer AO (2013). Network analysis: an integrative approach to the structure of psychopathology. Annual Review of Clinical Psychology, 9, 91–121.

Bringmann LF, Lemmens LHJM, Huibers MJH, Borsboom D, & Tuerlinckx FJPM (2015). Revealing the dynamic network structure of the Beck Depression Inventory-II. Psychological Medicine, 45(4), 747. [PubMed: 25191855]

Brown TA, Chorpita BF, & Barlow DH (1998). Structural relationships among dimensions of the DSM-IV anxiety and mood disorders and dimensions of negative affect, positive affect, and autonomic arousal. Journal of Abnormal Psychology, 107(2), 179. [PubMed: 9604548]

Burleson Daviss W, Birmaher B, Melhem NA, Axelson DA, Michaels SM, & Brent DA (2006). Criterion validity of the Mood and Feelings Questionnaire for depressive episodes in clinic and non-clinic subjects. Journal of Child Psychology and Psychiatry, 47(9), 927–934. [PubMed: 16930387]

Caspi A, Houts RM, Belsky DW, Goldman-Mellor SJ, Harrington H, Israel S, ... & Moffitt TE (2014). The p factor: one general psychopathology factor in the structure of psychiatric disorders? Clinical Psychological Science, 2(2), 119–137. [PubMed: 25360393]

Castro D, Ferreira F, de Castro I, Rodrigues AR, Correia M, Ribeiro J, & Ferreira TB (2019). The differential role of central and bridge symptoms in deactivating psychopathological networks. Frontiers in Psychology, 10, 2448. [PubMed: 31827450]

Choi Heeseung, & Park Gi, Chang. (2006). Understanding adolescent depression in ethnocultural context: Updated with empirical findings. Advances in Nursing Science, 29(4), E1–E12.

Comer JS, & Kendall PC (2004). A symptom-level examination of parent–child agreement in the diagnosis of anxious youths. Journal of the American Academy of Child & Adolescent Psychiatry, 43(7), 878–886. [PubMed: 15213589]

Constantin MA, & Cramer AOJ (2020). Sample size recommendations for estimating cross-sectional network models.

Csardi G, & Nepusz T (2006). The igraph software package for complex network research. InterJournal, Complex Systems, 1695(5), 1–9.

Cramer AO, Waldorp LJ, Van Der Maas HL, & Borsboom D (2010). Comorbidity: A network perspective. Behavioral and Brain Sciences, 33(2–3), 137. [PubMed: 20584369]

Cummings CM, Caporino NE, & Kendall PC (2014). Comorbidity of anxiety and depression in children and adolescents: 20 years after. Psychological Bulletin, 140(3), 816. [PubMed: 24219155]

De Los Reyes A, Augenstein TM, Wang M, Thomas SA, Drabick DA, Burgers DE, et al. (2015). The validity of the multi-informant approach to assessing child and adolescent mental health. Psychol. Bull. 141(4), 858–900. [PubMed: 25915035]

Dobson ET, Croarkin PE, Schroeder HK, Varney ST, Mossman SA, Cecil K, & Strawn JR (2021). Bridging anxiety and depression: A network approach in anxious adolescents. Journal of Affective Disorders, 280, 305–314. [PubMed: 33221716]

Epskamp S, Borsboom D, & Fried EI (2017). Estimating psychological networks and their accuracy: a tutorial paper. Behavior Research Methods, 50(1), 195–212.

Epskamp S, & Fried EI (2018). A tutorial on regularized partial correlation networks. Psychological Methods, 23(4), 617. [PubMed: 29595293]

Foygel R, & Drton M (2010). Extended Bayesian information criteria for Gaussian graphical models. arXiv preprint arXiv:1011.6640.

Fried EI (2015). Problematic assumptions have slowed down depression research: why symptoms, not syndromes are the way forward. Frontiers in Psychology, 6, 309. [PubMed: 25852621]

Fried EI, & Nesse RM (2014). The impact of individual depressive symptoms on impairment of psychosocial functioning. PloS One, 9(2), e90311. [PubMed: 24587318]

Fried EI, Epskamp S, Nesse RM, Tuerlinckx F, & Borsboom D (2016). What are ‘good’ depression symptoms? Comparing the centrality of DSM and non-DSM symptoms of depression in a network analysis. Journal of Affective Disorders, 189, 314–320. [PubMed: 26458184]

Garber J, & Weersing VR (2010). Comorbidity of anxiety and depression in youth: Implications for treatment and prevention. Clinical Psychology: Science and Practice, 17(4), 293–306. [PubMed: 21499544]

Ghandour RM, Sherman LJ, Vladutiu CJ, Ali MM, Lynch SE, Bitsko RH, & Blumberg SJ (2019). Prevalence and treatment of depression, anxiety, and conduct problems in US children. The Journal of Pediatrics, 206, 256–267. [PubMed: 30322701]

Hallquist MN, Wright AG, & Molenaar PC (2019). Problems with centrality measures in psychopathology symptom networks: Why network psychometrics cannot escape psychometric theory. Multivariate Behavioral Research, 1–25.

Hofflich SA, Hughes AA, & Kendall PC (2006). Somatic complaints and childhood anxiety disorders. International Journal of Clinical and Health Psychology, 6(2), 229–242.

Jones PJ (2017). networktools: Assorted Tools for Identifying Important Nodes in Networks. R package version 1.1.0.

Jones PJ, Mair P, Riemann BC, Mugno BL, & McNally RJ (2018). A network perspective on comorbid depression in adolescents with obsessive-compulsive disorder. Journal of Anxiety Disorders, 53, 1–8. [PubMed: 29125957]

Jones PJ, Ma R, & McNally RJ (2019). Bridge centrality: A network approach to understanding comorbidity. Multivariate Behavioral Research, 1–15.

Konac D, Young KS, Lau J, & Barker ED (2021). Comorbidity Between Depression and Anxiety in Adolescents: Bridge Symptoms and Relevance of Risk and Protective Factors. Journal of Psychopathology and Behavioral Assessment, 1–14.

Karver MS (2006). Determinants of multiple informant agreement on child and adolescent behavior. Journal of abnormal child psychology, 34(2), 242–253.

Levinson CA, Zerwas S, Calebs B, Forbush K, Kordy H, Watson H, ... & Bulik CM (2017). The core symptoms of bulimia nervosa, anxiety, and depression: A network analysis. Journal of Abnormal Psychology, 126(3), 340. [PubMed: 28277735]

McEvoy PM, Watson H, Watkins ER, & Nathan P (2013). The relationship between worry, rumination, and comorbidity: Evidence for repetitive negative thinking as a transdiagnostic construct. Journal of Affective Disorders, 151(1), 313–320. [PubMed: 23866301]

McElroy E, Fearon P, Belsky J, Fonagy P, & Patalay P (2018). Networks of depression and anxiety symptoms across development. Journal of the American Academy of Child & Adolescent Psychiatry, 57(12), 964–973. [PubMed: 30522742]

Monga S, Birmaher B, Chiappetta L, Brent D, Kaufman J, Bridge J, & Cully M (2000). Screen for Child Anxiety-Related Emotional Disorders (SCARED): convergent and divergent validity. Depression and Anxiety, 12(2), 85–91.

Muris P, Dreessen L, Bögels S, Weckx M, & van Melick M (2004). A questionnaire for screening a broad range of DSM-defined anxiety disorder symptoms in clinically referred children and Adolescents. Journal of Child Psychology and Psychiatry, and Allied Disciplines, 45(4), 813–820. 10.1111/j.1469-7610.2004.00274.x [PubMed: 15056312]

Osborn TL, Campbell S, Ndetei D, & Weisz J (2020). Network analysis reveals central symptoms of adolescent depression and anxiety in sub-Saharan Africa. 10.31234/osf.io/dv6c9

Poznanski E (1985). Children's depression rating scale-revised (September, 1984). Psychopharmacology Bulletin, 21, 979–989.

R Core Team (2013). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL http://www.R-project.org/.

Robinaugh DJ, LeBlanc NJ, Vuletich HA, & McNally RJ (2014). Network analysis of persistent complex bereavement disorder in conjugally bereaved adults. Journal of Abnormal Psychology, 123(3), 510. [PubMed: 24933281]

Silverman WK, & Albano AM (1996). The Anxiety Disorders Interview Schedule for DSM–IV—Child and parent versions. San Antonio, TX: Psychological Corporation.

Spielberger CD (1970). Manual for the State-Trait Anxiety, Inventory. Consulting Psychologist.

Spinhoven P, Drost J, van Hemert B, & Penninx BW (2015). Common rather than unique aspects of repetitive negative thinking are related to depressive and anxiety disorders and symptoms. Journal of Anxiety Disorders, 33, 45–52. [PubMed: 26004746]

Thabrew H, Stasiak K, Bavin LM, Frampton C, & Merry S (2018). Validation of the Mood and Feelings Questionnaire (MFQ) and Short Mood and Feelings Questionnaire (SMFQ) in New Zealand help-seeking adolescents. International Journal of Methods in Psychiatric Research, 27(3), 1–9.

Twenge JM, Cooper AB, Joiner TE, Duffy ME, & Binau SG (2019). Age, period, and cohort trends in mood disorder indicators and suicide-related outcomes in a nationally representative dataset, 2005–2017. Journal of Abnormal Psychology, 128(3), 185. [PubMed: 30869927]

Pina AA, & Silverman WK (2004). Clinical phenomenology, somatic symptoms, and distress in Hispanic/Latino and European American youths with anxiety disorders. Journal of Clinical Child and Adolescent Psychology, 33(2), 227–236. [PubMed: 15136186]

Van Borkulo CD, Boschloo L, Kossakowski J, Tio P, Schoevers RA, Borsboom D, & Waldorp LJ (2017). Comparing network structures on three aspects: A permutation test. Manuscript submitted for publication.

Wood A, Kroll L, Moore A, & Harrington R (1995). Properties of the mood and feelings questionnaire in adolescent psychiatric outpatients: a research note. Journal of Child Psychology and Psychiatry, 36(2), 327–334. [PubMed: 7759594]

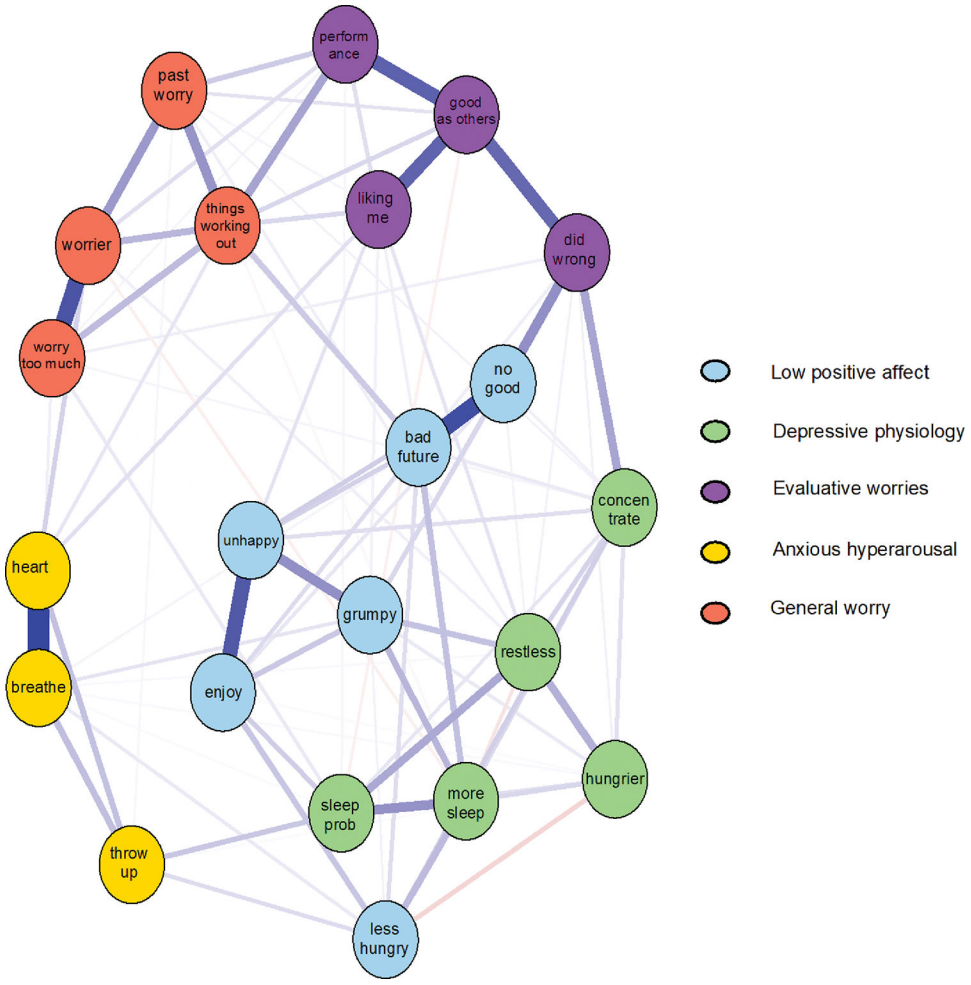

Figure 1.
Parent-Reported Regularized Partial Correlation Network with Color-Coded Communities

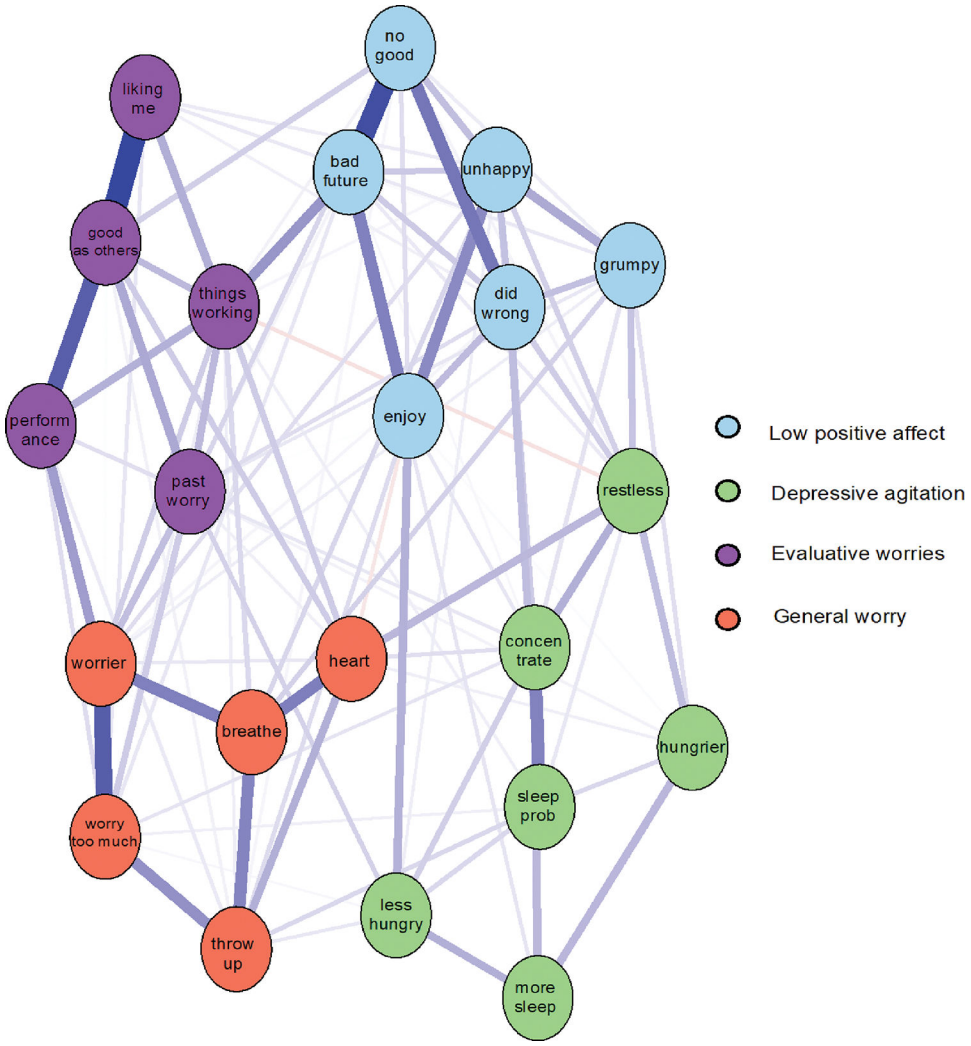

Figure 2.
Youth-Reported Regularized Partial Correlation Network with Color-Coded Communities

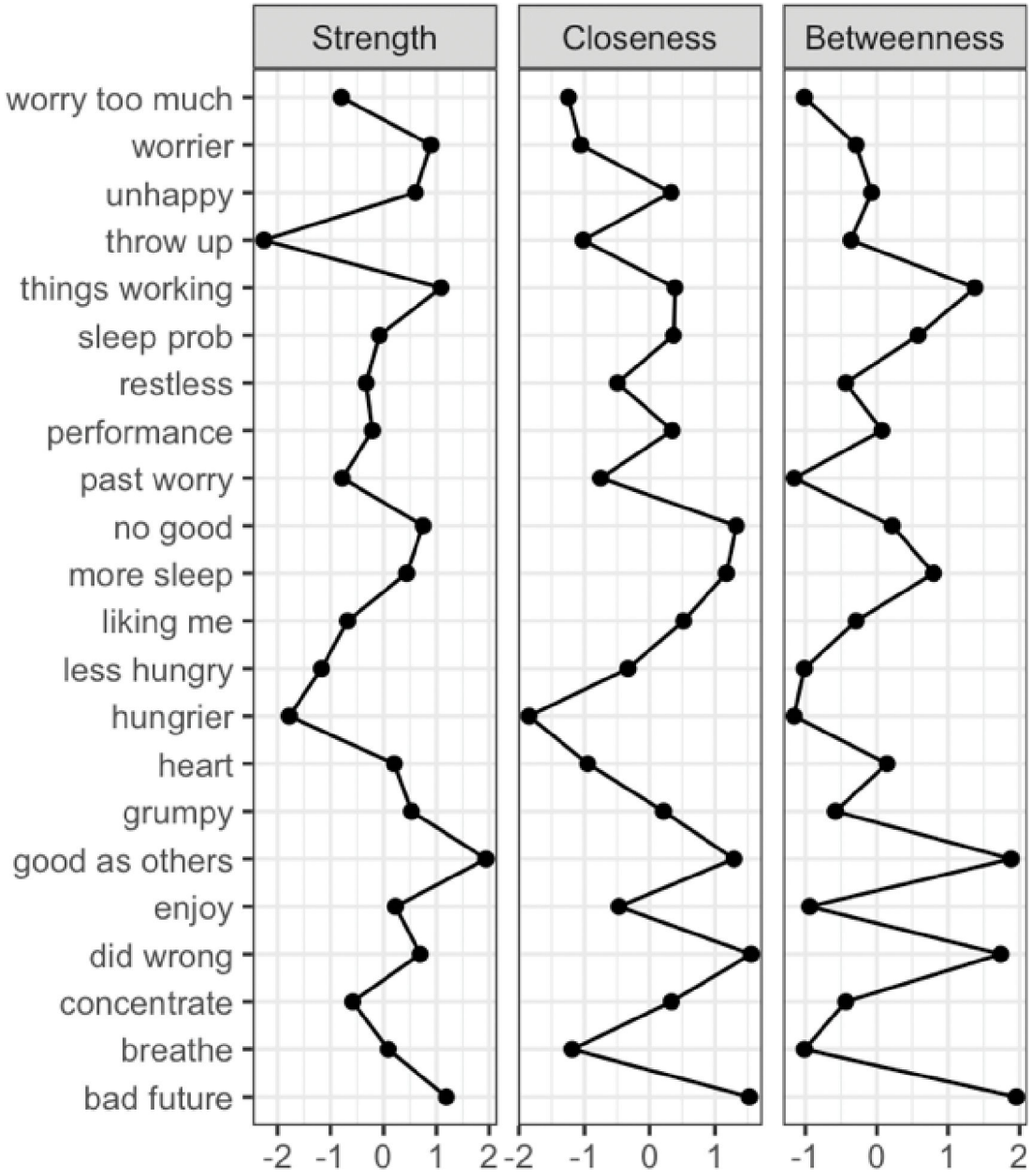

Figure 3.
Standardized Centrality Indexes of the Parent-Reported Network

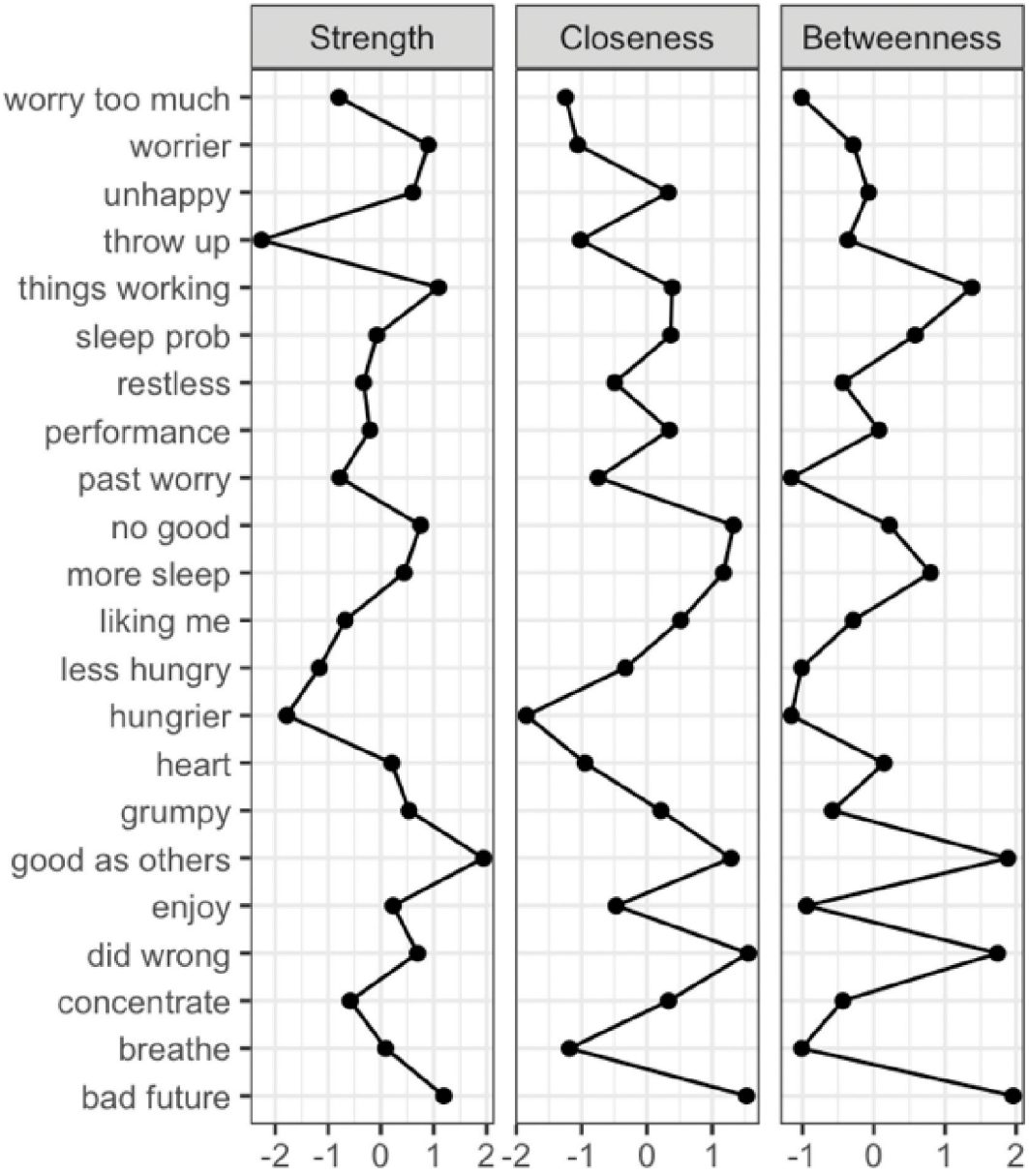

Figure 4.
Standardized Centrality Indexes for the Youth-Reported Network

Table 1

Demographic Information

	Mean (SD) or N (%)
Age	12.21 (3.05)
Sex; Female	232 (49.89%)
Race	
White	427 (91.43%)
American Indian	1 (0.2%)
Black	12 (2.57%)
Asian	10 (2.15%)
Other	17 (3.7%)
Ethnicity	
Hispanic	305 (65.53%)
Non-Hispanic	161 (34.47%)
Principle Diagnosis	
Depressive disorder	36 (7.71%)
Anxiety disorder	350 (74.95%)
Anxiety and depression	11 (2.35%)
Obsessive compulsive disorder	61 (13.06%)

Table 2

Nodes Used in Parent- and Youth-Reported Networks

Node	Item	Parent M (SD)	Youth M (SD)
unhappy	I felt miserable or unhappy	0.85 (0.62)	0.84 (0.64)
enjoy	I didn't enjoy anything at all	0.38 (0.55)	0.39 (0.58)
less hungry	I was less hungry than usual	0.39 (0.63)	0.58 (0.73)
hungrier	I ate more than usual	0.32 (0.59)	0.5 (0.69)
restless	I was very restless	0.64 (0.67)	0.75 (0.75)
no good	I felt I was no good anymore	0.5 (0.63)	0.51 (0.7)
grumpy	I felt grumpy and cross with my parents	1.1 (0.67)	0.91 (0.76)
bad future	I thought there was nothing good for me in the future	0.38 (0.62)	0.49 (0.72)
concentrate	I found it hard to think properly or concentrate	0.86 (0.74)	1 (0.74)
did wrong	I did everything wrong	0.53 (0.64)	0.45 (0.68)
sleep prob	I didn't sleep as well as I usually sleep	0.67 (0.75)	0.86 (0.82)
more sleep	I slept a lot more than usual	0.32 (0.61)	0.49 (0.7)
breathe	When I feel frightened, it is hard for me to breath	0.62 (0.73)	0.46 (0.66)
liking me	I worry about other people liking me	1.09 (0.76)	0.78 (0.82)
good as others	I worry about being as good as other kids	0.9 (0.79)	0.64 (0.79)
heart	When I get frightened, my heart beats fast	0.9 (0.79)	1.14 (0.81)
things working	I worry about things working out for me	1 (0.76)	0.75 (0.76)
worrier	I am a worrier	1.42 (0.72)	1.16 (1.31)
worry too much	People tell me that I worry too much	0.51 (0.72)	0.52 (0.73)
throw up	When I get frightened, I feel like throwing up	0.43 (0.7)	0.4 (0.65)
performance	I worry about how well I do things	1.19 (0.77)	0.94 (0.78)
past worry	I worry about things that have already happened	0.73 (0.74)	0.87 (0.78)