

The clustering of lifestyle behaviors in U.S. college students: A network approach

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Objective: College student mental health has been decreasing and lifestyle factors may be an important factor in improving mental health. These behaviors may cluster together in complex ways, which could impact the success of lifestyle interventions. **Participants:** Two samples of U.S. undergraduate college students were drawn from the American College Health Association's National College Health Assessment (NCHA). The data were collected in Fall of 2019 (N = 30,075) and Spring of 2021 (N = 70,059). **Methods:** Students responded to various health and well-being related questions. Network models were used to examine how lifestyle behaviors cluster together and additional models contained both lifestyle behaviors and health and well-being outcomes. **Results:** Lifestyle clustering was found, and some similar patterns were seen across time periods and across levels of psychological distress. **Conclusions:** Individual lifestyle behaviors exist within a complex lifestyle network, which may need to be accounted for in lifestyle interventions.

Key words: Lifestyle behaviors; Health behaviors; Lifestyle clustering; Mental health; Well-being

Introduction

Mental health and well-being have been declining for adolescents and young adults in the United States over the past decade.^{1,2} Amidst this decline in mental health, college students face increasing rates of depression and anxiety,^{3,4} with an estimated 31% to 39% of college students reporting symptoms of depression and 27% percent reporting significant anxiety.³ Furthermore, in one sample, 15.4% and 24.9% of students reported that their academic performance was negatively affected by symptoms of depression and anxiety respectively.⁵ Out of concern for these students' health and well-being, research is needed to examine the factors that might be contributing to these problematic trends. The present study uses a cross-sectional sample of U.S. students to examine whether lifestyle factors may play an important role in students' health and well-being.

The challenges that college students face may be related to the substantial changes in the environment in which their physical, social, and mental development occurs.⁶ College students face academic pressure, fear of failure, and feelings of inferiority,⁷ which may contribute to the tremendous amount of stress experienced during college years. Engagement in various health-related lifestyle behaviors as coping mechanisms may be essential to reduce stress and improve mental health and well-being among college students.⁸ Engagement in health-related lifestyle behaviors may also be essential during this time because habits developed during this time can continue on throughout the lifespan.⁹

Lifestyle and mental health

Lifestyle behaviors are being increasingly recognized as both contributing and maintaining factors in mental health.^{10,11} For example, diet,¹² physical activity,¹³ sleep,¹⁴ time spent volunteering,¹⁵ time spent in social interaction,¹⁶ TV watching,¹⁷ substance use,^{18,19} and

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meditation,²⁰ have substantial support as predictors of mental health and well-being.

Unfortunately, much previous research tends to examine a limited set of lifestyle behaviors at a time, which raises questions about the contribution of each behavior to mental health, controlling for the impact of the others. This is especially important because while various lifestyle behaviors have been shown to predict mental health outcomes, theory²¹ and previous research indicates that these lifestyle behaviors cluster together.^{22,23} Engaging in a healthy diet may be associated with one's rate of physical activity, while physical activity may in turn predict sleep, which may in turn predict substance use. Lifestyle behaviors and mental health have been shown to be related, but the direction of the relationship is not always clear.^{24,25} Symptoms of mental illness such as low motivation, lack of energy, problems concentrating, or worry may impact engagement in healthy lifestyle behaviors, speaking to potential bidirectional effects.

Variations in clustering by levels of distress

Another question in relation to lifestyle and psychological distress is whether clustering of these lifestyle behaviors differs by levels of psychological distress. Do those with more psychological distress have lifestyle behavior networks that look different from those with less psychological distress? While some cluster analysis research indicates that depressed people are more likely to be members of groups with poorer lifestyle behaviors, speaking to the way depression may be associated with rates of lifestyle engagement,²⁶ another question that could be asked is whether the strength of associations among the lifestyle behaviors (smoking and binge drinking or meditation and volunteering for example) differs for those with more and less psychological distress. The broaden and build theory of positive emotions might argue that negative emotional states tend to predict a narrowing of behavioral repertoire and psychological flexibility.²⁷ If a person is depressed for example, they may engage in poor eating habits, which

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as part of a downward spiral, may lead them to engage in poor sleep habits. In other words, negative lifestyle behaviors may more strongly predict engagement in other negative lifestyle behaviors for those who have high psychological distress as their mood states may limit the scope of their attention to healthy alternative behaviors. Alternatively, college students with lower psychological distress may still occasionally engage in an unhealthy lifestyle behavior (e.g., binge drinking), yet because they experience relatively fewer experiences of negative emotions, they may have greater flexibility in their choices of subsequent behaviors. Taking all of this into account, we expect greater positive correlations between unhealthy behaviors for those with greater psychological distress. As the broaden and build theory argues, positive mood predicts a broadened attention towards other positive behaviors, resulting in an “upward spiral.”²⁸ Thus, those with less psychological distress may have stronger positive associations among positive lifestyle behaviors, (e.g., meditation and social interaction).

Lifestyle clustering and the COVID-19 pandemic

Within the context of the already alarming rates of depression and anxiety faced by college students in the United States before the COVID-19 pandemic,²⁹ rates of depression, anxiety, and stress increased during the pandemic.^{30,32} Changes in lifestyle factors might be associated with changes in mental health during the pandemic. For example, Moriarty and colleagues found that health-related lifestyle behaviors such as sleep, physical activity, and social connectedness were predictors of perceived stress for college students during the pandemic.³¹ Changes in lifestyle factors, such as decreased levels of physical activity and poorer sleep quality, were also observed during the pandemic (Moriarty et al., 2021). Interestingly, although some individuals developed poor health-related coping habits during the pandemic, healthier lifestyle habits including increased physical activity, improved diet, and increased relaxation

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time were observed in 19.3% among a representative sample in the Netherlands.³³ In that study, it was hypothesized that health-related lifestyle behaviors may have become more valued during the pandemic for various reasons, such as the increased desire for a strong immune system.

Pandemic-related changes in daily living may have had impacts on the ways in which lifestyle behaviors tended to cluster together. College students all over the world were forced to adopt new health-related lifestyle behaviors³⁴ and adaptive coping strategies³⁵ due to the pandemic. Physical distancing may have impacted how tightly linked social engagement was with other behaviors, and the isolation may have impacted correlations between unhealthy forms of coping, such as forms of substance use. Interruptions to routines via work closures and social distancing may have also impacted routinized behaviors for individuals during COVID. People were forced to adapt and to adjust to a new lifestyle for an extended period,³⁶ which may have altered coping strategies and enforced new health-related habits.

Beyond just the clustering of the lifestyle behaviors themselves, the way in which these behaviors are associated with mental health factors may also be important to consider. Common mental health symptoms such as nervousness, sadness, and depression, may be bidirectionally linked with lifestyle behaviors.³⁷ Further, the pandemic was, for many, a traumatic experience that continues to impact daily experiences and health.³⁸ In response to the traumatic and/or stressful nature of COVID-19, resilience, or the ability to physically and psychologically adapt to difficult situations,³⁹ may have been an important factor affecting both mental health and lifestyle engagement. Differences in how people responded to stress and adversity during COVID may have depended on pre-pandemic resiliency that persisted during the pandemic,⁴⁰ possibly reinforcing engagement in health-related coping behaviors.^{34,41,42} Furthermore, research

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demonstrates that resiliency can help protect against depression and anxiety and is a significant predictor of well-being.³⁵

Present study

The current study examined the clustering of lifestyle behaviors within college students in the United States. Along with examining partial correlations between relevant lifestyle behaviors, other relevant health and well-being variables were examined to see how they fit within a healthy lifestyle network. This clustering was examined across levels of psychological distress and across samples from Pre-COVID and COVID time periods to identify ways in which the association of the variables differed across groups. Centrality indices were assessed to examine which behaviors had the most central positions within the networks. The present study was an exploratory attempt to establish a basic understanding of lifestyle clustering and centrality in this population. In a recognition of the complex ways lifestyle factors and mental health interact, this study's approach allows for a thorough examination into how health-related lifestyle behaviors are simultaneously associated with each other and mental health and well-being among U.S. college students.

Method

Sampling

The American College Health Association's National College Health Assessment (NCHA) is a nationally recognized survey that includes questions and standardized scales that tap into U.S. undergraduate and graduate students' physical and mental health.⁴³ This survey is administered twice annually and has been administered at both two-year and four-year public and private institutions from various regions and campus settings. Institutions self-select into participation in the study, with the survey being advertised as a way for institutions to assess and

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understand the health risks and needs of their students. In this study, data were collected through an online survey administered in the Fall of 2019 and Spring of 2021. In Fall of 2019, 38,679 students from 57 institutions provided some data for the survey. After removing graduate students ($n = 8,496$) and 0.3% of the remaining participants ($n = 108$) who completed less than 35% of the relevant items, the Fall 2019 sample was 30,075. In Spring of 2021, 96,489 students from 137 institutions provided some data for the survey. After removing graduate students (26,079) and 0.3% of the remaining participants ($n = 351$) with similarly high rates of missing data, the Spring 2021 sample was 70,059. Due to the received dataset being de-identified, the Institutional Review Board at the [UNIVERSITY] determined that this study was exempt from institutional review board approval.

Measures

Time usage

Various lifestyle behaviors were measured in the NCHA and included in this study. Time spent engaging in various lifestyle behaviors was measured by asking how many hours in a typical week the participant engaged in the behavior. Responses were on an 8-point scale ranging from 0 hours to more than 30 hours. Behaviors measured with this scale were community service and volunteering, spiritual or religious activities, socializing with friends, spending time with family, watching TV or other streaming media, commuting, and meditation or related activities.

Diet

Fruit and vegetable consumption were measured with a question asking about how many servings of fruit or vegetables the participant consumed on average per day, in the past 7 days. The responses ranged from 0 servings to more than 6 servings per day. These two items were summed to create a composite fruit and vegetable intake variable. Participants also reported how

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many servings of sugar-sweetened drinks they consumed on average, per day, for the last 7 days. Additionally, participants reported how many days in the last 30 they consumed energy drinks.

Substance use

Frequency of tobacco, alcohol, and cannabis use were each assessed with an item asking about how often the substance was consumed in the past 3 months, with responses ranging from “Never” to “Daily or Almost Daily” on a 5-point scale. Binge drinking was assessed with an item asking about how often the participant had 5 or more (for males) or 4 or more (for females) alcoholic drinks in one sitting. Responses ranged from “None” to “10 or more times.”

Physical activity

Physical activity variables included total metabolic expenditure and strength training frequency. Metabolic expenditure was assessed with two questions asking about total minutes spent doing moderate and vigorous physical activity in the last 7 days. In order to weigh the minutes of exercise by the expected metabolic expenditure relative to resting metabolic rate, the number of minutes of moderate exercise was multiplied by 4.5 and the number of minutes of vigorous exercise was multiplied by 7 utilizing Ainsworth and colleagues’ compendium of physical activities.⁴⁴ These two values were then added to create a total metabolic expenditure value. Strength training frequency was assessed with a question inquiring about the participant’s engagement in this sort of physical activity in the past 7 days, with responses ranging from 0 days to 7 days.

Sleep

Three aspects of sleep were assessed in this study: frequency of daytime naps, sleep quantity, and weekend-weekday difference in sleep quantity. Daytime naps were assessed with an item asking about their frequency in the past 7 days, with responses ranging from 0 to 7 days.

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Average sleep quantity was assessed with two items asking about weekday and weekend sleep quantity, with responses ranging from “Less than 4 hours” to “10 or more hours.” Weekday sleep was multiplied by 5 while weekend sleep was multiplied by 2. These two values were added and then divided by 7 to get the average quantity of daily sleep. The sleep difference variable was calculated by subtracting weekend sleep quantity from weekday sleep quantity.

Overall health

Overall health was assessed with a single item asking about perceptions of overall health, with responses ranging from excellent to poor.

Psychological distress

Psychological distress was measured with the Kessler-6 Psychological Distress scale.⁴⁵ This is a brief validated measure that assesses non-specific psychological distress.⁴⁶ The survey asks how often in the past 30 days the participant has experienced different aspects of psychological distress, including nervousness and hopelessness. The responses were on a 5-point scale ranging from “None of the time” to “All of the time.” It has been used to screen for mental illness, with cutoff values of 13 and above representing severe mental distress. This cutoff was used to separate the high and low psychological distress in the relevant models. In this study, the internal reliability of the scale in the Fall 2019 sample was .88 and .89 for the Spring 2021 sample.

Well-being

Well-being was assessed with the Flourishing Scale.⁴⁷ This is a brief, validated measure that assesses perceptions of positive functioning across various aspects of life. Areas such as optimism, purpose, self-esteem, and relationships are measured via relevant items, using a 7-point scale ranging from “strongly disagree” to “strongly agree”. The items are summed to create

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a total psychological well-being score. Scores can range from 8 to 56, with higher scores reflecting higher psychological well-being. In this study, the internal reliability of the scale in the Fall 2019 sample was .93 and .93 for the Spring 2021 sample.

Resilience

Resilience was assessed with two items asking about a participant's ability to adapt to change and ability to bounce back after hardship. The responses ranged from "not true at all" to "true nearly all of the time." These two items were summed to create a composite resilience variable. Scores can range from 0-8, with higher scores reflecting greater resilience.

Analysis

Network analyses are a multivariate approach to simultaneously modelling interrelationships among all potential variables of interest.⁴⁸ The associations are in the form of partial correlations, which indicate the degree to which two variables may be related, while partitioning out the amount of shared variance they have due to their shared variance with another third variable. For example, network models can answer the question of how strongly tobacco use and alcohol use are related, after separating out the degree to which they both may also be associated with cannabis use. A key feature of network analyses are visualization tools, which display the interrelations among the variables graphically, with partial correlations among the variables being represented by connecting "edges." Thus, one can examine the variable network as a whole with relative ease compared to examining values in a table. Strength centrality indices can also be calculated, which represent the degree to which a given variable is associated with other variables – indicating how "central" it is to the network.⁴⁹ Further, certain variables in the network may have particularly strong interrelations among each other,

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representing “communities” (highlighting the historical use of network models for examining social networks) or “clusters”, which can be identified with relevant algorithms.⁵⁰

To prepare the data, Winsorization was applied to a select number of variables that had some extreme outliers. Values above the 99.5th percentile were set to the value at the 99.5th percentile. This value was chosen to reduce the impact of extreme outliers on the analyses, yet to do so conservatively by only modifying a small number of values. In terms of missing data, ninety-five percent of participants had two or fewer missing values on the relevant variables. To account for the missing data, multiple imputation was conducted in the *mice* package to create 15 imputed datasets for each sample. Predictive mean matching was the chosen imputation method and these imputed datasets were used for identifying the network edges and centrality. The BGGM package’s built-in imputation feature was used for network comparisons and cluster identification analyses as these relevant functions could not make use of imputed datasets.⁵¹

A series of edge-weighted network models were tested using the BGGM package in R.^{51,52} This included models that only included lifestyle behaviors, and models that also included health and well-being variables. The first pair of models used the 2019 data, with a model for those with lower psychological distress and a model for those with higher psychological distress. The second pair of models examined lifestyle clustering for pre-COVID (Fall, 2019) and during COVID (Spring, 2021). The last pair of models were used to examine lifestyle behaviors as well as health and well-being clustering in the COVID and pre-COVID samples. For each network model, clusters were identified using the *ega.fit* function from the EGAnet package⁵³ and strength centrality indices were assessed using the *qgraph* package⁵⁴ in order to determine which variables were most central within the network. Lastly, using BGGM’s *ggm_compareestimate* function, network edge weights were compared between the aforementioned pairs of models to

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get a sense of how the clustering of the variables differed across networks. Built-in graphing functions within BGGM were used to visualize the centrality parameters. The layouts of the network model graphs were based on an average layout of the relevant pairs of models, which supported easier comparison of edge weights. After examining the initial network models graphs, we decided to not show edge weights of less than .04 to aid in visual interpretability and to highlight the larger associations, but the full results are available in table form in the supplemental material.

Results

Sample characteristics

The Pre-COVID sample was comprised of 19,176 identifying females, 10,226 identifying males, 218 non-binary adults and 97 transgender individuals. The average age of the participants was 20.82 years (SD = 4.76). The sample was predominantly White 16,543, followed by Latinx, 5,716, Black 2,986, Asian 2,918, American Indian 689, and bi-racial 475. The sample during COVID was comprised of 47,450 identifying females, 19,733 identifying males, 1,364 non-binary adults, and 298 transgender individuals. The average age of the participants was 21.75 years (SD = 5.26). The sample was predominantly White 36,027, followed by Latinx 13,654, Black 3,057, Asian 12,219, American Indian 1,520, and bi-racial 1,348. Full participant characteristics are available in Table 1.

Behaviors only – by psychological distress

Results from the low psychological distress (n = 23,814) and high psychological distress (n = 5,784) behavior-only models can be seen in figure 1 (and as color images in supplemental figures 1, 3, and 5). These figures contain nodes (i.e., variables) and edges (i.e. partial correlations). Each connecting edge represents a significant association. Similar clusters were

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apparent within each model, such that the substance use variables clustered together, as did strength training (weightlifting) and general physical activity. Hours of volunteering, religious/spiritual participation, and meditation variables clustered together in both networks, although the clusters within which they existed differed. Hours with friends, hours of sleep, week-weekend differences in sleep and daytime napping clustered together as well in both networks. All partial correlation estimates can be seen in Supplementary Tables 1 and 3.

The strength centrality indices demonstrate that the most central lifestyle behaviors (i.e. those with the greatest sum total absolute values of partial correlations with other variables) for the college students with low psychological distress were alcohol binge drinking frequency (1.27, 95% CI [1.23, 1.31]), hours watching TV (1.15, 95% CI [1.10, 1.20]), alcohol use frequency (1.14, 95% CI [1.11, 1.18]), weightlifting frequency (1.02, 95% CI [0.98, 1.06]), and hours spent with family (1.01, 95% CI [0.97, 1.04]). For those with high psychological distress, the most highly central variables were alcohol use frequency (1.22, 95% CI [1.16, 1.29]), alcohol binge drinking frequency (1.10, 95% CI [1.03, 1.17]), hours watching TV (1.08, 95% CI [0.99, 1.17]), hours spent meditating (1.05, 95% CI [0.96, 1.13]), and hours in religious/spiritual practice (1.03, 95% CI [0.96, 1.10]). Thus, amount of time watching TV, binge drinking, and alcohol use frequency, were highly associated with other variables in both two network models. All centrality indices can be seen in Supplementary Tables 2 and 4 and Supplementary Figures 2 and 4.

The network model comparison revealed some differences in behavior clustering across students with different levels of PD (See Supplementary table 5 for full results). For those with high PD, relative to those with low PD, the following associations were less positive: association between strength training frequency and fruit and vegetable intake (-.04, 95% CI [-.07, -.01]),

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hours spent watching TV and hours spent with family (-.04, 95% CI [-.07, -.01]), cannabis use frequency and hours in meditation (-.04, 95% CI [-.07, -.01]), napping and cannabis use frequency (-.04, 95% CI [-.07, -.01]), tobacco use frequency and binge drinking frequency (-.04, 95% CI [-.06, -.01]), and hours spent commuting and hours spent with family (-.03, 95% CI [-.06, -.01]). On the other hand, for those with high psychological distress, the associations between napping and hours of sleep (.05, 95% CI [.02, .08]) and volunteering and weeknight/weekend sleep difference were less negative (.04, 95% CI [.01, .07]).

The following associations were more positive those with high PD: cannabis use frequency and alcohol use frequency (.05, 95% CI [.02, .08]), hours spent with friends and hours spent meditating (.05, 95% CI [.02, .08]), hours spent commuting and hours spent in religious/spiritual practice (.04, 95% CI [.02, .07]), tobacco use frequency and alcohol use frequency (.04, 95% CI [.01, .07]), and hours volunteering and hours meditating (.04, 95% CI [.01, .07]). The hypothesis that clustering of negative lifestyle behaviors would be stronger for those with psychological distress was not universally found as seen with binge drinking and tobacco use as well as cannabis use and napping, which were less strongly associated in the high PD group. Further, time spent in meditation was more positively associated with both socializing with friends and volunteering with the high PD group. Nonetheless, other associations did align with expectations (cannabis and alcohol use; tobacco and alcohol use; strength training and fruit and vegetable intake).

Behaviors only – by COVID time period

Results from the pre-COVID (n = 29,937) and COVID (n = 69,579) lifestyle behavior network models can be seen in supplemental figures 6, 8, and 10 and full edge weights can be seen in supplemental tables 6 and 8. Similar clusters were apparent in the Pre-COVID and

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COVID models among the substance use variables in particular. Strength training and physical activity were in a cluster in each sample, but in the COVID sample, fruit and vegetable intake and sugary drink consumption were also in the same cluster. Hours spent in religious participation, meditation and volunteering clustered together in both samples, although in the COVID sample, that cluster also included other variables. The sleep variables and energy drink consumption consistently clustered across samples.

The strength centrality indices (available in Supplemental tables 7 and 9 and supplemental figures 7 and 9) suggest that the lifestyle behaviors that seem to be most central (i.e. have the greatest total partial correlations with other variables), in these two samples were alcohol binge drinking, frequency in alcohol consumption, hours spent watching TV, and hours spent with family, and strength training frequency. Consumption of sugary drinks, consumption of energy drinks, daytime napping, difference in hours of sleep from weekend to weekday were some of the least central lifestyle factors across both groups.

The network model comparisons revealed some differences in behavior clustering across the two samples, with some of the larger differences listed below, while the full results are available in supplemental table 10. Correlations that were more positive in the COVID group, (relative to the pre-COVID group), were hours spent with friends and hours commuting (.08, 95% CI [.06, .09]), hours spent with family and hours spent watching TV (.06, 95% CI [.05, .08]), hours volunteering and hours commuting (.04, 95% CI [.03, .06]), hours commuting and frequency of alcohol use (.04, 95% CI [.03, .05]), hours in religious and spiritual practice and hours socializing with friends (.04, 95% CI [.03, .05]), hours in religious and spiritual practice and hours commuting (.04, 95% CI [.02, .05]). Correlations that were more negative in the COVID group were hours spent with family and hours commuting (-.19, 95% CI [-.20, -.18]),

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hours spent watching TV and hours commuting (-.06, 95% CI [.07, .04]), hours commuting and cannabis use frequency (-.05, 95% CI [-.06, -.04]), cannabis use frequency and tobacco use frequency (-.05, 95% CI [-.06, -.03]), hours socializing with friends and hours socializing with family (-.05, 95% CI [-.06, -.03]), and strength training frequency and total physical activity (-.05, 95% CI [-.06, -.03]).

Behaviors and mental health – by COVID time period

Edge weights for the models that included health and well-being variables are visualized in figure 2 for the pre-COVID (n = 29,884) and COVID (n = 69,433) samples and in supplemental figures 11, 13 and 15. The complete list of partial correlations are available in supplemental tables 11 and 13. The network models demonstrate continued clustering of lifestyle behaviors. The four substance use variables clustered together. The newly added flourishing, psychological distress, resilience, and health variables also clustered together in both samples, although in the COVID sample, strength training and total physical activity also clustered with those variables, while in the pre-CVOID sample, they existed as their own cluster.

Strength centrality indices (Table 2; Supplemental figures 12 and 14) imply that self-rated flourishing and psychological distress are highly central in this network of lifestyle, well-being, and health variables. That is particularly true of flourishing during COVID. Although in differing order, the next six most central variables were the same for both the Pre-COVID and COVID samples: time spent watching TV, alcohol binge drinking frequency, alcohol use frequency, time spent in with friends, time spent with family, and strength training physical activity. The six least central variables, also similar across samples (though differing in order), were sugary drink consumption, energy drink consumption, weeknight/weekend sleep quantity difference, daytime napping, total physical activity, and fruit and vegetable intake.

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Some network differences were found (see supplemental table 15). Comparing the COVID sample to the pre-COVID sample, the associations that were more positive included flourishing and resilience (.14, 95% CI [.13, .15]), hours spent socializing with friends and commuting (.07, 95% CI [.06, .07]), hours spent watching TV and hours spent with family (.07, 95% CI [.05, .08]), psychological distress and resilience (.06, 95% CI [.05, .08]), and alcohol use and cannabis use (.04, 95% CI [.03, .06]), hours commuting and alcohol consumption frequency (.04, 95% CI [.03, .06]), and hours in religious/spiritual activities and hours in social interaction with friends (.04, 95% CI [.02, .05]).

Correlations that were more negative were hours spent with family and hours spent commuting (-.19, 95% CI [-.20, -.18]), hours watching TV and hours commuting (-.05, 95% CI [-.06, -.04]), time with friends and time with family (-.05, 95% CI [-.06, -.04]), cannabis use frequency and tobacco use frequency (-.04, 95% CI [-.06, -.03]), frequency of weight training and total physical activity (-.05, 95% CI [-.06, -.03]), and cannabis use and hours commuting was more negatively associated for the COVID group (-.04, 95% CI [-.06, -.03]).

Discussion

This study was designed to explore the ways in which lifestyle behaviors cluster together in undergraduate college students. This involved examining partial correlation networks, the centrality of each lifestyle behavior, and variable clustering across levels of psychological distress and across time, comparing a pre-COVID and COVID sample. Also, of interest was an examination of these networks when relevant mental health and well-being variables were included in the networks. As an exploratory, data-driven, cross-sectional study, this project aimed to provide findings that may inform new hypotheses and provide insights about assessment of college student lifestyle, mental health, and well-being.

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In all the models, various lifestyle behaviors were associated with each other, sometimes in relatively expected ways. For example, substance use variables clustered together as demonstrated in previous research,²³ as did prosocial variables. In other words, the frequency of students' use of one substance is associated with their use of other substances. Due to the network analysis approach of this study, these findings extend previous research based on bivariate correlations and regressions; not only were the lifestyle variables associated with each other, but they were associated while controlling for all other associations between those variables and other lifestyle, mental health, and well-being variables. Results from these network analyses may be used clinically by guiding health and lifestyle assessments – if a student reports tobacco use to their physician for example, a look the network model graphic may indicate that an assessment of cannabis use and aspects of alcohol use may help contextualize the tobacco use among other relevant lifestyle factors. Additionally, a mental health provider, working with a client to improve their depression by improving their sleep, might be led to ask about relevant related behaviors, all of which were negatively associated with sleep quantity in the models: weeknight-weekend sleep differences, naps, energy drink consumption and binge drinking. Further, the overall strength centrality indices might lead providers to emphasize assessing for those behaviors which are most central to the nexus of health and well-being factors. In these ways, providers might be guided in their hypotheses and the questions they ask, and with an integration of their clinical training and judgment, how to proceed. The visual nature of the network models may aid the complex assessment process. Campus staff focused on health promotion, might also consider how the networks and the clusters could inform the content and delivery of their efforts.

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Relative to other forms of analyzing clustering, particularly latent class analysis,^{55,56} the network analysis approach add a new perspective. A network analysis approach may be seen as more variable-centric, such that if there are concerns about a student's specific behavior (e.g. fruit and vegetable intake), a quick examination of connecting edges and relevant clustering among the variables might reveal targets for continued assessment and intervention. Further, these associations are partial correlations, which means they are present, even after controlling for potential confounding variables in the model, which may not be true in other analyses.

The clustering approach to examining lifestyle and mental health provides an interesting perspective on the complex impact of potential lifestyle changes. One behavior of note was TV watching. Hours spent watching TV was one of the few variables, out of many, to predict subsequent depression in a recent rigorous Mendelian randomization study.⁵⁷ Other studies also support TV watching's association with mental health disorders.⁵⁸ As such, certain aspects of TV watching may lead to worse mental health, potentially making it a desirable target of lifestyle change. However, when seen within the network of lifestyle behaviors in the present study, questions can be raised about the complex ways an intervention focused on reducing TV watching might impact overall lifestyle profile and mental health. It was regularly one of the most central variables in the network, indicating that it had one of the highest total sums of absolute values of partial correlations with other behaviors. For example, in the pre-COVID sample, it had negative associations with fruit and vegetable intake, strength training, volunteering, and overall physical activity; at the same time, it had a relatively strong positive associations with time spent with family and time spent socializing with friends. Assuming that part of the correlation between TV watching and time spent with others is because individuals are spending time with others while watching TV, reducing TV watching may have unintended

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negative consequences on the social life of individuals. If a family's most frequent form of interaction is watching and discussing TV shows together, taking an individual out of that context may create isolation or loneliness. As such, future interventions designed for lifestyle change may benefit from a reflection on these network models to help plan for these potential unintended consequences. Alternatively, when targeting lifestyle change in one given behavior, it might make sense to attempt to target other behaviors which can counteract the negative impacts of the original behavior change. In this case, an intervention may combine efforts to reduce TV watching with concurrent recommendations for new forms of social engagement.⁵⁹

Along with unintended consequences of supposedly positive lifestyle changes, the capacity to bring about changes in one lifestyle behavior may depend on related associations (both statistical and psychological) with other lifestyle behaviors. Tobacco use, for example, provides an interesting case. While moderately central to the whole network, tobacco use has relatively strong associations with alcohol use frequency, binge drinking frequency, cannabis use frequency, and energy drink consumption. In an ideal world, impacting tobacco use may have downstream effects on the network, reducing engagement in these other unhealthy behaviors. However, it may be that tobacco cessation is tightly bound up with these other unhealthy behaviors, making tobacco cessation highly difficult and dependent on a more comprehensive behavioral repertoire change. With evidence indicating that targeting a moderate number of lifestyle behaviors tends to be the most effective approach to lifestyle change,⁶⁰ providers may want to purposefully select behaviors with a consideration of how those behaviors are related in network models. For example, one trial is examining a combined alcohol and tobacco use intervention in primary care, which multipronged approach may bring about greater effects by impacting multiple components of this cluster within the network.⁶¹

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From a developmental perspective, it might be interesting to examine this sort of clustering in other age groups, where the highly central behavior of alcohol use frequency may not hold as central of a place within the network. In other words, regardless of mean differences in frequency of alcohol use between college students and middle-aged adults, the clustering of alcohol with other behaviors in the network may also be quite different. The same may also be said of comparisons between college and non-college young adults, as alcohol plays a particular role in the lives of college students.^{62,63}

Examining the networks of those with lower versus higher psychological distress, the general structure of the networks seemed similar. The same sets of behaviors generally tended to cluster together, and the same sets of variables seemed to, for the most part, be the most central within the networks. Religious and spiritual participation and meditation were more central for the group with high psychological distress, but their centrality did not reveal consistent patterns of associations in terms of healthy or unhealthy lifestyle engagement. Some cross-group differences in partial correlations were found. For those with higher PD, they exhibited stronger positive associations among some of the substance use variables (cannabis use and alcohol; tobacco use and alcohol). For this group, the use of these substances may be used concurrently to act as a buffer against emotional distress – highlighting the potential for a multi-behavior intervention. Interpreting each correlational difference is outside the scope of a single journal article, revealing some of the challenges of the network modeling approach. However, the differences are freely available in supplemental materials, allowing interested readers the opportunity to look for additional patterns and potential hypotheses.

Considering differences between COVID and pre-COVID lifestyle network models, the pandemic's apparent impact on commute times and its place in the network was notable. In a

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world where commuting was suddenly much less common and no longer required for engaging in some forms of school and work, commuting time played a different role within the networks. Hours spent commuting were more positively associated with various forms of social engagement in the COVID sample (i.e. volunteering, religious participation, and time spent with friends), but less associated with spending time with family and watching TV. While commuter students pre-COVID may be those who live at home and spend more time with family, during COVID many students went back home and took their classes online, disconnecting that association between commuting and family engagement. At the same time, it may have been that those who were willing to commute to school or work were also those that were willing to attend religious service, to volunteer, and to get together with friends. Various other differences across the networks were found, but in general the network structure seemed similar, speaking to the fact that while differences in *mean levels* of engagement in these behaviors may have been occurring, their associations with each other seemed to be similar. The limited cross-group variation does help provide evidence for the reliability of the lifestyle networks across contexts.

Once health and well-being variables were added to the networks, the substance use variables remained as the most consistently distinct cluster. The well-being and health behaviors clustered together with diet and physical activity variables for the COVID sample, but not the pre-COVID sample, potentially indicating the importance of those behaviors for actual or perceived health and well-being during the stressful pandemic experience. When considering the cross-group differences in correlations, probably the most interesting was the role of resilience. Resilience was quite a bit more strongly associated with flourishing during COVID, but less correlated with psychological distress. In other words, while symptoms of psychological distress seemed to arise regardless of one's levels of resilience during COVID, those who were resilient

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were still more likely to flourish, despite those symptoms. This has some alignment with the Acceptance and Commitment Therapy approach to mental health where reduction of symptoms is not a central goal, but rather teaching clients to flexibly adapt to painful experiences is expected to lead to a value-driven life with more meaning and purpose.⁶⁵

Various limitations of this study are apparent. The data is cross-sectional, and as such, direction of associations, let alone causation, are not available. Future longitudinal research may provide helpful insight into the directional relationships between these factors. The measurement of many of the variables was brief, such that single items were often used as part of this survey. Further, self-reported variables such as physical activity often lack reliability, raising questions about the error introduced in this study. Clustering may occur differently among different groups, for example by gender, race, socioeconomic status, and trauma exposure among others. Examination of all of these was not within the scope of this project.^a Lastly, as in all studies examining lifestyle behavior clustering, it is not clear that *all* relevant lifestyle behaviors are accounted for, with caffeine intake, social media use, and others not examined in this study.

Conclusion

Lifestyle behaviors are an important aspect of maintaining and improving physical and mental health. This study found interesting ways in which lifestyle behaviors cluster together within two large samples of college students in the United States. Clusters, including one involving substance use behaviors, were identified. Further, certain variables, such as alcohol consumption frequency, time spent watching TV, hours spent with friends, hours spent with family, and strengthening exercises were the behaviors that tended to be most central in the

^a At a reviewer's suggestion, we did run separate network models for males and females using the Pre-COVID sample. Those models and their comparisons are available as supplemental materials.

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networks, or in other words, the behaviors that had the greatest sum of associations with the other variables. Some interesting cross-group comparisons were found, particularly with the change in role of commuting hours from pre-COVID to COVID. The visual displays of the lifestyle networks can help facilitate an exploration of ways in which lifestyle interventions might impact and be impacted by the network of associations among the lifestyle behaviors. Additionally, the network model graphic may help guide lifestyle assessment as it can provide clinicians with a visual tool that can be used to understand the behavioral context within which the behaviors exist, potentially prompting further assessment on related factors. Future longitudinal research may give more insight into how these associations play out over time.

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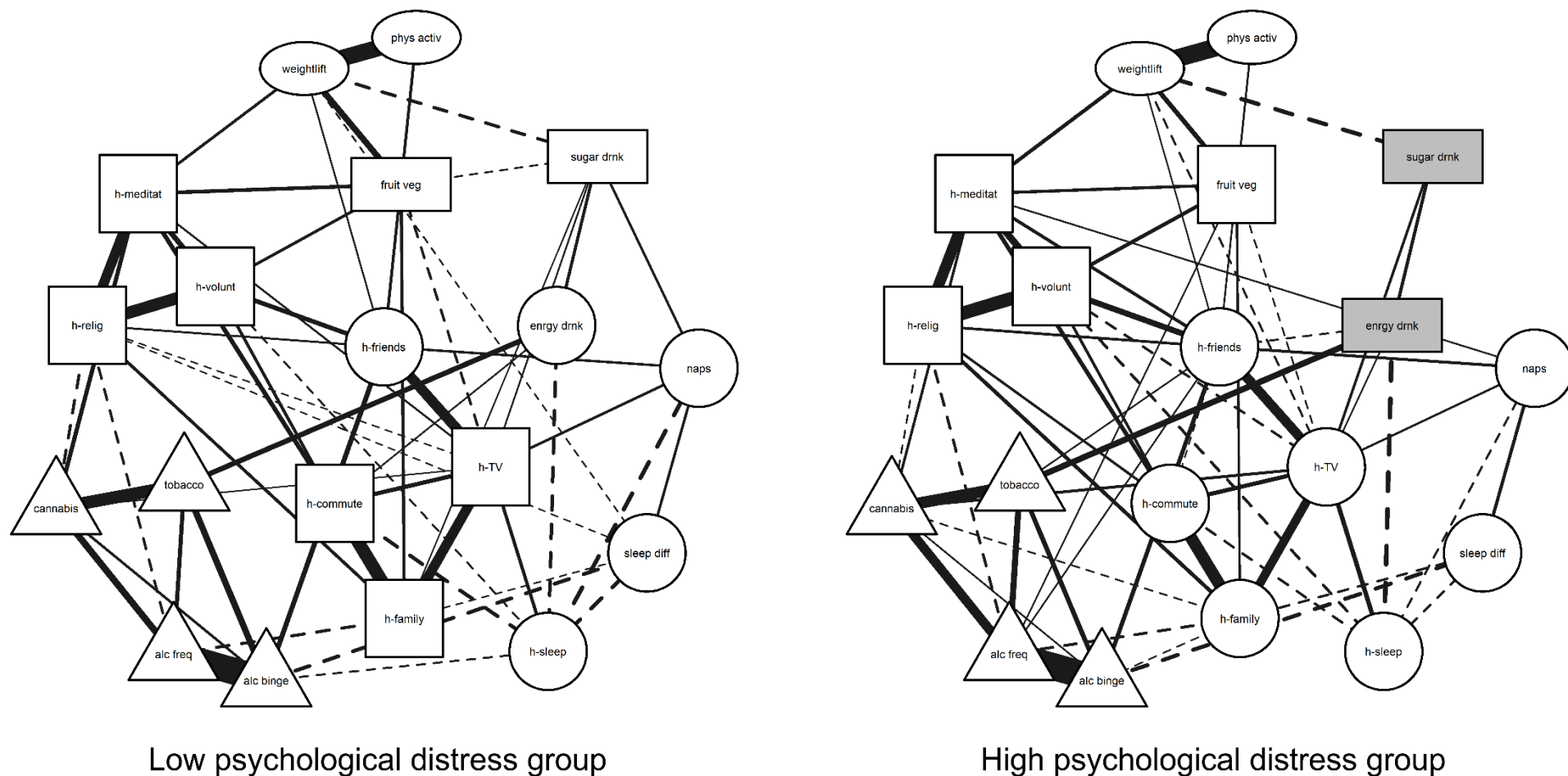
Table 1
Participant Characteristics

	Pre-COVID (Fall, 2019)		During COVID (Spring, 2021)	
	Mean (SD)	n	Mean (SD)	n
Age	20.82 (4.76)	29,875	21.75 (5.26)	69,572
Overall health	3.52 (0.89)	29,642	3.47 (0.93)	67,530
Sleep hours	6.77 (1.17)	30,043	6.99 (1.21)	69,982
Psychological distress	7.99 (5.39)	29,598	9.15 (5.54)	69,187
	%	N	%	n
Psychological distress		29,598		69,187
High (≥ 13)	19.54%	5,784	26.39%	18,257
Low (< 13)	80.45%	23,814	73.61%	50,930
Race		29,970		69,732
American Indian	2.30%	689	2.18%	1,520
Asian	9.74	2,918	17.53%	12,226
Biracial	1.58%	475	1.93%	1,349
Black	9.96%	2,986	4.39%	3,058
Hawaiian	0.36%	109	0.44%	309
Hispanic	19.07%	5,716	19.59%	13,656
Middle Eastern/North African	0.10%	304	1.49%	1,043
Other	0.77%	230	0.77%	538
White	55.20%	16,543	51.68%	36,033
Sex at birth		30,037		69,962
Female	65.31%	19,616	71.07%	49,725
Male	34.65%	10,408	28.90%	20,217
Intersex	0.04%	13	0.03%	20
Gender identity		30,024		69,921
Woman	63.89%	19,181	67.86%	47,450
Man	34.06	10,227	28.22%	19,733
Trans woman	0.11%	32	0.12%	84
Trans man	0.22%	65	0.31%	214
Non-binary	0.73%	218	1.95%	1,364
Other	1.00%	301	1.54%	1,076
Grade		30,084		70,087
1 st year	29.38%	8,841	24.26%	17,005
2 nd year	24.37%	7,332	21.36%	14,968
3 rd year	22.37%	6,837	26.50%	18,570
4 th year	18.53%	5,574	20.87%	14,629
5 th year or greater	5.00%	1,500	7.01%	4,915

Table 2
Strength Centrality Indices for the Lifestyle Behaviors and Well-being Models

	Pre-COVID		COVID	
	Strength Centrality	95% CrI	Strength Centrality	95% CrI
Flourishing	1.36	[1.32, 1.40]	1.57	[1.54, 1.60]
Psychological distress	1.36	[1.31, 1.41]	1.33	[1.31, 1.37]
TV hours	1.27	[1.22, 1.31]	1.24	[1.21, 1.27]
Alcohol binge drinking frequency	1.25	[1.21, 1.29]	1.17	[1.15, 1.20]
Alcohol use frequency	1.23	[1.19, 1.27]	1.30	[1.27, 1.23]
Weightlifting frequency	1.12	[1.08, 1.16]	1.10	[1.07, 1.13]
Friend hours	1.11	[1.07, 1.16]	1.10	[1.07, 1.24]
Family hours	1.11	[1.07, 1.15]	1.15	[1.11, 1.18]
Religion/spiritual hours	1.07	[1.03, 1.11]	1.07	[1.04, 1.09]
Meditate hours	1.03	[0.98, 1.07]	1.05	[1.02, 1.08]
Health	1.01	[0.97, 1.04]	0.99	[0.97, 1.02]
Cannabis use frequency	0.98	[0.94, 1.02]	1.05	[1.03, 1.08]
Volunteer hours	0.98	[0.94, 1.02]	0.97	[0.94, 1.00]
Commute hours	0.97	[0.93, 1.02]	0.84	[0.81, 0.88]
Sleep hours	0.94	[0.89, 0.98]	1.08	[1.05, 1.11]
Tobacco use frequency	0.91	[0.87, 0.95]	0.88	[0.85, 0.91]
Resilience	0.79	[0.75, 0.83]	0.90	[0.88, 0.93]
Fruits & vegetables	0.76	[0.71, 0.80]	0.74	[0.72, 0.77]
Physical activity total	0.71	[0.67, 0.75]	0.80	[0.77, 0.83]
Daytime napping	0.62	[0.58, 0.67]	0.58	[0.55, 0.61]
Sleep hours difference	0.58	[0.54, 0.62]	0.56	[0.53, 0.59]
Energy drinks	0.57	[0.53, 0.61]	0.56	[0.53, 0.58]
Sugary drinks	0.55	[0.50, 0.59]	0.53	[0.50, 0.56]

Figure 1
Behavior-only Lifestyle Network Models by Psychological Distress



Only partial correlations greater than or equal to .04 are included in this graph to aid in interpretability. Full partial correlations are available in the supplemental materials. Solid lines represent positive associations while dashed lines represent negative associations. For reference, the largest partial correlation between alcohol frequency and alcohol binge drinking frequency was .61 in the high PD group. In the high PD group, sugary drink intake and energy drink intake were not a part of any cluster (including with each other).

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1.0 Lifestyle Behavior Clustering by Level of Psychological Distress

1.1 Low Psychological Distress Group

1.1.a Low psychological distress group - partial correlations

Supplemental Table 1

```
summary(fit_ncha_low_pd)
```

```
## BGGM: Bayesian Gaussian Graphical Models
## ---
## Type: continuous
## Analytic: FALSE
## Formula:
## Posterior Samples: 30050
## Observations (n):
## Nodes (p): 19
## Relations: 171
## ---
## Call:
## estimate(Y = as.matrix(subset(Y, .imp == x)[, -1]), type = "continuous",
##   iter = iter, impute = FALSE, cores = 7)
## ---
## Estimates:
##           Relation Post.mean Post.sd Cred.lb Cred.ub
## hr_volunteer--hr_relig_spirit    0.275  0.006  0.264  0.288
##           hr_volunteer--hr_social    0.107  0.007  0.095  0.120
##           hr_relig_spirit--hr_social  0.054  0.007  0.042  0.067
##           hr_volunteer--hr_family   0.009  0.007 -0.003  0.022
##           hr_relig_spirit--hr_family  0.079  0.006  0.066  0.091
```

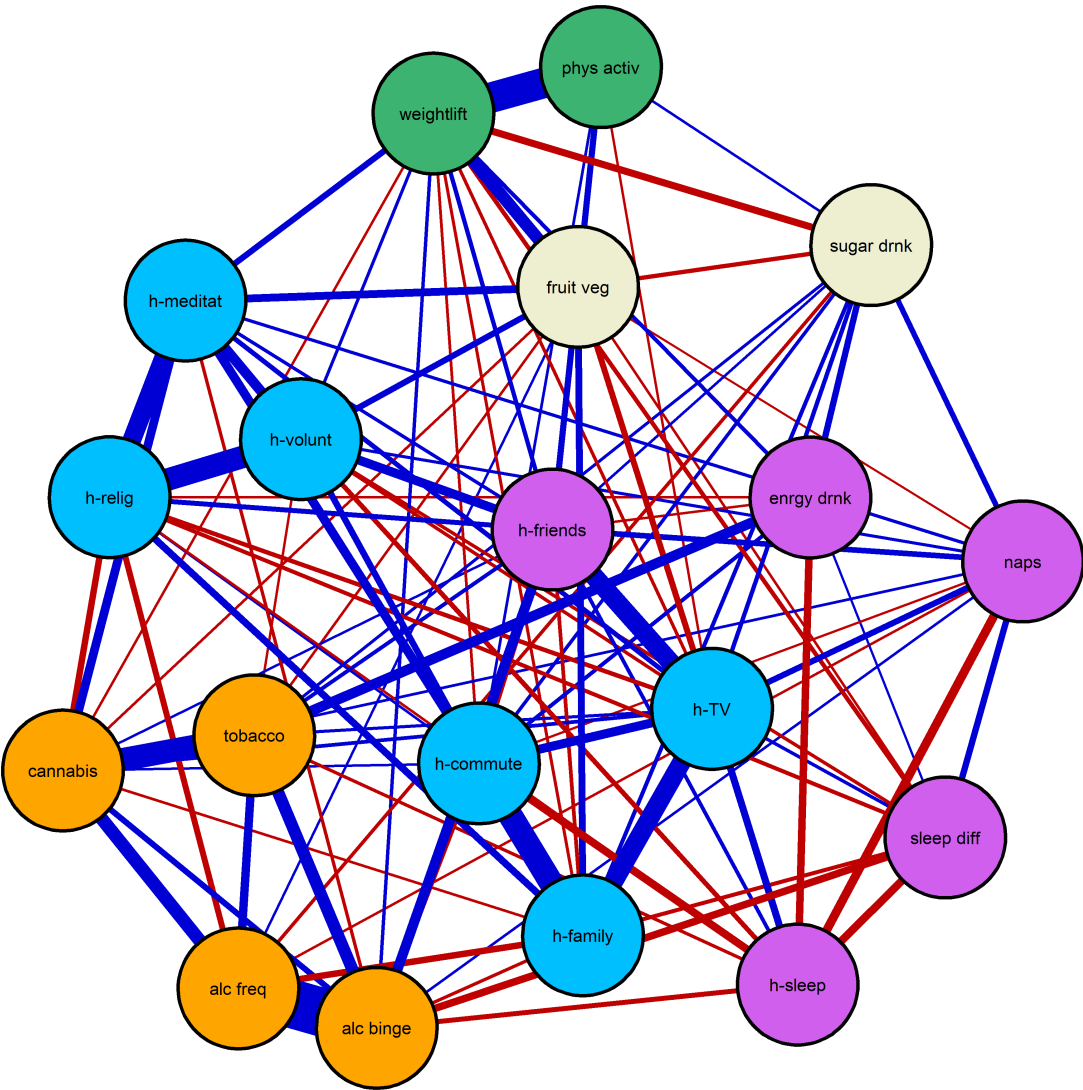
##	hr_social--hr_family	-0.038	0.006	-0.051	-0.026
##	hr_volunteer--hr_tv	-0.036	0.006	-0.048	-0.023
##	hr_relig_spirit--hr_tv	-0.045	0.007	-0.057	-0.030
##	hr_social--hr_tv	0.232	0.006	0.220	0.244
##	hr_family--hr_tv	0.230	0.006	0.217	0.241
##	hr_volunteer--hr_commute	0.075	0.007	0.063	0.088
##	hr_relig_spirit--hr_commute	0.024	0.007	0.011	0.037
##	hr_social--hr_commute	-0.029	0.007	-0.042	-0.016
##	hr_family--hr_commute	0.301	0.006	0.289	0.313
##	hr_tv--hr_commute	0.105	0.006	0.092	0.118
##	hr_volunteer--hr_meditate	0.120	0.006	0.108	0.134
##	hr_relig_spirit--hr_meditate	0.231	0.006	0.218	0.242
##	hr_social--hr_meditate	0.033	0.007	0.020	0.046
##	hr_family--hr_meditate	0.028	0.007	0.013	0.039
##	hr_tv--hr_meditate	0.051	0.007	0.037	0.064
##	hr_commute--hr_meditate	0.108	0.007	0.095	0.121
##	hr_volunteer--pa_weights	0.034	0.006	0.021	0.046
##	hr_relig_spirit--pa_weights	0.018	0.006	0.006	0.032
##	hr_social--pa_weights	0.047	0.006	0.032	0.058
##	hr_family--pa_weights	-0.030	0.007	-0.044	-0.018
##	hr_tv--pa_weights	-0.036	0.007	-0.049	-0.024
##	hr_commute--pa_weights	-0.026	0.006	-0.038	-0.014
##	hr_meditate--pa_weights	0.071	0.007	0.057	0.083
##	hr_volunteer--diet_sugardrink	-0.004	0.006	-0.016	0.009
##	hr_relig_spirit--diet_sugardrink	0.000	0.007	-0.012	0.013
##	hr_social--diet_sugardrink	0.022	0.007	0.009	0.035
##	hr_family--diet_sugardrink	0.041	0.007	0.029	0.054
##	hr_tv--diet_sugardrink	0.045	0.006	0.034	0.059
##	hr_commute--diet_sugardrink	0.033	0.006	0.021	0.046
##	hr_meditate--diet_sugardrink	-0.012	0.007	-0.025	0.001
##	pa_weights--diet_sugardrink	-0.080	0.006	-0.093	-0.067
##	hr_volunteer--diet_energydrink	0.002	0.006	-0.012	0.013
##	hr_relig_spirit--diet_energydrink	-0.024	0.007	-0.036	-0.010
##	hr_social--diet_energydrink	-0.022	0.006	-0.034	-0.009
##	hr_family--diet_energydrink	0.011	0.007	-0.004	0.023
##	hr_tv--diet_energydrink	0.015	0.007	0.003	0.029
##	hr_commute--diet_energydrink	0.040	0.007	0.028	0.054
##	hr_meditate--diet_energydrink	0.020	0.007	0.006	0.033
##	pa_weights--diet_energydrink	0.037	0.006	0.025	0.050
##	diet_sugardrink--diet_energydrink	0.076	0.006	0.060	0.085
##	hr_volunteer--fruitvegs	0.070	0.006	0.056	0.082
##	hr_relig_spirit--fruitvegs	0.018	0.006	0.006	0.031
##	hr_social--fruitvegs	0.025	0.007	0.013	0.038
##	hr_family--fruitvegs	0.076	0.007	0.066	0.091
##	hr_tv--fruitvegs	-0.067	0.006	-0.081	-0.055
##	hr_commute--fruitvegs	0.008	0.006	-0.005	0.020
##	hr_meditate--fruitvegs	0.091	0.006	0.078	0.103
##	pa_weights--fruitvegs	0.146	0.006	0.134	0.159
##	diet_sugardrink--fruitvegs	-0.045	0.006	-0.058	-0.033
##	diet_energydrink--fruitvegs	-0.007	0.006	-0.021	0.005
##	hr_volunteer--sleep_nap	0.031	0.007	0.017	0.044
##	hr_relig_spirit--sleep_nap	0.002	0.006	-0.012	0.012
##	hr_social--sleep_nap	0.061	0.007	0.048	0.074
##	hr_family--sleep_nap	-0.011	0.006	-0.024	0.002

##	hr_tv--sleep_nap	0.065	0.007	0.053	0.079
##	hr_commute--sleep_nap	-0.021	0.007	-0.034	-0.008
##	hr_meditate--sleep_nap	0.034	0.006	0.024	0.049
##	pa_weights--sleep_nap	0.016	0.007	0.003	0.029
##	diet_sugardrink--sleep_nap	0.059	0.007	0.046	0.073
##	diet_energydrink--sleep_nap	0.013	0.006	0.001	0.026
##	fruitvegs--sleep_nap	-0.020	0.007	-0.033	-0.007
##	hr_volunteer--subst_freq_alc	-0.001	0.007	-0.012	0.014
##	hr_relig_spirit--subst_freq_alc	-0.066	0.006	-0.077	-0.052
##	hr_social--subst_freq_alc	0.017	0.006	0.004	0.029
##	hr_family--subst_freq_alc	-0.075	0.006	-0.089	-0.064
##	hr_tv--subst_freq_alc	-0.011	0.007	-0.025	0.001
##	hr_commute--subst_freq_alc	-0.012	0.007	-0.024	0.002
##	hr_meditate--subst_freq_alc	0.003	0.006	-0.010	0.015
##	pa_weights--subst_freq_alc	0.000	0.006	-0.013	0.012
##	diet_sugardrink--subst_freq_alc	-0.034	0.007	-0.046	-0.021
##	diet_energydrink--subst_freq_alc	0.007	0.007	-0.007	0.019
##	fruitvegs--subst_freq_alc	0.023	0.006	0.011	0.037
##	sleep_nap--subst_freq_alc	-0.020	0.007	-0.034	-0.008
##	hr_volunteer--subst_freq_cannabis	-0.020	0.007	-0.033	-0.008
##	hr_relig_spirit--subst_freq_cannabis	-0.075	0.006	-0.087	-0.062
##	hr_social--subst_freq_cannabis	0.025	0.006	0.012	0.038
##	hr_family--subst_freq_cannabis	-0.028	0.007	-0.042	-0.015
##	hr_tv--subst_freq_cannabis	0.040	0.006	0.026	0.052
##	hr_commute--subst_freq_cannabis	0.022	0.007	0.008	0.034
##	hr_meditate--subst_freq_cannabis	0.102	0.006	0.089	0.114
##	pa_weights--subst_freq_cannabis	-0.021	0.006	-0.034	-0.009
##	diet_sugardrink--subst_freq_cannabis	-0.003	0.007	-0.016	0.010
##	diet_energydrink--subst_freq_cannabis	-0.004	0.007	-0.019	0.007
##	fruitvegs--subst_freq_cannabis	-0.021	0.006	-0.033	-0.008
##	sleep_nap--subst_freq_cannabis	0.027	0.007	0.014	0.039
##	subst_freq_alc--subst_freq_cannabis	0.157	0.006	0.145	0.171
##	hr_volunteer--subst_freq_tobacco	-0.021	0.006	-0.034	-0.009
##	hr_relig_spirit--subst_freq_tobacco	-0.002	0.007	-0.016	0.010
##	hr_social--subst_freq_tobacco	0.039	0.006	0.026	0.051
##	hr_family--subst_freq_tobacco	0.010	0.006	-0.001	0.025
##	hr_tv--subst_freq_tobacco	0.032	0.007	0.019	0.045
##	hr_commute--subst_freq_tobacco	0.007	0.007	-0.008	0.018
##	hr_meditate--subst_freq_tobacco	0.000	0.006	-0.010	0.015
##	pa_weights--subst_freq_tobacco	0.008	0.007	-0.005	0.020
##	diet_sugardrink--subst_freq_tobacco	0.032	0.006	0.020	0.045
##	diet_energydrink--subst_freq_tobacco	0.120	0.007	0.109	0.134
##	fruitvegs--subst_freq_tobacco	-0.023	0.006	-0.036	-0.011
##	sleep_nap--subst_freq_tobacco	0.007	0.006	-0.006	0.019
##	subst_freq_alc--subst_freq_tobacco	0.099	0.006	0.088	0.113
##	subst_freq_cannabis--subst_freq_tobacco	0.283	0.006	0.270	0.294
##	hr_volunteer--subst_alc_freq_binge	0.009	0.006	-0.004	0.022
##	hr_relig_spirit--subst_alc_freq_binge	-0.011	0.006	-0.025	0.001
##	hr_social--subst_alc_freq_binge	0.116	0.006	0.105	0.130
##	hr_family--subst_alc_freq_binge	-0.035	0.007	-0.047	-0.020
##	hr_tv--subst_alc_freq_binge	-0.020	0.007	-0.032	-0.005
##	hr_commute--subst_alc_freq_binge	-0.029	0.006	-0.042	-0.017
##	hr_meditate--subst_alc_freq_binge	-0.036	0.006	-0.049	-0.024
##	pa_weights--subst_alc_freq_binge	0.034	0.006	0.022	0.047

##	diet_sugardrink--subst_alc_freq_binge	-0.004	0.007	-0.016	0.010
##	diet_energydrink--subst_alc_freq_binge	0.015	0.007	0.002	0.028
##	fruitvegs--subst_alc_freq_binge	-0.007	0.007	-0.020	0.005
##	sleep_nap--subst_alc_freq_binge	0.021	0.006	0.008	0.034
##	subst_freq_alc--subst_alc_freq_binge	0.612	0.004	0.603	0.619
##	subst_freq_cannabis--subst_alc_freq_binge	0.067	0.007	0.054	0.080
##	subst_freq_tobacco--subst_alc_freq_binge	0.147	0.006	0.134	0.159
##	hr_volunteer--pa_met_tot	-0.003	0.006	-0.017	0.008
##	hr_relig_spirit--pa_met_tot	0.003	0.006	-0.010	0.015
##	hr_social--pa_met_tot	0.071	0.006	0.061	0.086
##	hr_family--pa_met_tot	0.009	0.006	-0.003	0.022
##	hr_tv--pa_met_tot	-0.021	0.007	-0.035	-0.009
##	hr_commute--pa_met_tot	0.028	0.006	0.017	0.041
##	hr_meditate--pa_met_tot	-0.013	0.006	-0.025	0.000
##	pa_weights--pa_met_tot	0.379	0.006	0.368	0.390
##	diet_sugardrink--pa_met_tot	0.028	0.006	0.015	0.040
##	diet_energydrink--pa_met_tot	-0.008	0.006	-0.022	0.004
##	fruitvegs--pa_met_tot	0.068	0.006	0.055	0.080
##	sleep_nap--pa_met_tot	-0.005	0.007	-0.018	0.008
##	subst_freq_alc--pa_met_tot	0.020	0.007	0.007	0.033
##	subst_freq_cannabis--pa_met_tot	-0.003	0.007	-0.015	0.010
##	subst_freq_tobacco--pa_met_tot	-0.011	0.006	-0.024	0.002
##	subst_alc_freq_binge--pa_met_tot	0.000	0.007	-0.014	0.012
##	hr_volunteer--sleep_hrs_average	-0.052	0.007	-0.064	-0.039
##	hr_relig_spirit--sleep_hrs_average	-0.028	0.007	-0.041	-0.016
##	hr_social--sleep_hrs_average	0.039	0.007	0.025	0.051
##	hr_family--sleep_hrs_average	-0.001	0.006	-0.014	0.011
##	hr_tv--sleep_hrs_average	0.080	0.006	0.068	0.093
##	hr_commute--sleep_hrs_average	-0.088	0.006	-0.102	-0.076
##	hr_meditate--sleep_hrs_average	-0.013	0.007	-0.027	-0.002
##	pa_weights--sleep_hrs_average	0.010	0.006	-0.002	0.022
##	diet_sugardrink--sleep_hrs_average	-0.014	0.006	-0.027	-0.003
##	diet_energydrink--sleep_hrs_average	-0.085	0.007	-0.098	-0.072
##	fruitvegs--sleep_hrs_average	0.016	0.007	0.003	0.029
##	sleep_nap--sleep_hrs_average	-0.103	0.006	-0.115	-0.090
##	subst_freq_alc--sleep_hrs_average	0.017	0.006	0.004	0.030
##	subst_freq_cannabis--sleep_hrs_average	0.011	0.007	-0.002	0.023
##	subst_freq_tobacco--sleep_hrs_average	-0.035	0.007	-0.047	-0.022
##	subst_alc_freq_binge--sleep_hrs_average	-0.053	0.006	-0.066	-0.040
##	pa_met_tot--sleep_hrs_average	-0.019	0.007	-0.033	-0.007
##	hr_volunteer--sleep_hrs_diff	-0.034	0.006	-0.045	-0.020
##	hr_relig_spirit--sleep_hrs_diff	-0.042	0.007	-0.055	-0.029
##	hr_social--sleep_hrs_diff	-0.018	0.007	-0.031	-0.005
##	hr_family--sleep_hrs_diff	-0.043	0.007	-0.056	-0.030
##	hr_tv--sleep_hrs_diff	0.033	0.006	0.019	0.044
##	hr_commute--sleep_hrs_diff	-0.013	0.006	-0.026	-0.001
##	hr_meditate--sleep_hrs_diff	-0.017	0.007	-0.032	-0.005
##	pa_weights--sleep_hrs_diff	-0.045	0.007	-0.057	-0.032
##	diet_sugardrink--sleep_hrs_diff	-0.008	0.007	-0.021	0.004
##	diet_energydrink--sleep_hrs_diff	0.021	0.006	0.007	0.033
##	fruitvegs--sleep_hrs_diff	-0.021	0.007	-0.034	-0.008
##	sleep_nap--sleep_hrs_diff	0.068	0.007	0.056	0.082
##	subst_freq_alc--sleep_hrs_diff	0.006	0.007	-0.007	0.019
##	subst_freq_cannabis--sleep_hrs_diff	-0.002	0.006	-0.015	0.011


```
##      subst_freq_tobacco--sleep_hrs_diff    0.014  0.007  0.002  0.028
##      subst_alc_freq_binge--sleep_hrs_diff  -0.088  0.007 -0.101 -0.076
##      pa_met_tot--sleep_hrs_diff           -0.004  0.006 -0.017  0.008
##      sleep_hrs_average--sleep_hrs_diff     -0.089  0.007 -0.102 -0.076
## ---
```

Supplemental Figure 1



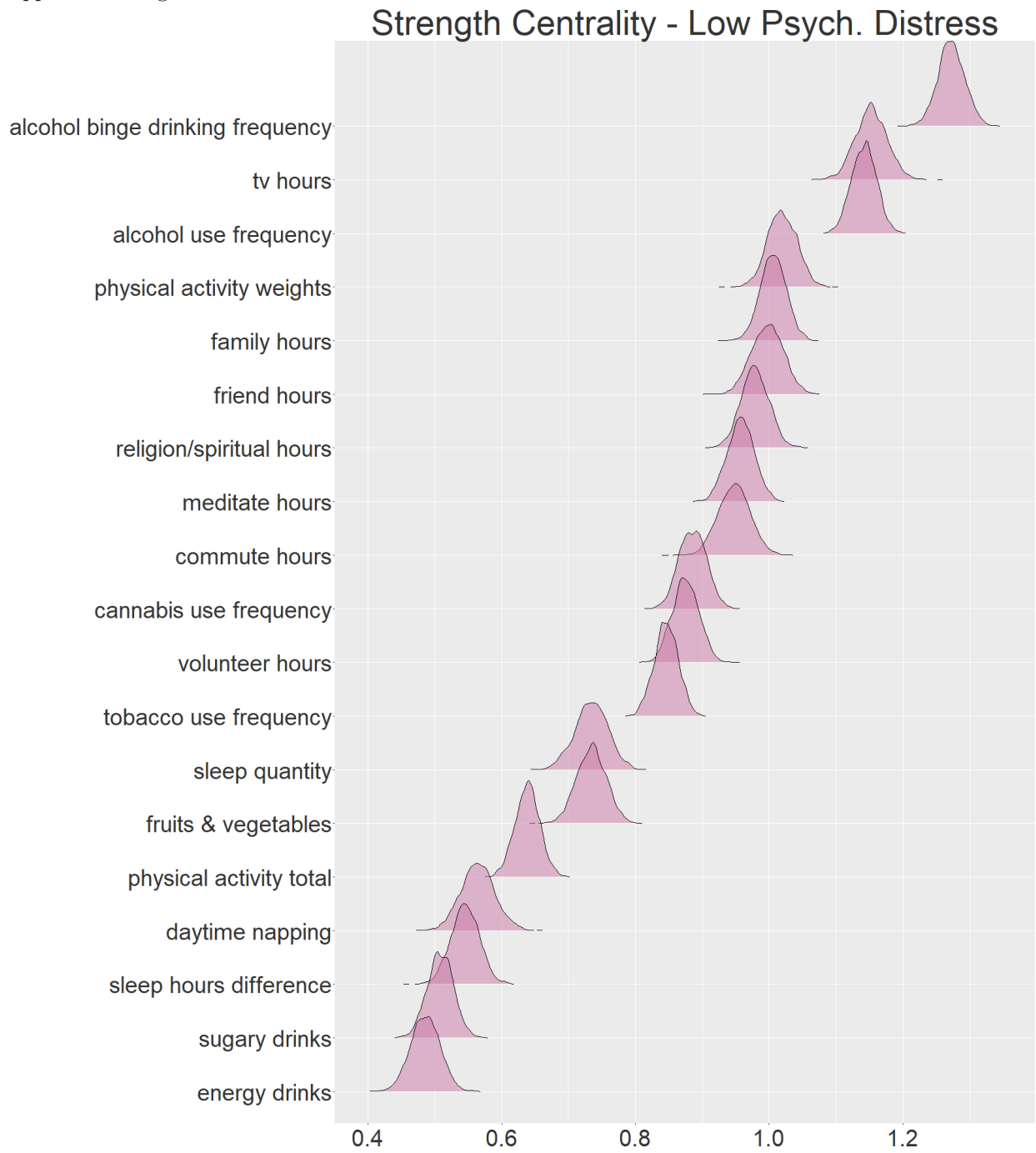
Network graph - Low psychological distress

1.1.b Low psychological distress group - strength centrality indices

Supplemental Table 2

```
## BGGM: Bayesian Gaussian Graphical Models
## ---
## Network Stats: Roll Your Own
## Posterior Samples: 30050
## ---
## Estimates:
##
##           Node Post.mean Post.sd Cred.lb Cred.ub
## volunteer hours           1    0.875  0.020  0.837  0.914
## religion/spiritual hours    2    0.979  0.021  0.938  1.021
## friend hours                3    0.997  0.024  0.951  1.044
## family hours                4    1.006  0.019  0.968  1.044
## tv hours                    5    1.153  0.024  1.107  1.200
## commute hours              6    0.948  0.024  0.902  0.995
## meditate hours             7    0.957  0.020  0.918  0.998
## strength training          8    1.020  0.022  0.977  1.062
## sugary drinks              9    0.508  0.020  0.471  0.547
## energy drinks             10    0.486  0.022  0.443  0.529
## fruits & vegetables       11    0.734  0.022  0.691  0.777
## daytime napping           12    0.564  0.025  0.515  0.616
## alcohol use frequency     13    1.142  0.019  1.106  1.178
## cannabis use frequency    14    0.886  0.020  0.847  0.925
## tobacco use frequency     15    0.846  0.018  0.811  0.880
## alcohol binge drinking frequency 16    1.272  0.020  1.233  1.312
## physical activity total   17    0.639  0.018  0.602  0.675
## sleep quantity            18    0.734  0.025  0.685  0.783
## sleep hours difference    19    0.546  0.021  0.504  0.587
## ---
```

Supplemental Figure 2



1.1.c Low psychological distress group - cluster identification

```
beh_pdlow_communities
```

```
## Model: BGGM (continuous)
## Prior SD: 0.25 (5000 iterations)
## Credible Interval: 0.95 (two-sided)
## Analytic: No
##
## Number of nodes: 19
## Number of edges: 128
## Edge density: 0.749
##
## Non-zero edge weights:
##      M      SD      Min      Max
## 0.033 0.096 -0.103 0.612
##
## ----
##
## Algorithm: Walktrap (Steps = 4)
##
## Number of communities: 5
##
##      hr_volunteer      hr_relig_spirit      hr_social
##          1              1              2
##      hr_family      hr_tv      hr_commute
##          1              1              1
##      hr_meditate      pa_weights      diet_sugardrink
##          1              3              4
##      diet_energydrink      fruitvegs      sleep_nap
##          2              4              2
##      subst_freq_alc      subst_freq_cannabis      subst_freq_tobacco
##          5              5              5
##      subst_alc_freq_binge      pa_met_tot      sleep_hrs_average
##          5              3              2
##      sleep_hrs_diff
##          2
##
##
## ----
##
## TEFI: -15.615
```

1.2 High Psychological Distress Group

1.2.a High psychological distress group - partial correlations

Supplemental Table 3

```
summary(fit_ncha_hi_pd)
```

```
## BGGM: Bayesian Gaussian Graphical Models
## ---
## Type: continuous
## Analytic: FALSE
## Formula:
## Posterior Samples: 30050
## Observations (n):
## Nodes (p): 19
## Relations: 171
## ---
## Call:
## estimate(Y = as.matrix(subset(Y, .imp == x)[, -1]), type = "continuous",
##   iter = iter, impute = FALSE, cores = 7)
## ---
## Estimates:
```

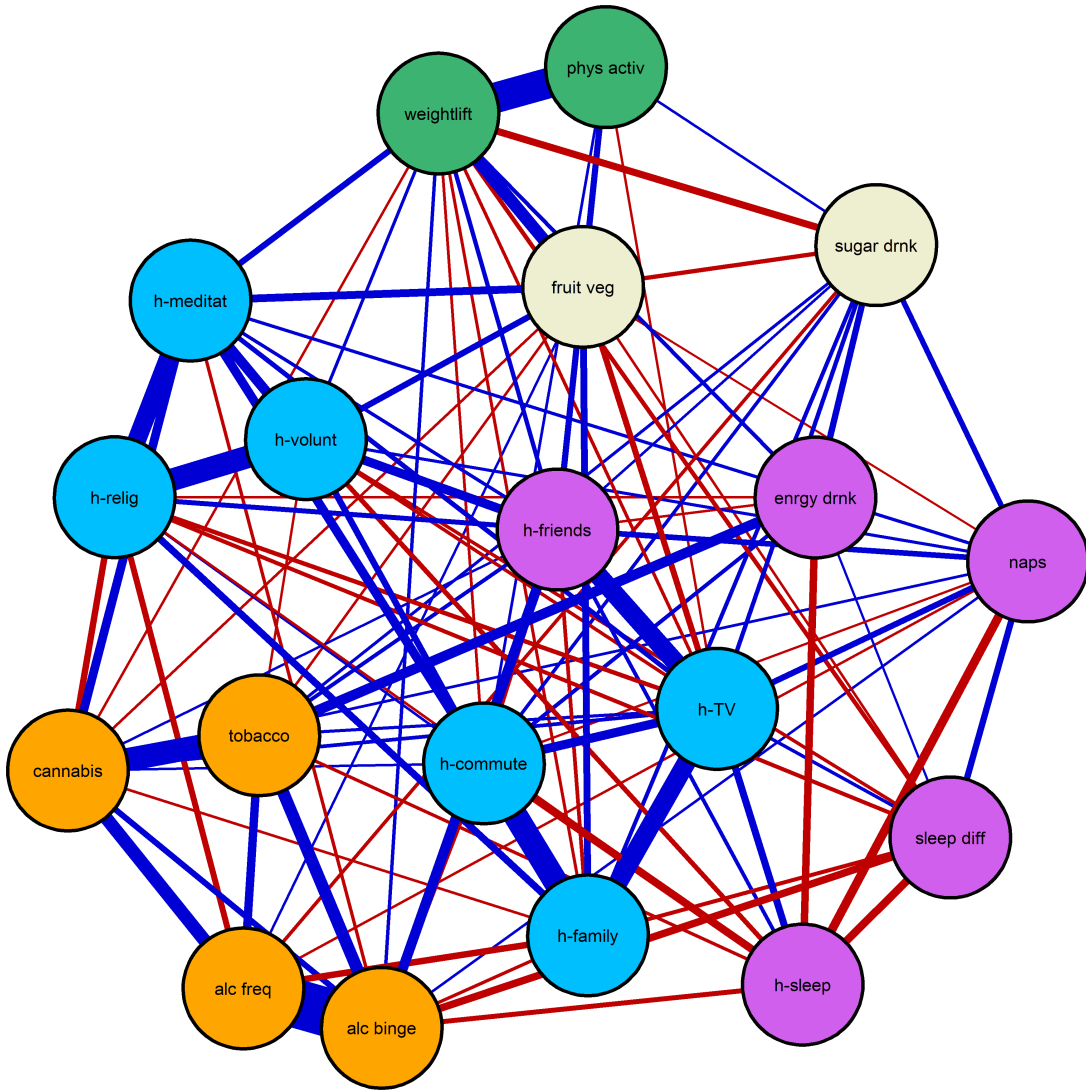
	Relation	Post.mean	Post.sd	Cred.lb	Cred.ub
##	hr_volunteer--hr_relig_spirit	0.293	0.013	0.264	0.314
##	hr_volunteer--hr_social	0.130	0.013	0.105	0.156
##	hr_relig_spirit--hr_social	0.063	0.013	0.039	0.091
##	hr_volunteer--hr_family	0.008	0.013	-0.016	0.035
##	hr_relig_spirit--hr_family	0.089	0.013	0.057	0.109
##	hr_social--hr_family	-0.018	0.013	-0.042	0.009
##	hr_volunteer--hr_tv	-0.064	0.013	-0.089	-0.038
##	hr_relig_spirit--hr_tv	-0.025	0.014	-0.050	0.004
##	hr_social--hr_tv	0.216	0.013	0.192	0.240
##	hr_family--hr_tv	0.193	0.013	0.168	0.217
##	hr_volunteer--hr_commute	0.071	0.013	0.047	0.098
##	hr_relig_spirit--hr_commute	0.067	0.014	0.042	0.096
##	hr_social--hr_commute	-0.043	0.014	-0.071	-0.019
##	hr_family--hr_commute	0.265	0.012	0.243	0.291
##	hr_tv--hr_commute	0.101	0.013	0.072	0.124
##	hr_volunteer--hr_meditate	0.161	0.013	0.132	0.184
##	hr_relig_spirit--hr_meditate	0.243	0.013	0.224	0.275
##	hr_social--hr_meditate	0.080	0.013	0.055	0.107
##	hr_family--hr_meditate	0.031	0.013	0.007	0.060
##	hr_tv--hr_meditate	0.037	0.014	0.009	0.063
##	hr_commute--hr_meditate	0.103	0.013	0.079	0.132
##	hr_volunteer--pa_weights	0.026	0.013	0.004	0.055
##	hr_relig_spirit--pa_weights	0.033	0.013	0.006	0.058
##	hr_social--pa_weights	0.040	0.013	0.014	0.065
##	hr_family--pa_weights	0.000	0.014	-0.030	0.023
##	hr_tv--pa_weights	-0.054	0.013	-0.082	-0.030
##	hr_commute--pa_weights	-0.013	0.013	-0.041	0.009
##	hr_meditate--pa_weights	0.087	0.014	0.064	0.118
##	hr_volunteer--diet_sugardrink	-0.004	0.013	-0.030	0.022
##	hr_relig_spirit--diet_sugardrink	0.030	0.013	0.004	0.056

##	hr_social--diet_sugardrink	0.037	0.013	0.012	0.065
##	hr_family--diet_sugardrink	0.018	0.013	-0.009	0.042
##	hr_tv--diet_sugardrink	0.065	0.013	0.039	0.090
##	hr_commute--diet_sugardrink	0.031	0.013	0.005	0.056
##	hr_meditate--diet_sugardrink	-0.004	0.013	-0.030	0.021
##	pa_weights--diet_sugardrink	-0.099	0.013	-0.124	-0.072
##	hr_volunteer--diet_energydrink	0.005	0.013	-0.020	0.030
##	hr_relig_spirit--diet_energydrink	0.001	0.014	-0.025	0.029
##	hr_social--diet_energydrink	-0.053	0.013	-0.076	-0.025
##	hr_family--diet_energydrink	0.019	0.013	-0.008	0.045
##	hr_tv--diet_energydrink	0.044	0.013	0.017	0.069
##	hr_commute--diet_energydrink	0.016	0.013	-0.011	0.041
##	hr_meditate--diet_energydrink	0.014	0.013	-0.016	0.038
##	pa_weights--diet_energydrink	0.026	0.013	0.000	0.050
##	diet_sugardrink--diet_energydrink	0.077	0.013	0.052	0.102
##	hr_volunteer--fruitvegs	0.087	0.013	0.062	0.113
##	hr_relig_spirit--fruitvegs	0.030	0.013	0.005	0.055
##	hr_social--fruitvegs	0.019	0.013	-0.007	0.044
##	hr_family--fruitvegs	0.061	0.013	0.035	0.087
##	hr_tv--fruitvegs	-0.048	0.013	-0.074	-0.022
##	hr_commute--fruitvegs	0.014	0.013	-0.014	0.037
##	hr_meditate--fruitvegs	0.073	0.013	0.045	0.096
##	pa_weights--fruitvegs	0.104	0.013	0.078	0.129
##	diet_sugardrink--fruitvegs	-0.022	0.013	-0.047	0.003
##	diet_energydrink--fruitvegs	0.015	0.013	-0.011	0.041
##	hr_volunteer--sleep_nap	0.023	0.013	-0.003	0.051
##	hr_relig_spirit--sleep_nap	-0.002	0.013	-0.025	0.025
##	hr_social--sleep_nap	0.070	0.014	0.042	0.096
##	hr_family--sleep_nap	-0.012	0.013	-0.042	0.011
##	hr_tv--sleep_nap	0.056	0.013	0.031	0.082
##	hr_commute--sleep_nap	-0.009	0.013	-0.032	0.020
##	hr_meditate--sleep_nap	0.049	0.013	0.022	0.073
##	pa_weights--sleep_nap	0.001	0.013	-0.024	0.027
##	diet_sugardrink--sleep_nap	0.037	0.014	0.011	0.065
##	diet_energydrink--sleep_nap	0.011	0.013	-0.014	0.036
##	fruitvegs--sleep_nap	-0.019	0.013	-0.046	0.008
##	hr_volunteer--subst_freq_alc	0.004	0.013	-0.024	0.028
##	hr_relig_spirit--subst_freq_alc	-0.067	0.013	-0.092	-0.042
##	hr_social--subst_freq_alc	0.045	0.013	0.021	0.071
##	hr_family--subst_freq_alc	-0.068	0.013	-0.096	-0.045
##	hr_tv--subst_freq_alc	-0.021	0.013	-0.046	0.006
##	hr_commute--subst_freq_alc	-0.014	0.013	-0.040	0.012
##	hr_meditate--subst_freq_alc	0.000	0.013	-0.021	0.031
##	pa_weights--subst_freq_alc	0.006	0.013	-0.020	0.033
##	diet_sugardrink--subst_freq_alc	-0.034	0.013	-0.060	-0.008
##	diet_energydrink--subst_freq_alc	0.029	0.013	0.000	0.052
##	fruitvegs--subst_freq_alc	0.041	0.013	0.013	0.065
##	sleep_nap--subst_freq_alc	-0.001	0.014	-0.026	0.026
##	hr_volunteer--subst_freq_cannabis	-0.023	0.013	-0.045	0.006
##	hr_relig_spirit--subst_freq_cannabis	-0.049	0.013	-0.076	-0.025
##	hr_social--subst_freq_cannabis	0.023	0.013	-0.001	0.050
##	hr_family--subst_freq_cannabis	-0.047	0.014	-0.075	-0.021
##	hr_tv--subst_freq_cannabis	0.067	0.013	0.041	0.092
##	hr_commute--subst_freq_cannabis	0.018	0.013	-0.009	0.044

##	hr_meditate--subst_freq_cannabis	0.067	0.013	0.040	0.090
##	pa_weights--subst_freq_cannabis	0.001	0.013	-0.025	0.026
##	diet_sugardrink--subst_freq_cannabis	-0.004	0.014	-0.030	0.024
##	diet_energydrink--subst_freq_cannabis	-0.003	0.013	-0.029	0.022
##	fruitvegs--subst_freq_cannabis	-0.014	0.013	-0.042	0.009
##	sleep_nap--subst_freq_cannabis	-0.010	0.013	-0.036	0.015
##	subst_freq_alc--subst_freq_cannabis	0.209	0.013	0.184	0.235
##	hr_volunteer--subst_freq_tobacco	-0.040	0.013	-0.067	-0.016
##	hr_relig_spirit--subst_freq_tobacco	-0.017	0.013	-0.046	0.006
##	hr_social--subst_freq_tobacco	0.046	0.013	0.018	0.070
##	hr_family--subst_freq_tobacco	0.031	0.013	0.006	0.057
##	hr_tv--subst_freq_tobacco	0.008	0.013	-0.020	0.032
##	hr_commute--subst_freq_tobacco	-0.017	0.013	-0.043	0.009
##	hr_meditate--subst_freq_tobacco	0.022	0.013	0.000	0.050
##	pa_weights--subst_freq_tobacco	-0.015	0.013	-0.042	0.010
##	diet_sugardrink--subst_freq_tobacco	0.014	0.013	-0.010	0.041
##	diet_energydrink--subst_freq_tobacco	0.138	0.013	0.113	0.164
##	fruitvegs--subst_freq_tobacco	-0.012	0.013	-0.037	0.013
##	sleep_nap--subst_freq_tobacco	0.017	0.013	-0.009	0.042
##	subst_freq_alc--subst_freq_tobacco	0.138	0.013	0.114	0.164
##	subst_freq_cannabis--subst_freq_tobacco	0.254	0.013	0.229	0.279
##	hr_volunteer--subst_alc_freq_binge	0.006	0.013	-0.017	0.035
##	hr_relig_spirit--subst_alc_freq_binge	0.010	0.013	-0.017	0.036
##	hr_social--subst_alc_freq_binge	0.094	0.013	0.067	0.119
##	hr_family--subst_alc_freq_binge	-0.047	0.014	-0.072	-0.018
##	hr_tv--subst_alc_freq_binge	-0.017	0.014	-0.047	0.009
##	hr_commute--subst_alc_freq_binge	0.001	0.013	-0.025	0.027
##	hr_meditate--subst_alc_freq_binge	-0.033	0.013	-0.064	-0.012
##	pa_weights--subst_alc_freq_binge	0.030	0.013	0.005	0.055
##	diet_sugardrink--subst_alc_freq_binge	-0.003	0.013	-0.029	0.023
##	diet_energydrink--subst_alc_freq_binge	0.020	0.014	-0.005	0.048
##	fruitvegs--subst_alc_freq_binge	-0.033	0.013	-0.057	-0.006
##	sleep_nap--subst_alc_freq_binge	0.014	0.013	-0.013	0.039
##	subst_freq_alc--subst_alc_freq_binge	0.588	0.009	0.572	0.605
##	subst_freq_cannabis--subst_alc_freq_binge	0.042	0.013	0.016	0.068
##	subst_freq_tobacco--subst_alc_freq_binge	0.111	0.013	0.085	0.137
##	hr_volunteer--pa_met_tot	0.005	0.013	-0.026	0.027
##	hr_relig_spirit--pa_met_tot	-0.021	0.013	-0.044	0.008
##	hr_social--pa_met_tot	0.047	0.013	0.022	0.073
##	hr_family--pa_met_tot	0.022	0.013	-0.004	0.048
##	hr_tv--pa_met_tot	-0.003	0.013	-0.030	0.022
##	hr_commute--pa_met_tot	0.034	0.013	0.010	0.061
##	hr_meditate--pa_met_tot	-0.030	0.014	-0.059	-0.007
##	pa_weights--pa_met_tot	0.391	0.011	0.370	0.415
##	diet_sugardrink--pa_met_tot	0.027	0.013	0.001	0.053
##	diet_energydrink--pa_met_tot	0.013	0.013	-0.011	0.040
##	fruitvegs--pa_met_tot	0.051	0.013	0.027	0.077
##	sleep_nap--pa_met_tot	-0.010	0.013	-0.037	0.016
##	subst_freq_alc--pa_met_tot	0.008	0.013	-0.020	0.033
##	subst_freq_cannabis--pa_met_tot	0.003	0.013	-0.022	0.029
##	subst_freq_tobacco--pa_met_tot	-0.005	0.013	-0.029	0.023
##	subst_alc_freq_binge--pa_met_tot	-0.003	0.013	-0.029	0.024
##	hr_volunteer--sleep_hrs_average	-0.069	0.013	-0.095	-0.043
##	hr_relig_spirit--sleep_hrs_average	-0.034	0.013	-0.058	-0.006

##	hr_social--sleep_hrs_average	0.026	0.013	-0.001	0.051
##	hr_family--sleep_hrs_average	-0.002	0.013	-0.026	0.024
##	hr_tv--sleep_hrs_average	0.106	0.013	0.080	0.130
##	hr_commute--sleep_hrs_average	-0.067	0.013	-0.094	-0.042
##	hr_meditate--sleep_hrs_average	0.021	0.013	-0.008	0.043
##	pa_weights--sleep_hrs_average	0.011	0.013	-0.014	0.036
##	diet_sugardrink--sleep_hrs_average	-0.022	0.013	-0.047	0.003
##	diet_energydrink--sleep_hrs_average	-0.105	0.013	-0.132	-0.080
##	fruitvegs--sleep_hrs_average	0.015	0.013	-0.013	0.040
##	sleep_nap--sleep_hrs_average	-0.055	0.013	-0.077	-0.027
##	subst_freq_alc--sleep_hrs_average	0.002	0.013	-0.023	0.030
##	subst_freq_cannabis--sleep_hrs_average	0.022	0.013	-0.004	0.048
##	subst_freq_tobacco--sleep_hrs_average	-0.022	0.013	-0.047	0.004
##	subst_alc_freq_binge--sleep_hrs_average	-0.030	0.013	-0.057	-0.004
##	pa_met_tot--sleep_hrs_average	-0.027	0.013	-0.053	0.000
##	hr_volunteer--sleep_hrs_diff	0.011	0.013	-0.017	0.035
##	hr_relig_spirit--sleep_hrs_diff	-0.032	0.013	-0.057	-0.004
##	hr_social--sleep_hrs_diff	-0.007	0.013	-0.031	0.022
##	hr_family--sleep_hrs_diff	-0.059	0.013	-0.086	-0.033
##	hr_tv--sleep_hrs_diff	0.035	0.013	0.010	0.060
##	hr_commute--sleep_hrs_diff	-0.037	0.013	-0.060	-0.010
##	hr_meditate--sleep_hrs_diff	-0.036	0.013	-0.065	-0.011
##	pa_weights--sleep_hrs_diff	-0.021	0.013	-0.049	0.003
##	diet_sugardrink--sleep_hrs_diff	-0.016	0.013	-0.043	0.008
##	diet_energydrink--sleep_hrs_diff	0.017	0.013	-0.008	0.044
##	fruitvegs--sleep_hrs_diff	-0.021	0.013	-0.047	0.006
##	sleep_nap--sleep_hrs_diff	0.077	0.013	0.051	0.104
##	subst_freq_alc--sleep_hrs_diff	0.031	0.013	0.004	0.056
##	subst_freq_cannabis--sleep_hrs_diff	-0.012	0.013	-0.039	0.014
##	subst_freq_tobacco--sleep_hrs_diff	0.014	0.013	-0.012	0.041
##	subst_alc_freq_binge--sleep_hrs_diff	-0.091	0.013	-0.115	-0.064
##	pa_met_tot--sleep_hrs_diff	0.007	0.013	-0.018	0.034
##	sleep_hrs_average--sleep_hrs_diff	-0.056	0.013	-0.082	-0.029
##	---				

Supplemental Figure 3



Network graph - High psychological distress

1.2.b High psychological distress group - strength centrality indices

Supplemental Table 4

```
## BGGM: Bayesian Gaussian Graphical Models
## ---
## Network Stats: Roll Your Own
## Posterior Samples: 30050
## ---
## Estimates:
##
##           Node Post.mean Post.sd Cred.lb Cred.ub
## volunteer hours           1    0.943  0.035  0.875  1.011
## religion/spiritual hours    2    1.029  0.038  0.958  1.103
## friend hours                3    0.968  0.043  0.882  1.052
## family hours                4    0.893  0.037  0.823  0.965
## tv hours                    5    1.082  0.045  0.991  1.171
## commute hours              6    0.827  0.038  0.753  0.902
## meditate hours             7    1.048  0.042  0.962  1.131
## strength training          8    0.897  0.035  0.831  0.967
## sugary drinks              9    0.438  0.038  0.364  0.511
## energy drinks             10    0.440  0.034  0.373  0.509
## fruits & vegetables       11    0.523  0.037  0.452  0.595
## daytime napping           12    0.341  0.031  0.282  0.402
## alcohol use frequency     13    1.222  0.033  1.158  1.286
## cannabis use frequency    14    0.734  0.031  0.676  0.794
## tobacco use frequency     15    0.759  0.030  0.702  0.819
## alcohol binge drinking frequency 16    1.099  0.038  1.026  1.174
## physical activity total   17    0.613  0.035  0.546  0.683
## sleep quantity           18    0.546  0.037  0.473  0.618
## sleep hours difference    19    0.452  0.039  0.374  0.528
## ---
```

Supplemental Figure 4



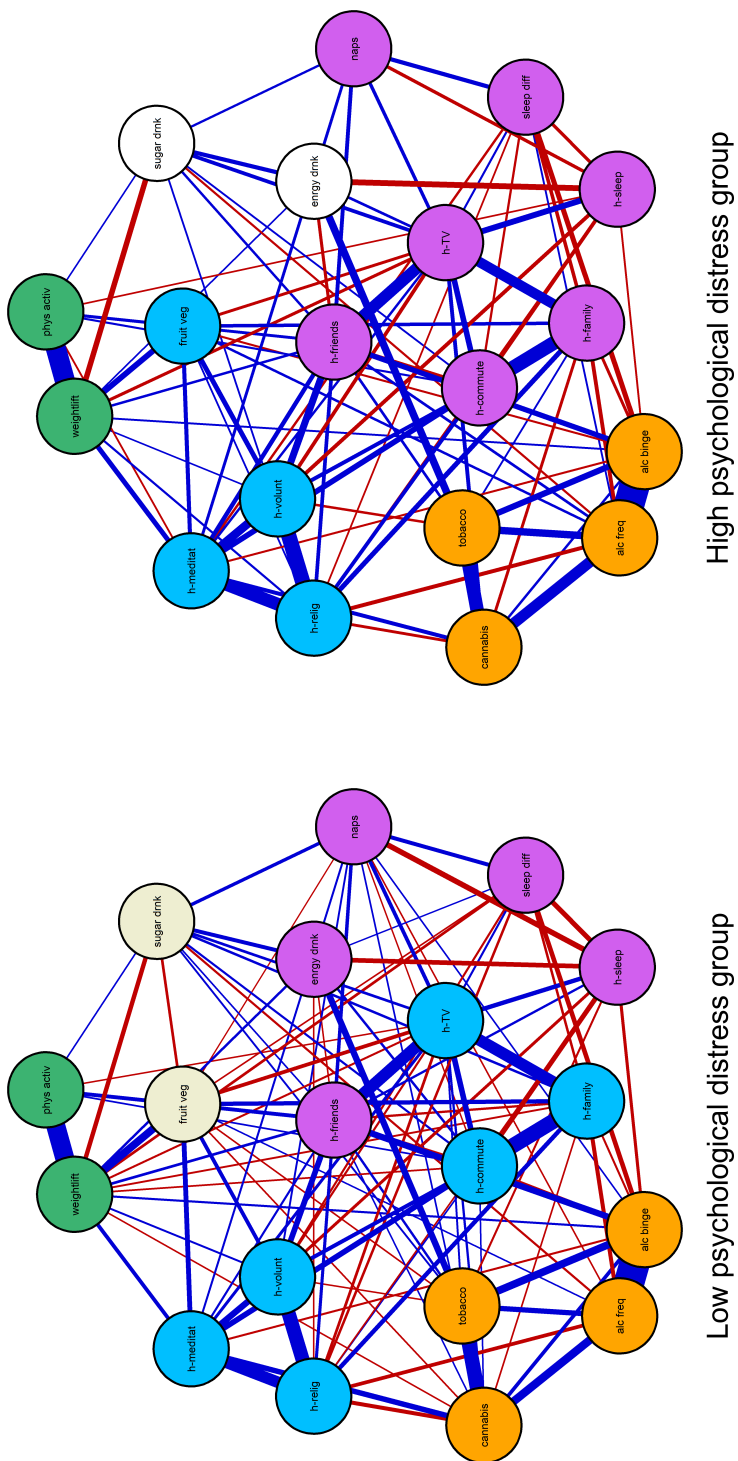
1.2.c High psychological distress group - cluster identification

```
beh_pdhi_communities
```

```
## Model: BGGM (continuous)
## Prior SD: 0.25 (5000 iterations)
## Credible Interval: 0.95 (two-sided)
## Analytic: No
##
## Number of nodes: 19
## Number of edges: 88
## Edge density: 0.515
##
## Non-zero edge weights:
##      M      SD      Min      Max
## 0.050 0.110 -0.104 0.589
##
## ----
##
## Algorithm: Walktrap (Steps = 3)
##
## Number of communities: 4
##
##      hr_volunteer      hr_relig_spirit      hr_social
##              1              1              2
##      hr_family      hr_tv      hr_commute
##              2              2              2
##      hr_meditate      pa_weights      diet_sugardrink
##              1              3              NA
##      diet_energydrink      fruitvegs      sleep_nap
##              NA              1              2
##      subst_freq_alc      subst_freq_cannabis      subst_freq_tobacco
##              4              4              4
##      subst_alc_freq_binge      pa_met_tot      sleep_hrs_average
##              4              3              2
##      sleep_hrs_diff
##              2
##
##
## ----
##
## TEFI: -12.797
```

1.3 Network comparison by levels of psychological distress

Supplemental figure 5 (Side-by-side networks)



Supplemental Table 5

Differences in partial correlations between high and low psychological distress groups

##	Relation	Post.mean	Post.sd	Cred.lb	Cred.ub
## 13	hr_social--hr_commute	-0.078	0.007	-0.093	-0.064
## 10	hr_family--hr_tv	-0.064	0.007	-0.077	-0.051
## 11	hr_volunteer--hr_commute	-0.043	0.007	-0.056	-0.030
## 91	subst_freq_alc--subst_freq_cannabis	-0.041	0.007	-0.054	-0.028
## 3	hr_relig_spirit--hr_social	-0.039	0.007	-0.052	-0.025
## 12	hr_relig_spirit--hr_commute	-0.036	0.007	-0.049	-0.023
## 120	subst_freq_tobacco--subst_alc_freq_binge	-0.031	0.007	-0.044	-0.018
## 61	hr_commute--sleep_nap	-0.029	0.007	-0.043	-0.015
## 130	diet_energydrink--pa_met_tot	-0.029	0.007	-0.043	-0.015
## 85	hr_meditate--subst_freq_cannabis	-0.028	0.007	-0.042	-0.015
## 88	diet_energydrink--subst_freq_cannabis	-0.028	0.007	-0.042	-0.014
## 72	hr_commute--subst_freq_alc	-0.026	0.007	-0.039	-0.012
## 49	hr_family--fruitvegs	-0.025	0.007	-0.039	-0.012
## 126	hr_commute--pa_met_tot	-0.023	0.007	-0.037	-0.010
## 97	hr_commute--subst_freq_tobacco	-0.022	0.007	-0.036	-0.009
## 19	hr_family--hr_meditate	-0.021	0.007	-0.034	-0.007
## 75	diet_sugardrink--subst_freq_alc	-0.021	0.007	-0.035	-0.008
## 4	hr_volunteer--hr_family	-0.020	0.007	-0.034	-0.007
## 143	hr_meditate--sleep_hrs_average	-0.020	0.007	-0.034	-0.007
## 39	hr_social--diet_energydrink	-0.019	0.007	-0.033	-0.005
## 152	subst_alc_freq_binge--sleep_hrs_average	-0.018	0.007	-0.032	-0.005
## 66	fruitvegs--sleep_nap	-0.017	0.007	-0.030	-0.003
## 127	hr_meditate--pa_met_tot	-0.017	0.007	-0.030	-0.003
## 17	hr_relig_spirit--hr_meditate	-0.016	0.007	-0.029	-0.003
## 23	hr_relig_spirit--pa_weights	-0.016	0.007	-0.030	-0.002
## 71	hr_tv--subst_freq_alc	-0.016	0.007	-0.029	-0.002
## 111	hr_commute--subst_alc_freq_binge	-0.016	0.007	-0.030	-0.003
## 157	hr_family--sleep_hrs_diff	-0.016	0.007	-0.030	-0.003
## 27	hr_commute--pa_weights	-0.015	0.007	-0.029	-0.002
## 69	hr_social--subst_freq_alc	-0.015	0.007	-0.029	-0.001
## 135	subst_freq_tobacco--pa_met_tot	-0.015	0.007	-0.029	-0.001
## 138	hr_relig_spirit--sleep_hrs_average	-0.015	0.007	-0.028	-0.001
## 38	hr_relig_spirit--diet_energydrink	-0.014	0.007	-0.028	-0.001
## 42	hr_commute--diet_energydrink	-0.014	0.007	-0.028	0.000
## 65	diet_energydrink--sleep_nap	-0.014	0.007	-0.028	-0.001
## 108	hr_social--subst_alc_freq_binge	-0.014	0.007	-0.028	-0.001
## 112	hr_meditate--subst_alc_freq_binge	-0.014	0.007	-0.027	0.000
## 146	diet_energydrink--sleep_hrs_average	-0.014	0.007	-0.028	-0.001
## 155	hr_relig_spirit--sleep_hrs_diff	-0.014	0.007	-0.027	0.000
## 156	hr_social--sleep_hrs_diff	-0.014	0.007	-0.027	0.000
## 139	hr_social--sleep_hrs_average	-0.013	0.007	-0.026	0.001
## 150	subst_freq_cannabis--sleep_hrs_average	-0.013	0.007	-0.027	0.000
## 67	hr_volunteer--subst_freq_alc	-0.012	0.007	-0.026	0.001
## 74	pa_weights--subst_freq_alc	-0.012	0.007	-0.026	0.001
## 89	fruitvegs--subst_freq_cannabis	-0.012	0.007	-0.025	0.002
## 169	subst_alc_freq_binge--sleep_hrs_diff	-0.012	0.007	-0.026	0.001
## 122	hr_relig_spirit--pa_met_tot	-0.011	0.007	-0.026	0.003
## 134	subst_freq_cannabis--pa_met_tot	-0.011	0.007	-0.025	0.003
## 34	hr_commute--diet_sugardrink	-0.010	0.007	-0.024	0.004
## 93	hr_relig_spirit--subst_freq_tobacco	-0.010	0.007	-0.024	0.003

## 149	subst_freq_alc--sleep_hrs_average	-0.010	0.007	-0.024	0.003
## 70	hr_family--subst_freq_alc	-0.009	0.007	-0.022	0.005
## 124	hr_family--pa_met_tot	-0.009	0.007	-0.023	0.005
## 131	fruitvegs--pa_met_tot	-0.009	0.007	-0.023	0.004
## 162	diet_sugardrink--sleep_hrs_diff	-0.009	0.007	-0.022	0.005
## 164	fruitvegs--sleep_hrs_diff	-0.009	0.007	-0.023	0.004
## 98	hr_meditate--subst_freq_tobacco	-0.008	0.007	-0.021	0.006
## 114	diet_sugardrink--subst_alc_freq_binge	-0.008	0.007	-0.022	0.006
## 154	hr_volunteer--sleep_hrs_diff	-0.007	0.007	-0.021	0.006
## 161	pa_weights--sleep_hrs_diff	-0.007	0.007	-0.020	0.007
## 46	hr_volunteer--fruitvegs	-0.006	0.007	-0.020	0.007
## 107	hr_relig_spirit--subst_alc_freq_binge	-0.006	0.007	-0.019	0.008
## 116	fruitvegs--subst_alc_freq_binge	-0.006	0.007	-0.019	0.008
## 53	pa_weights--fruitvegs	-0.004	0.007	-0.017	0.010
## 142	hr_commute--sleep_hrs_average	-0.004	0.007	-0.017	0.010
## 54	diet_sugardrink--fruitvegs	-0.003	0.007	-0.017	0.010
## 87	diet_sugardrink--subst_freq_cannabis	-0.003	0.007	-0.016	0.010
## 117	sleep_nap--subst_alc_freq_binge	-0.003	0.007	-0.017	0.011
## 136	subst_alc_freq_binge--pa_met_tot	-0.003	0.007	-0.016	0.011
## 167	subst_freq_cannabis--sleep_hrs_diff	-0.003	0.007	-0.016	0.011
## 36	pa_weights--diet_sugardrink	-0.002	0.007	-0.016	0.011
## 76	diet_energydrink--subst_freq_alc	-0.002	0.007	-0.016	0.011
## 115	diet_energydrink--subst_alc_freq_binge	-0.002	0.007	-0.015	0.012
## 165	sleep_nap--sleep_hrs_diff	-0.002	0.007	-0.015	0.012
## 166	subst_freq_alc--sleep_hrs_diff	-0.002	0.007	-0.016	0.012
## 50	hr_tv--fruitvegs	-0.001	0.007	-0.014	0.012
## 79	hr_volunteer--subst_freq_cannabis	-0.001	0.007	-0.014	0.013
## 92	hr_volunteer--subst_freq_tobacco	-0.001	0.007	-0.015	0.012
## 57	hr_relig_spirit--sleep_nap	0.000	0.007	-0.014	0.013
## 60	hr_tv--sleep_nap	0.000	0.007	-0.014	0.014
## 102	fruitvegs--subst_freq_tobacco	0.000	0.007	-0.014	0.014
## 109	hr_family--subst_alc_freq_binge	0.000	0.007	-0.013	0.014
## 20	hr_tv--hr_meditate	0.001	0.007	-0.012	0.015
## 33	hr_tv--diet_sugardrink	0.001	0.007	-0.013	0.014
## 45	diet_sugardrink--diet_energydrink	0.001	0.007	-0.013	0.015
## 52	hr_meditate--fruitvegs	0.001	0.007	-0.012	0.014
## 83	hr_tv--subst_freq_cannabis	0.001	0.007	-0.013	0.014
## 113	pa_weights--subst_alc_freq_binge	0.001	0.007	-0.013	0.015
## 144	pa_weights--sleep_hrs_average	0.001	0.007	-0.012	0.014
## 28	hr_meditate--pa_weights	0.002	0.007	-0.011	0.015
## 110	hr_tv--subst_alc_freq_binge	0.002	0.007	-0.012	0.016
## 133	subst_freq_alc--pa_met_tot	0.002	0.007	-0.011	0.016
## 145	diet_sugardrink--sleep_hrs_average	0.002	0.007	-0.012	0.015
## 22	hr_volunteer--pa_weights	0.003	0.007	-0.010	0.017
## 37	hr_volunteer--diet_energydrink	0.003	0.007	-0.010	0.017
## 121	hr_volunteer--pa_met_tot	0.003	0.007	-0.010	0.017
## 132	sleep_nap--pa_met_tot	0.003	0.007	-0.011	0.016
## 160	hr_meditate--sleep_hrs_diff	0.003	0.007	-0.011	0.017
## 29	hr_volunteer--diet_sugardrink	0.004	0.007	-0.010	0.018
## 30	hr_relig_spirit--diet_sugardrink	0.004	0.007	-0.010	0.018
## 35	hr_meditate--diet_sugardrink	0.004	0.007	-0.010	0.017
## 73	hr_meditate--subst_freq_alc	0.004	0.007	-0.009	0.018
## 78	sleep_nap--subst_freq_alc	0.004	0.007	-0.010	0.018
## 80	hr_relig_spirit--subst_freq_cannabis	0.004	0.007	-0.010	0.017

## 103	sleep_nap--subst_freq_tobacco	0.004	0.007	-0.010	0.017
## 44	pa_weights--diet_energydrink	0.005	0.007	-0.009	0.018
## 100	diet_sugardrink--subst_freq_tobacco	0.005	0.007	-0.008	0.019
## 137	hr_volunteer--sleep_hrs_average	0.005	0.007	-0.008	0.019
## 7	hr_volunteer--hr_tv	0.006	0.007	-0.008	0.019
## 51	hr_commute--fruitvegs	0.006	0.007	-0.008	0.019
## 64	diet_sugardrink--sleep_nap	0.006	0.007	-0.007	0.020
## 125	hr_tv--pa_met_tot	0.006	0.007	-0.007	0.020
## 129	diet_sugardrink--pa_met_tot	0.006	0.007	-0.008	0.019
## 140	hr_family--sleep_hrs_average	0.006	0.007	-0.008	0.019
## 62	hr_meditate--sleep_nap	0.007	0.007	-0.007	0.020
## 86	pa_weights--subst_freq_cannabis	0.007	0.007	-0.006	0.020
## 56	hr_volunteer--sleep_nap	0.008	0.007	-0.005	0.022
## 163	diet_energydrink--sleep_hrs_diff	0.008	0.007	-0.005	0.022
## 123	hr_social--pa_met_tot	0.009	0.007	-0.004	0.023
## 158	hr_tv--sleep_hrs_diff	0.009	0.007	-0.004	0.023
## 24	hr_social--pa_weights	0.010	0.007	-0.003	0.024
## 25	hr_family--pa_weights	0.010	0.007	-0.004	0.024
## 26	hr_tv--pa_weights	0.010	0.007	-0.004	0.023
## 94	hr_social--subst_freq_tobacco	0.010	0.007	-0.004	0.024
## 32	hr_family--diet_sugardrink	0.011	0.007	-0.003	0.024
## 81	hr_social--subst_freq_cannabis	0.011	0.007	-0.003	0.024
## 99	pa_weights--subst_freq_tobacco	0.013	0.007	-0.001	0.026
## 41	hr_tv--diet_energydrink	0.014	0.007	0.001	0.028
## 141	hr_tv--sleep_hrs_average	0.014	0.007	0.000	0.027
## 153	pa_met_tot--sleep_hrs_average	0.014	0.007	0.000	0.028
## 8	hr_relig_spirit--hr_tv	0.015	0.007	0.002	0.029
## 43	hr_meditate--diet_energydrink	0.015	0.007	0.002	0.029
## 55	diet_energydrink--fruitvegs	0.015	0.007	0.002	0.028
## 101	diet_energydrink--subst_freq_tobacco	0.015	0.007	0.001	0.028
## 104	subst_freq_alc--subst_freq_tobacco	0.015	0.007	0.001	0.028
## 106	hr_volunteer--subst_alc_freq_binge	0.015	0.007	0.002	0.029
## 18	hr_social--hr_meditate	0.016	0.007	0.002	0.029
## 59	hr_family--sleep_nap	0.016	0.007	0.002	0.030
## 96	hr_tv--subst_freq_tobacco	0.016	0.007	0.002	0.029
## 31	hr_social--diet_sugardrink	0.017	0.007	0.003	0.031
## 159	hr_commute--sleep_hrs_diff	0.019	0.007	0.006	0.033
## 21	hr_commute--hr_meditate	0.021	0.007	0.007	0.034
## 9	hr_social--hr_tv	0.022	0.007	0.008	0.035
## 16	hr_volunteer--hr_meditate	0.022	0.007	0.009	0.035
## 47	hr_relig_spirit--fruitvegs	0.022	0.007	0.008	0.035
## 82	hr_family--subst_freq_cannabis	0.022	0.007	0.008	0.035
## 168	subst_freq_tobacco--sleep_hrs_diff	0.022	0.007	0.009	0.036
## 170	pa_met_tot--sleep_hrs_diff	0.022	0.007	0.008	0.036
## 2	hr_volunteer--hr_social	0.023	0.007	0.009	0.036
## 151	subst_freq_tobacco--sleep_hrs_average	0.023	0.007	0.009	0.037
## 40	hr_family--diet_energydrink	0.024	0.007	0.011	0.037
## 77	fruitvegs--subst_freq_alc	0.024	0.007	0.010	0.038
## 90	sleep_nap--subst_freq_cannabis	0.024	0.007	0.011	0.038
## 147	fruitvegs--sleep_hrs_average	0.024	0.007	0.011	0.038
## 148	sleep_nap--sleep_hrs_average	0.024	0.007	0.011	0.037
## 171	sleep_hrs_average--sleep_hrs_diff	0.024	0.007	0.011	0.038
## 68	hr_relig_spirit--subst_freq_alc	0.025	0.007	0.011	0.039
## 118	subst_freq_alc--subst_alc_freq_binge	0.026	0.004	0.017	0.034

## 5	hr_relig_spirit--hr_family	0.028	0.007	0.015	0.042
## 58	hr_social--sleep_nap	0.028	0.007	0.014	0.041
## 63	pa_weights--sleep_nap	0.028	0.007	0.014	0.042
## 95	hr_family--subst_freq_tobacco	0.028	0.007	0.014	0.042
## 1	hr_volunteer--hr_relig_spirit	0.029	0.007	0.016	0.042
## 119	subst_freq_cannabis--subst_alc_freq_binge	0.030	0.007	0.016	0.043
## 48	hr_social--fruitvegs	0.032	0.007	0.018	0.045
## 6	hr_social--hr_family	0.046	0.007	0.032	0.060
## 128	pa_weights--pa_met_tot	0.046	0.006	0.034	0.057
## 105	subst_freq_cannabis--subst_freq_tobacco	0.047	0.007	0.034	0.059
## 84	hr_commute--subst_freq_cannabis	0.049	0.007	0.035	0.062
## 15	hr_tv--hr_commute	0.058	0.007	0.044	0.071
## 14	hr_family--hr_commute	0.188	0.006	0.175	0.201

2.0 Lifestyle Behavior Clustering by COVID time period

2.1 Pre-COVID Sample

2.1.a Pre-COVID - partial correlations

Supplemental Table 6

```
summary(fit_ncha_precovid)
```

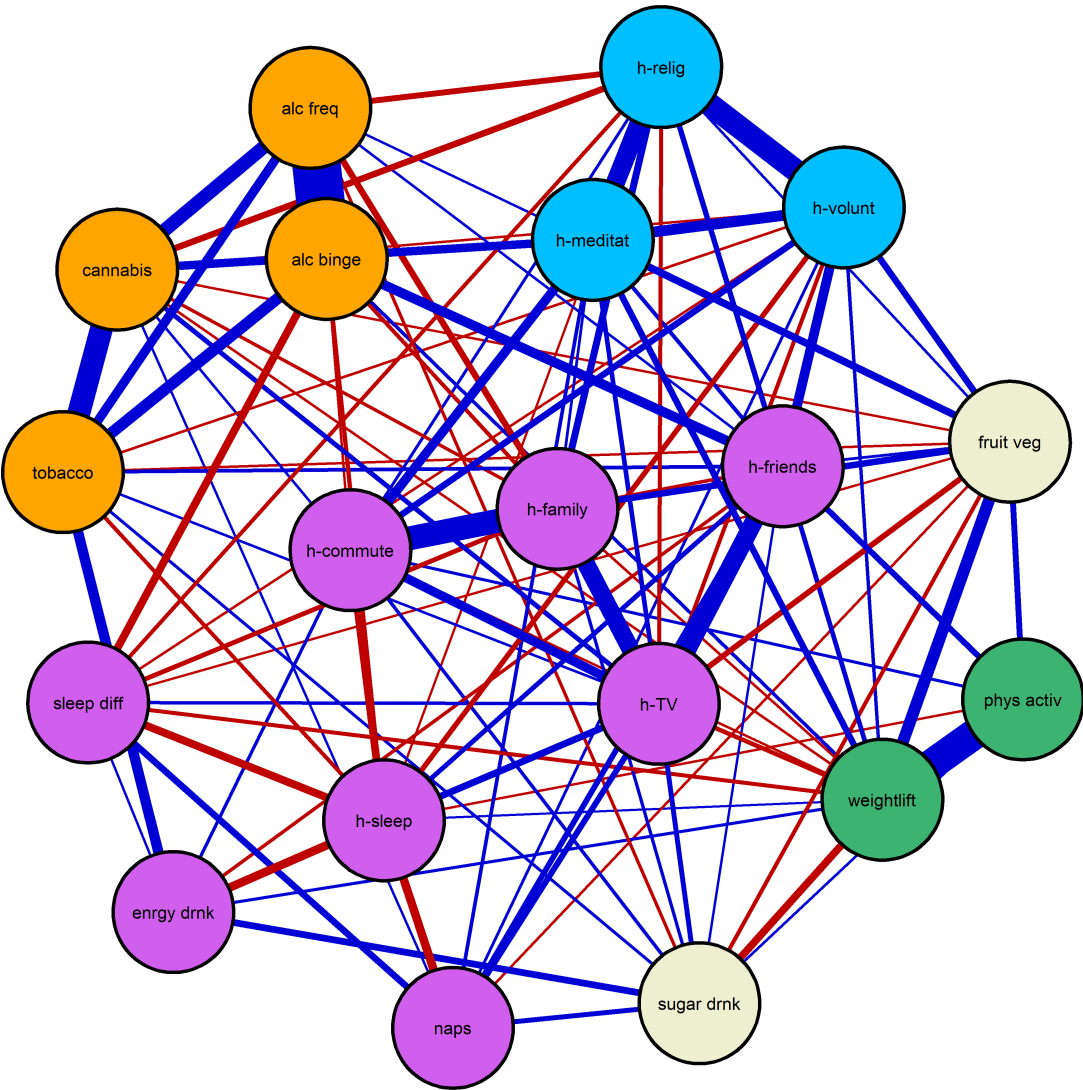
```
## BGGM: Bayesian Gaussian Graphical Models
## ---
## Type: continuous
## Analytic: FALSE
## Formula:
## Posterior Samples: 30050
## Observations (n):
## Nodes (p): 19
## Relations: 171
## ---
## Call:
## estimate(Y = as.matrix(subset(Y, .imp == x)[, -1]), type = "continuous",
##   iter = iter, impute = FALSE, cores = 7)
## ---
## Estimates:
##               Relation Post.mean Post.sd Cred.lb Cred.ub
## hr_volunteer--hr_relig_spirit    0.279  0.006  0.268  0.290
## hr_volunteer--hr_social          0.114  0.006  0.102  0.125
## hr_relig_spirit--hr_social        0.059  0.006  0.048  0.071
## hr_volunteer--hr_family          0.010  0.006 -0.001  0.021
## hr_relig_spirit--hr_family        0.083  0.006  0.070  0.092
## hr_social--hr_family             -0.030  0.006 -0.041 -0.018
## hr_volunteer--hr_tv             -0.043  0.006 -0.054 -0.031
## hr_relig_spirit--hr_tv           -0.043  0.006 -0.054 -0.030
## hr_social--hr_tv                 0.223  0.006  0.212  0.234
## hr_family--hr_tv                 0.218  0.006  0.207  0.228
## hr_volunteer--hr_commute         0.074  0.006  0.063  0.086
## hr_relig_spirit--hr_commute       0.030  0.006  0.020  0.043
## hr_social--hr_commute            -0.035  0.006 -0.047 -0.024
## hr_family--hr_commute            0.293  0.005  0.283  0.304
## hr_tv--hr_commute                0.107  0.006  0.095  0.117
## hr_volunteer--hr_meditate        0.130  0.006  0.119  0.142
## hr_relig_spirit--hr_meditate     0.232  0.006  0.222  0.244
## hr_social--hr_meditate           0.041  0.006  0.030  0.053
## hr_family--hr_meditate           0.028  0.006  0.016  0.039
## hr_tv--hr_meditate               0.050  0.006  0.037  0.061
## hr_commute--hr_meditate          0.109  0.006  0.099  0.122
## hr_volunteer--pa_weights         0.033  0.006  0.021  0.044
## hr_relig_spirit--pa_weights       0.023  0.006  0.013  0.035
## hr_social--pa_weights            0.052  0.006  0.039  0.062
## hr_family--pa_weights            -0.022  0.006 -0.035 -0.011
## hr_tv--pa_weights                -0.045  0.006 -0.057 -0.034
## hr_commute--pa_weights           -0.026  0.006 -0.037 -0.015
```

##	hr_meditate--pa_weights	0.072	0.006	0.060	0.084
##	hr_volunteer--diet_sugardrink	-0.004	0.006	-0.014	0.009
##	hr_relig_spirit--diet_sugardrink	0.006	0.006	-0.005	0.018
##	hr_social--diet_sugardrink	0.024	0.006	0.012	0.036
##	hr_family--diet_sugardrink	0.035	0.006	0.024	0.046
##	hr_tv--diet_sugardrink	0.052	0.006	0.042	0.064
##	hr_commute--diet_sugardrink	0.033	0.006	0.022	0.045
##	hr_meditate--diet_sugardrink	-0.009	0.006	-0.021	0.002
##	pa_weights--diet_sugardrink	-0.085	0.006	-0.097	-0.073
##	hr_volunteer--diet_energydrink	0.003	0.006	-0.010	0.013
##	hr_relig_spirit--diet_energydrink	-0.019	0.006	-0.029	-0.006
##	hr_social--diet_energydrink	-0.034	0.006	-0.044	-0.021
##	hr_family--diet_energydrink	0.010	0.006	-0.003	0.020
##	hr_tv--diet_energydrink	0.027	0.006	0.016	0.039
##	hr_commute--diet_energydrink	0.035	0.006	0.023	0.046
##	hr_meditate--diet_energydrink	0.018	0.006	0.006	0.029
##	pa_weights--diet_energydrink	0.030	0.006	0.019	0.041
##	diet_sugardrink--diet_energydrink	0.077	0.006	0.063	0.086
##	hr_volunteer--fruitvegs	0.074	0.006	0.062	0.085
##	hr_relig_spirit--fruitvegs	0.021	0.006	0.011	0.033
##	hr_social--fruitvegs	0.025	0.006	0.014	0.037
##	hr_family--fruitvegs	0.073	0.006	0.064	0.086
##	hr_tv--fruitvegs	-0.063	0.006	-0.075	-0.053
##	hr_commute--fruitvegs	0.009	0.006	-0.004	0.019
##	hr_meditate--fruitvegs	0.087	0.006	0.075	0.097
##	pa_weights--fruitvegs	0.139	0.006	0.129	0.151
##	diet_sugardrink--fruitvegs	-0.040	0.006	-0.051	-0.030
##	diet_energydrink--fruitvegs	-0.001	0.006	-0.013	0.010
##	hr_volunteer--sleep_nap	0.029	0.006	0.017	0.041
##	hr_relig_spirit--sleep_nap	-0.001	0.006	-0.013	0.009
##	hr_social--sleep_nap	0.060	0.006	0.048	0.072
##	hr_family--sleep_nap	-0.013	0.006	-0.026	-0.002
##	hr_tv--sleep_nap	0.067	0.006	0.056	0.079
##	hr_commute--sleep_nap	-0.016	0.006	-0.027	-0.004
##	hr_meditate--sleep_nap	0.039	0.006	0.030	0.052
##	pa_weights--sleep_nap	0.010	0.006	-0.001	0.022
##	diet_sugardrink--sleep_nap	0.055	0.006	0.043	0.067
##	diet_energydrink--sleep_nap	0.014	0.006	0.003	0.025
##	fruitvegs--sleep_nap	-0.021	0.006	-0.032	-0.009
##	hr_volunteer--subst_freq_alc	0.001	0.006	-0.010	0.013
##	hr_relig_spirit--subst_freq_alc	-0.065	0.006	-0.076	-0.053
##	hr_social--subst_freq_alc	0.026	0.006	0.014	0.036
##	hr_family--subst_freq_alc	-0.073	0.006	-0.086	-0.063
##	hr_tv--subst_freq_alc	-0.015	0.006	-0.027	-0.004
##	hr_commute--subst_freq_alc	-0.014	0.006	-0.025	-0.002
##	hr_meditate--subst_freq_alc	0.002	0.006	-0.009	0.014
##	pa_weights--subst_freq_alc	0.003	0.006	-0.009	0.014
##	diet_sugardrink--subst_freq_alc	-0.034	0.006	-0.045	-0.023
##	diet_energydrink--subst_freq_alc	0.011	0.006	-0.002	0.021
##	fruitvegs--subst_freq_alc	0.028	0.006	0.017	0.039
##	sleep_nap--subst_freq_alc	-0.018	0.006	-0.029	-0.006
##	hr_volunteer--subst_freq_cannabis	-0.021	0.006	-0.032	-0.009
##	hr_relig_spirit--subst_freq_cannabis	-0.072	0.006	-0.083	-0.060
##	hr_social--subst_freq_cannabis	0.018	0.006	0.007	0.030

##	hr_family--subst_freq_cannabis	-0.036	0.006	-0.048	-0.024
##	hr_tv--subst_freq_cannabis	0.053	0.006	0.041	0.064
##	hr_commute--subst_freq_cannabis	0.023	0.006	0.011	0.034
##	hr_meditate--subst_freq_cannabis	0.096	0.006	0.084	0.106
##	pa_weights--subst_freq_cannabis	-0.021	0.006	-0.033	-0.010
##	diet_sugardrink--subst_freq_cannabis	-0.002	0.006	-0.014	0.010
##	diet_energydrink--subst_freq_cannabis	0.000	0.006	-0.012	0.010
##	fruitvegs--subst_freq_cannabis	-0.020	0.006	-0.032	-0.010
##	sleep_nap--subst_freq_cannabis	0.021	0.006	0.009	0.032
##	subst_freq_alc--subst_freq_cannabis	0.166	0.006	0.156	0.179
##	hr_volunteer--subst_freq_tobacco	-0.025	0.006	-0.037	-0.015
##	hr_relig_spirit--subst_freq_tobacco	-0.007	0.006	-0.020	0.004
##	hr_social--subst_freq_tobacco	0.038	0.006	0.027	0.049
##	hr_family--subst_freq_tobacco	0.015	0.006	0.005	0.027
##	hr_tv--subst_freq_tobacco	0.028	0.006	0.016	0.039
##	hr_commute--subst_freq_tobacco	0.002	0.006	-0.011	0.012
##	hr_meditate--subst_freq_tobacco	0.006	0.006	-0.003	0.020
##	pa_weights--subst_freq_tobacco	0.000	0.006	-0.012	0.011
##	diet_sugardrink--subst_freq_tobacco	0.028	0.006	0.017	0.040
##	diet_energydrink--subst_freq_tobacco	0.126	0.006	0.117	0.139
##	fruitvegs--subst_freq_tobacco	-0.021	0.006	-0.032	-0.011
##	sleep_nap--subst_freq_tobacco	0.011	0.006	-0.001	0.022
##	subst_freq_alc--subst_freq_tobacco	0.107	0.006	0.097	0.119
##	subst_freq_cannabis--subst_freq_tobacco	0.280	0.005	0.268	0.290
##	hr_volunteer--subst_alc_freq_binge	0.009	0.006	-0.002	0.020
##	hr_relig_spirit--subst_alc_freq_binge	-0.007	0.006	-0.019	0.004
##	hr_social--subst_alc_freq_binge	0.113	0.006	0.102	0.124
##	hr_family--subst_alc_freq_binge	-0.037	0.006	-0.048	-0.024
##	hr_tv--subst_alc_freq_binge	-0.020	0.006	-0.032	-0.007
##	hr_commute--subst_alc_freq_binge	-0.022	0.006	-0.034	-0.011
##	hr_meditate--subst_alc_freq_binge	-0.035	0.006	-0.048	-0.026
##	pa_weights--subst_alc_freq_binge	0.034	0.006	0.024	0.046
##	diet_sugardrink--subst_alc_freq_binge	-0.003	0.006	-0.015	0.009
##	diet_energydrink--subst_alc_freq_binge	0.015	0.006	0.004	0.028
##	fruitvegs--subst_alc_freq_binge	-0.013	0.006	-0.024	-0.001
##	sleep_nap--subst_alc_freq_binge	0.019	0.006	0.008	0.031
##	subst_freq_alc--subst_alc_freq_binge	0.607	0.004	0.600	0.614
##	subst_freq_cannabis--subst_alc_freq_binge	0.061	0.006	0.050	0.073
##	subst_freq_tobacco--subst_alc_freq_binge	0.138	0.006	0.127	0.149
##	hr_volunteer--pa_met_tot	-0.002	0.006	-0.015	0.008
##	hr_relig_spirit--pa_met_tot	-0.001	0.006	-0.012	0.011
##	hr_social--pa_met_tot	0.067	0.006	0.057	0.080
##	hr_family--pa_met_tot	0.012	0.006	0.001	0.024
##	hr_tv--pa_met_tot	-0.017	0.006	-0.030	-0.007
##	hr_commute--pa_met_tot	0.028	0.006	0.018	0.040
##	hr_meditate--pa_met_tot	-0.017	0.006	-0.028	-0.005
##	pa_weights--pa_met_tot	0.383	0.005	0.373	0.392
##	diet_sugardrink--pa_met_tot	0.027	0.006	0.015	0.038
##	diet_energydrink--pa_met_tot	-0.003	0.006	-0.015	0.008
##	fruitvegs--pa_met_tot	0.065	0.006	0.053	0.075
##	sleep_nap--pa_met_tot	-0.007	0.006	-0.019	0.005
##	subst_freq_alc--pa_met_tot	0.018	0.006	0.006	0.030
##	subst_freq_cannabis--pa_met_tot	-0.002	0.006	-0.013	0.010
##	subst_freq_tobacco--pa_met_tot	-0.010	0.006	-0.021	0.002

##	subst_alc_freq_binge--pa_met_tot	-0.001	0.006	-0.013	0.010
##	hr_volunteer--sleep_hrs_average	-0.057	0.006	-0.068	-0.045
##	hr_relig_spirit--sleep_hrs_average	-0.023	0.006	-0.034	-0.011
##	hr_social--sleep_hrs_average	0.048	0.006	0.036	0.059
##	hr_family--sleep_hrs_average	0.005	0.006	-0.006	0.016
##	hr_tv--sleep_hrs_average	0.077	0.006	0.066	0.088
##	hr_commute--sleep_hrs_average	-0.089	0.006	-0.101	-0.078
##	hr_meditate--sleep_hrs_average	-0.010	0.006	-0.023	-0.001
##	pa_weights--sleep_hrs_average	0.020	0.006	0.009	0.031
##	diet_sugardrink--sleep_hrs_average	-0.019	0.006	-0.031	-0.009
##	diet_energydrink--sleep_hrs_average	-0.098	0.006	-0.110	-0.087
##	fruitvegs--sleep_hrs_average	0.019	0.006	0.006	0.030
##	sleep_nap--sleep_hrs_average	-0.098	0.006	-0.108	-0.087
##	subst_freq_alc--sleep_hrs_average	0.017	0.006	0.006	0.030
##	subst_freq_cannabis--sleep_hrs_average	0.003	0.006	-0.009	0.014
##	subst_freq_tobacco--sleep_hrs_average	-0.036	0.006	-0.048	-0.025
##	subst_alc_freq_binge--sleep_hrs_average	-0.047	0.006	-0.059	-0.036
##	pa_met_tot--sleep_hrs_average	-0.020	0.006	-0.033	-0.009
##	hr_volunteer--sleep_hrs_diff	-0.023	0.006	-0.034	-0.012
##	hr_relig_spirit--sleep_hrs_diff	-0.042	0.006	-0.053	-0.030
##	hr_social--sleep_hrs_diff	-0.019	0.006	-0.030	-0.007
##	hr_family--sleep_hrs_diff	-0.048	0.006	-0.060	-0.036
##	hr_tv--sleep_hrs_diff	0.036	0.006	0.024	0.046
##	hr_commute--sleep_hrs_diff	-0.017	0.006	-0.028	-0.006
##	hr_meditate--sleep_hrs_diff	-0.019	0.006	-0.033	-0.010
##	pa_weights--sleep_hrs_diff	-0.043	0.006	-0.054	-0.031
##	diet_sugardrink--sleep_hrs_diff	-0.009	0.006	-0.021	0.002
##	diet_energydrink--sleep_hrs_diff	0.021	0.006	0.009	0.032
##	fruitvegs--sleep_hrs_diff	-0.022	0.006	-0.033	-0.010
##	sleep_nap--sleep_hrs_diff	0.072	0.006	0.061	0.085
##	subst_freq_alc--sleep_hrs_diff	0.010	0.006	-0.002	0.021
##	subst_freq_cannabis--sleep_hrs_diff	-0.001	0.006	-0.013	0.011
##	subst_freq_tobacco--sleep_hrs_diff	0.016	0.006	0.004	0.028
##	subst_alc_freq_binge--sleep_hrs_diff	-0.088	0.006	-0.100	-0.078
##	pa_met_tot--sleep_hrs_diff	-0.002	0.006	-0.014	0.009
##	sleep_hrs_average--sleep_hrs_diff	-0.087	0.006	-0.099	-0.076
##	---				

Supplemental Figure 6



Network graph - Pre-COVID (Fall, 2019)

2.1.b Pre-COVID - strength centrality indices

Supplemental Table 7

```
## BGGM: Bayesian Gaussian Graphical Models
## ---
## Network Stats: Roll Your Own
## Posterior Samples: 30050
## ---
## Estimates:
##
##           Node Post.mean Post.sd Cred.lb Cred.ub
## volunteer hours           1    0.902  0.018  0.869  0.937
## religion/spiritual hours    2    0.991  0.019  0.954  1.028
## friend hours                3    1.025  0.022  0.983  1.067
## family hours                4    1.019  0.021  0.978  1.059
## tv hours                    5    1.182  0.022  1.140  1.226
## commute hours              6    0.956  0.021  0.914  0.997
## meditate hours             7    0.990  0.020  0.950  1.029
## strength training          8    1.031  0.020  0.994  1.069
## sugary drinks              9    0.509  0.018  0.475  0.544
## energy drinks             10    0.513  0.020  0.474  0.551
## fruits & vegetables       11    0.733  0.021  0.693  0.774
## daytime napping           12    0.546  0.023  0.502  0.592
## alcohol use frequency     13    1.190  0.017  1.156  1.224
## cannabis use frequency    14    0.886  0.018  0.851  0.922
## tobacco use frequency     15    0.862  0.017  0.829  0.896
## alcohol binge drinking frequency 16    1.252  0.019  1.215  1.289
## physical activity total   17    0.658  0.019  0.621  0.696
## sleep quantity           18    0.770  0.023  0.723  0.814
## sleep hours difference    19    0.555  0.019  0.519  0.592
## ---
```


Supplemental Figure 7



2.1.c Pre-COVID distress group - cluster identification

```
beh_precovid_communities
```

```
## Model: BGM (continuous)
## Prior SD: 0.25 (5000 iterations)
## Credible Interval: 0.95 (two-sided)
## Analytic: No
##
## Number of nodes: 19
## Number of edges: 133
## Edge density: 0.778
##
## Non-zero edge weights:
##      M      SD      Min      Max
## 0.031 0.094 -0.098 0.607
##
## ----
##
## Algorithm: Walktrap (Steps = 5)
##
## Number of communities: 5
##
##      hr_volunteer      hr_relig_spirit      hr_social
##          1              1                  2
##      hr_family          hr_tv              hr_commute
##          2              2                  2
##      hr_meditate      pa_weights      diet_sugardrink
##          1              3                  4
##      diet_energydrink      fruitvegs      sleep_nap
##          2              4                  2
##      subst_freq_alc      subst_freq_cannabis      subst_freq_tobacco
##          5              5                  5
##      subst_alc_freq_binge      pa_met_tot      sleep_hrs_average
##          5              3                  2
##      sleep_hrs_diff
##          2
##
##
## ----
##
## TEFI: -14.344
```

2.2 COVID Sample

2.2.a COVID - partial correlations

Supplemental Table 8

```
summary(fit_covid_beh)
```

```
## BGGM: Bayesian Gaussian Graphical Models
## ---
## Type: continuous
## Analytic: FALSE
## Formula:
## Posterior Samples: 30050
## Observations (n):
## Nodes (p): 19
## Relations: 171
## ---
## Call:
## estimate(Y = as.matrix(subset(Y, .imp == x)[, -1]), type = "continuous",
##   iter = iter, impute = FALSE, cores = 7)
## ---
## Estimates:
```

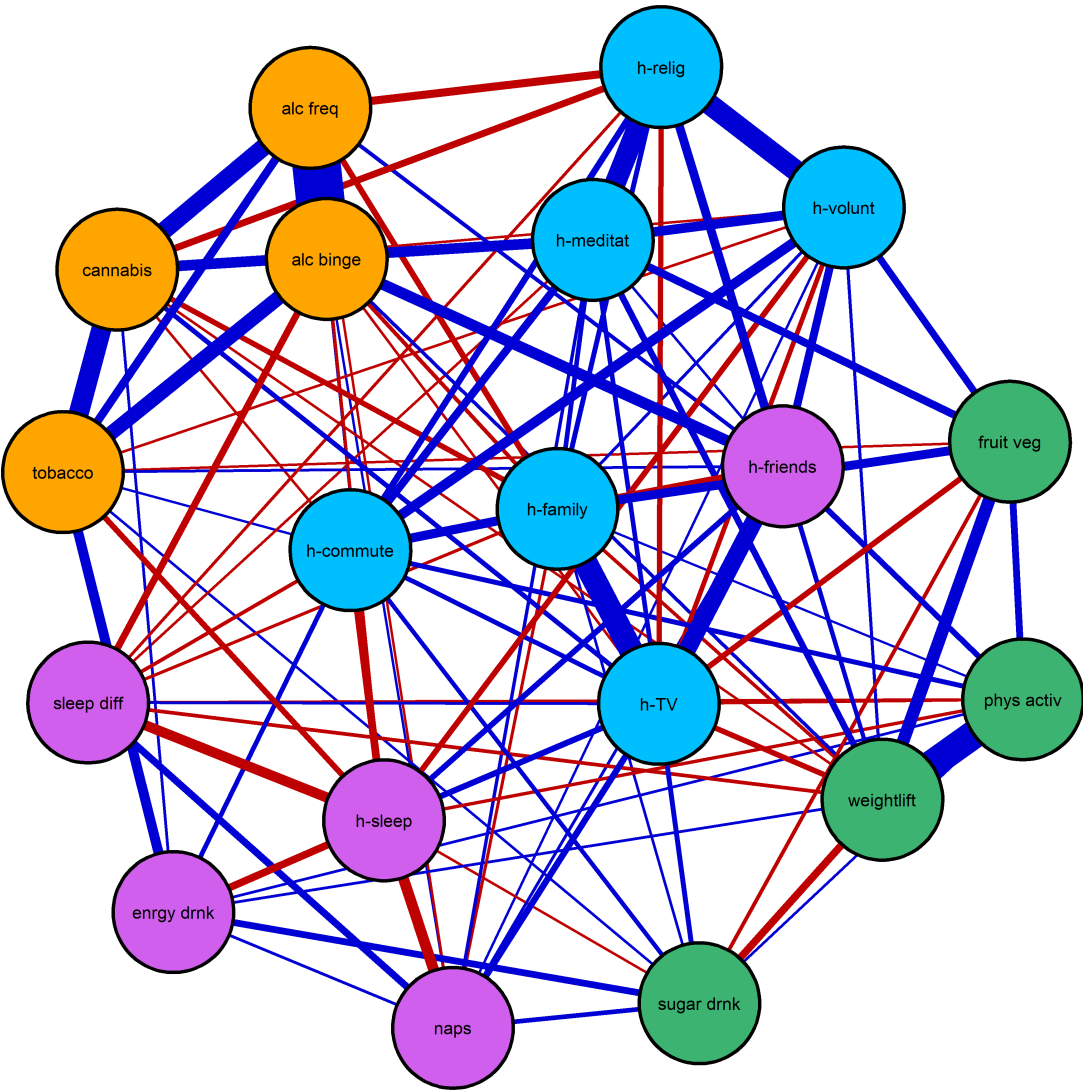
	Relation	Post.mean	Post.sd	Cred.lb	Cred.ub
##	hr_volunteer--hr_relig_spirit	0.248	0.004	0.241	0.256
##	hr_volunteer--hr_social	0.091	0.004	0.084	0.099
##	hr_relig_spirit--hr_social	0.097	0.004	0.090	0.105
##	hr_volunteer--hr_family	0.031	0.004	0.024	0.038
##	hr_relig_spirit--hr_family	0.052	0.004	0.045	0.060
##	hr_social--hr_family	-0.076	0.004	-0.083	-0.068
##	hr_volunteer--hr_tv	-0.049	0.004	-0.056	-0.041
##	hr_relig_spirit--hr_tv	-0.058	0.004	-0.066	-0.050
##	hr_social--hr_tv	0.202	0.004	0.194	0.208
##	hr_family--hr_tv	0.281	0.003	0.274	0.288
##	hr_volunteer--hr_commute	0.117	0.004	0.109	0.124
##	hr_relig_spirit--hr_commute	0.066	0.004	0.058	0.073
##	hr_social--hr_commute	0.042	0.004	0.035	0.050
##	hr_family--hr_commute	0.106	0.004	0.098	0.113
##	hr_tv--hr_commute	0.048	0.004	0.040	0.055
##	hr_volunteer--hr_meditate	0.107	0.004	0.099	0.115
##	hr_relig_spirit--hr_meditate	0.246	0.004	0.240	0.254
##	hr_social--hr_meditate	0.024	0.004	0.017	0.032
##	hr_family--hr_meditate	0.049	0.004	0.042	0.057
##	hr_tv--hr_meditate	0.047	0.004	0.040	0.055
##	hr_commute--hr_meditate	0.089	0.004	0.081	0.096
##	hr_volunteer--pa_weights	0.029	0.004	0.021	0.036
##	hr_relig_spirit--pa_weights	0.041	0.004	0.033	0.048
##	hr_social--pa_weights	0.039	0.004	0.032	0.047
##	hr_family--pa_weights	-0.033	0.004	-0.040	-0.025
##	hr_tv--pa_weights	-0.055	0.004	-0.063	-0.048
##	hr_commute--pa_weights	-0.012	0.004	-0.019	-0.005
##	hr_meditate--pa_weights	0.071	0.004	0.063	0.079
##	hr_volunteer--diet_sugardrink	-0.007	0.004	-0.014	0.001
##	hr_relig_spirit--diet_sugardrink	0.002	0.004	-0.005	0.009

##	hr_social--diet_sugardrink	0.006	0.004	-0.001	0.014
##	hr_family--diet_sugardrink	0.024	0.004	0.016	0.031
##	hr_tv--diet_sugardrink	0.052	0.004	0.045	0.060
##	hr_commute--diet_sugardrink	0.043	0.004	0.036	0.050
##	hr_meditate--diet_sugardrink	-0.014	0.004	-0.020	-0.005
##	pa_weights--diet_sugardrink	-0.083	0.004	-0.091	-0.075
##	hr_volunteer--diet_energydrink	-0.003	0.004	-0.009	0.005
##	hr_relig_spirit--diet_energydrink	-0.003	0.004	-0.011	0.004
##	hr_social--diet_energydrink	-0.013	0.004	-0.021	-0.006
##	hr_family--diet_energydrink	-0.015	0.004	-0.023	-0.008
##	hr_tv--diet_energydrink	0.013	0.004	0.005	0.020
##	hr_commute--diet_energydrink	0.049	0.004	0.042	0.057
##	hr_meditate--diet_energydrink	0.001	0.004	-0.007	0.009
##	pa_weights--diet_energydrink	0.026	0.004	0.018	0.033
##	diet_sugardrink--diet_energydrink	0.077	0.004	0.067	0.083
##	hr_volunteer--fruitvegs	0.080	0.004	0.072	0.087
##	hr_relig_spirit--fruitvegs	0.002	0.004	-0.005	0.009
##	hr_social--fruitvegs	-0.006	0.004	-0.014	0.001
##	hr_family--fruitvegs	0.101	0.004	0.094	0.108
##	hr_tv--fruitvegs	-0.064	0.004	-0.072	-0.057
##	hr_commute--fruitvegs	0.002	0.004	-0.006	0.009
##	hr_meditate--fruitvegs	0.086	0.004	0.078	0.093
##	pa_weights--fruitvegs	0.142	0.004	0.135	0.150
##	diet_sugardrink--fruitvegs	-0.037	0.004	-0.044	-0.030
##	diet_energydrink--fruitvegs	-0.016	0.004	-0.024	-0.009
##	hr_volunteer--sleep_nap	0.020	0.004	0.013	0.028
##	hr_relig_spirit--sleep_nap	-0.002	0.004	-0.009	0.005
##	hr_social--sleep_nap	0.031	0.004	0.023	0.039
##	hr_family--sleep_nap	-0.031	0.004	-0.039	-0.024
##	hr_tv--sleep_nap	0.067	0.004	0.060	0.075
##	hr_commute--sleep_nap	0.013	0.004	0.005	0.021
##	hr_meditate--sleep_nap	0.033	0.004	0.026	0.040
##	pa_weights--sleep_nap	-0.017	0.004	-0.025	-0.010
##	diet_sugardrink--sleep_nap	0.050	0.004	0.041	0.057
##	diet_energydrink--sleep_nap	0.029	0.004	0.022	0.036
##	fruitvegs--sleep_nap	-0.004	0.004	-0.012	0.004
##	hr_volunteer--subst_freq_alc	0.013	0.004	0.006	0.020
##	hr_relig_spirit--subst_freq_alc	-0.090	0.004	-0.097	-0.082
##	hr_social--subst_freq_alc	0.042	0.004	0.034	0.049
##	hr_family--subst_freq_alc	-0.065	0.004	-0.073	-0.058
##	hr_tv--subst_freq_alc	0.000	0.004	-0.007	0.008
##	hr_commute--subst_freq_alc	0.012	0.004	0.004	0.019
##	hr_meditate--subst_freq_alc	-0.002	0.004	-0.009	0.006
##	pa_weights--subst_freq_alc	0.015	0.004	0.007	0.022
##	diet_sugardrink--subst_freq_alc	-0.013	0.004	-0.020	-0.005
##	diet_energydrink--subst_freq_alc	0.011	0.004	0.003	0.019
##	fruitvegs--subst_freq_alc	0.004	0.004	-0.004	0.011
##	sleep_nap--subst_freq_alc	-0.023	0.004	-0.030	-0.015
##	hr_volunteer--subst_freq_cannabis	-0.020	0.004	-0.028	-0.013
##	hr_relig_spirit--subst_freq_cannabis	-0.075	0.004	-0.083	-0.068
##	hr_social--subst_freq_cannabis	0.008	0.004	0.000	0.015
##	hr_family--subst_freq_cannabis	-0.057	0.004	-0.066	-0.050
##	hr_tv--subst_freq_cannabis	0.051	0.004	0.043	0.058
##	hr_commute--subst_freq_cannabis	-0.025	0.004	-0.033	-0.018

##	hr_meditate--subst_freq_cannabis	0.122	0.004	0.115	0.129
##	pa_weights--subst_freq_cannabis	-0.028	0.004	-0.035	-0.021
##	diet_sugardrink--subst_freq_cannabis	0.001	0.004	-0.006	0.009
##	diet_energydrink--subst_freq_cannabis	0.027	0.004	0.020	0.035
##	fruitvegs--subst_freq_cannabis	-0.009	0.004	-0.016	-0.001
##	sleep_nap--subst_freq_cannabis	-0.004	0.004	-0.010	0.004
##	subst_freq_alc--subst_freq_cannabis	0.208	0.004	0.200	0.215
##	hr_volunteer--subst_freq_tobacco	-0.024	0.004	-0.032	-0.017
##	hr_relig_spirit--subst_freq_tobacco	0.001	0.004	-0.006	0.009
##	hr_social--subst_freq_tobacco	0.028	0.004	0.020	0.035
##	hr_family--subst_freq_tobacco	-0.013	0.004	-0.020	-0.005
##	hr_tv--subst_freq_tobacco	0.012	0.004	0.004	0.019
##	hr_commute--subst_freq_tobacco	0.023	0.004	0.015	0.030
##	hr_meditate--subst_freq_tobacco	0.016	0.004	0.009	0.023
##	pa_weights--subst_freq_tobacco	-0.013	0.004	-0.020	-0.005
##	diet_sugardrink--subst_freq_tobacco	0.023	0.004	0.016	0.031
##	diet_energydrink--subst_freq_tobacco	0.113	0.004	0.106	0.121
##	fruitvegs--subst_freq_tobacco	-0.021	0.004	-0.029	-0.014
##	sleep_nap--subst_freq_tobacco	0.008	0.004	0.000	0.015
##	subst_freq_alc--subst_freq_tobacco	0.093	0.004	0.086	0.100
##	subst_freq_cannabis--subst_freq_tobacco	0.233	0.004	0.226	0.240
##	hr_volunteer--subst_alc_freq_binge	-0.005	0.004	-0.013	0.002
##	hr_relig_spirit--subst_alc_freq_binge	-0.002	0.004	-0.009	0.006
##	hr_social--subst_alc_freq_binge	0.127	0.004	0.120	0.134
##	hr_family--subst_alc_freq_binge	-0.037	0.004	-0.044	-0.029
##	hr_tv--subst_alc_freq_binge	-0.020	0.004	-0.029	-0.013
##	hr_commute--subst_alc_freq_binge	-0.006	0.004	-0.013	0.002
##	hr_meditate--subst_alc_freq_binge	-0.023	0.004	-0.031	-0.016
##	pa_weights--subst_alc_freq_binge	0.034	0.004	0.026	0.041
##	diet_sugardrink--subst_alc_freq_binge	0.005	0.004	-0.003	0.012
##	diet_energydrink--subst_alc_freq_binge	0.019	0.004	0.010	0.026
##	fruitvegs--subst_alc_freq_binge	-0.007	0.004	-0.014	0.001
##	sleep_nap--subst_alc_freq_binge	0.022	0.004	0.015	0.030
##	subst_freq_alc--subst_alc_freq_binge	0.581	0.002	0.577	0.586
##	subst_freq_cannabis--subst_alc_freq_binge	0.031	0.004	0.024	0.040
##	subst_freq_tobacco--subst_alc_freq_binge	0.169	0.004	0.161	0.176
##	hr_volunteer--pa_met_tot	-0.005	0.004	-0.012	0.002
##	hr_relig_spirit--pa_met_tot	0.009	0.004	0.002	0.016
##	hr_social--pa_met_tot	0.060	0.004	0.053	0.067
##	hr_family--pa_met_tot	0.021	0.004	0.013	0.027
##	hr_tv--pa_met_tot	-0.026	0.004	-0.033	-0.019
##	hr_commute--pa_met_tot	0.054	0.004	0.047	0.062
##	hr_meditate--pa_met_tot	0.000	0.004	-0.008	0.007
##	pa_weights--pa_met_tot	0.336	0.003	0.330	0.343
##	diet_sugardrink--pa_met_tot	0.022	0.004	0.014	0.029
##	diet_energydrink--pa_met_tot	0.027	0.004	0.018	0.033
##	fruitvegs--pa_met_tot	0.073	0.004	0.066	0.080
##	sleep_nap--pa_met_tot	-0.009	0.004	-0.017	-0.001
##	subst_freq_alc--pa_met_tot	0.016	0.004	0.008	0.024
##	subst_freq_cannabis--pa_met_tot	0.008	0.004	0.001	0.016
##	subst_freq_tobacco--pa_met_tot	0.006	0.004	-0.001	0.014
##	subst_alc_freq_binge--pa_met_tot	0.002	0.004	-0.006	0.009
##	hr_volunteer--sleep_hrs_average	-0.061	0.004	-0.069	-0.054
##	hr_relig_spirit--sleep_hrs_average	-0.007	0.004	-0.014	0.001

##	hr_social--sleep_hrs_average	0.059	0.004	0.052	0.067
##	hr_family--sleep_hrs_average	0.000	0.004	-0.008	0.006
##	hr_tv--sleep_hrs_average	0.063	0.004	0.056	0.070
##	hr_commute--sleep_hrs_average	-0.086	0.004	-0.093	-0.078
##	hr_meditate--sleep_hrs_average	0.007	0.004	-0.001	0.014
##	pa_weights--sleep_hrs_average	0.018	0.004	0.011	0.025
##	diet_sugardrink--sleep_hrs_average	-0.021	0.004	-0.029	-0.014
##	diet_energydrink--sleep_hrs_average	-0.083	0.004	-0.091	-0.076
##	fruitvegs--sleep_hrs_average	-0.005	0.004	-0.013	0.002
##	sleep_nap--sleep_hrs_average	-0.122	0.004	-0.129	-0.115
##	subst_freq_alc--sleep_hrs_average	0.028	0.004	0.020	0.035
##	subst_freq_cannabis--sleep_hrs_average	0.017	0.004	0.009	0.024
##	subst_freq_tobacco--sleep_hrs_average	-0.059	0.004	-0.067	-0.052
##	subst_alc_freq_binge--sleep_hrs_average	-0.029	0.004	-0.036	-0.021
##	pa_met_tot--sleep_hrs_average	-0.033	0.004	-0.041	-0.026
##	hr_volunteer--sleep_hrs_diff	-0.015	0.004	-0.023	-0.008
##	hr_relig_spirit--sleep_hrs_diff	-0.029	0.004	-0.036	-0.021
##	hr_social--sleep_hrs_diff	-0.006	0.004	-0.014	0.002
##	hr_family--sleep_hrs_diff	-0.032	0.004	-0.039	-0.024
##	hr_tv--sleep_hrs_diff	0.026	0.004	0.018	0.033
##	hr_commute--sleep_hrs_diff	-0.035	0.004	-0.043	-0.028
##	hr_meditate--sleep_hrs_diff	-0.025	0.004	-0.032	-0.017
##	pa_weights--sleep_hrs_diff	-0.036	0.004	-0.043	-0.028
##	diet_sugardrink--sleep_hrs_diff	0.000	0.004	-0.009	0.006
##	diet_energydrink--sleep_hrs_diff	0.012	0.004	0.004	0.019
##	fruitvegs--sleep_hrs_diff	-0.013	0.004	-0.020	-0.005
##	sleep_nap--sleep_hrs_diff	0.076	0.004	0.068	0.083
##	subst_freq_alc--sleep_hrs_diff	0.012	0.004	0.004	0.019
##	subst_freq_cannabis--sleep_hrs_diff	0.001	0.004	-0.006	0.009
##	subst_freq_tobacco--sleep_hrs_diff	-0.007	0.004	-0.014	0.001
##	subst_alc_freq_binge--sleep_hrs_diff	-0.076	0.004	-0.083	-0.069
##	pa_met_tot--sleep_hrs_diff	-0.024	0.004	-0.032	-0.017
##	sleep_hrs_average--sleep_hrs_diff	-0.112	0.004	-0.119	-0.104
##	---				

Supplemental Figure 8



Network graph - COVID (Spring, 2021)

2.2.b COVID - strength centrality indices

Supplemental Table 9

```
## BGGM: Bayesian Gaussian Graphical Models
## ---
## Network Stats: Roll Your Own
## Posterior Samples: 30050
## ---
## Estimates:
##
##           Node Post.mean Post.sd Cred.lb Cred.ub
## volunteer hours           1    0.905  0.013  0.880  0.931
## religion/spiritual hours    2    1.010  0.011  0.990  1.032
## friend hours                3    0.932  0.013  0.905  0.958
## family hours                4    1.022  0.013  0.995  1.047
## tv hours                    5    1.133  0.015  1.105  1.162
## commute hours              6    0.818  0.014  0.790  0.846
## meditate hours             7    0.952  0.013  0.927  0.977
## strength training          8    1.028  0.014  1.001  1.055
## sugary drinks              9    0.455  0.012  0.432  0.478
## energy drinks             10    0.526  0.013  0.499  0.553
## fruits & vegetables       11    0.642  0.011  0.620  0.663
## daytime napping           12    0.543  0.014  0.517  0.571
## alcohol use frequency     13    1.220  0.014  1.194  1.247
## cannabis use frequency    14    0.913  0.013  0.888  0.939
## tobacco use frequency     15    0.839  0.012  0.815  0.863
## alcohol binge drinking frequency 16    1.168  0.012  1.145  1.192
## physical activity total   17    0.718  0.014  0.691  0.745
## sleep quantity           18    0.793  0.014  0.765  0.820
## sleep hours difference    19    0.520  0.013  0.495  0.544
## ---
```


Supplemental Figure 9

Strength Centrality - Spring, 2021



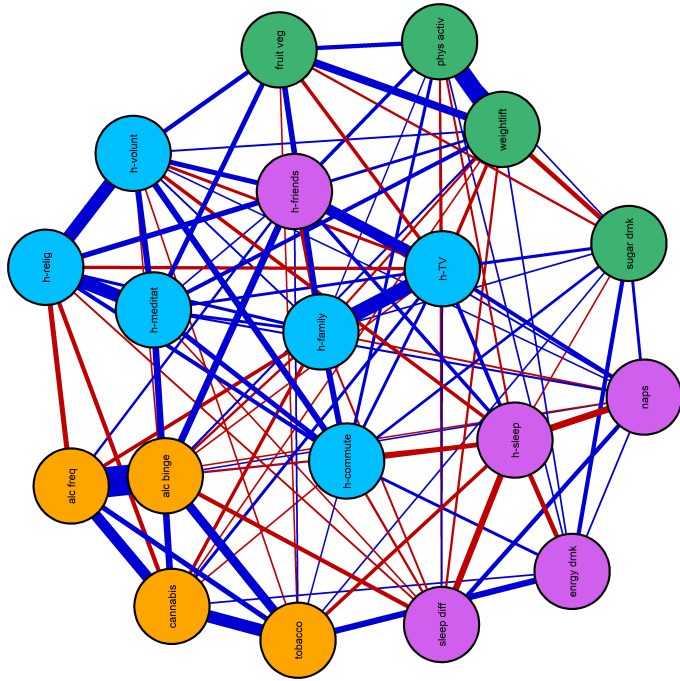
2.2.c COVID distress group - cluster identification

```
beh_covid_communities
```

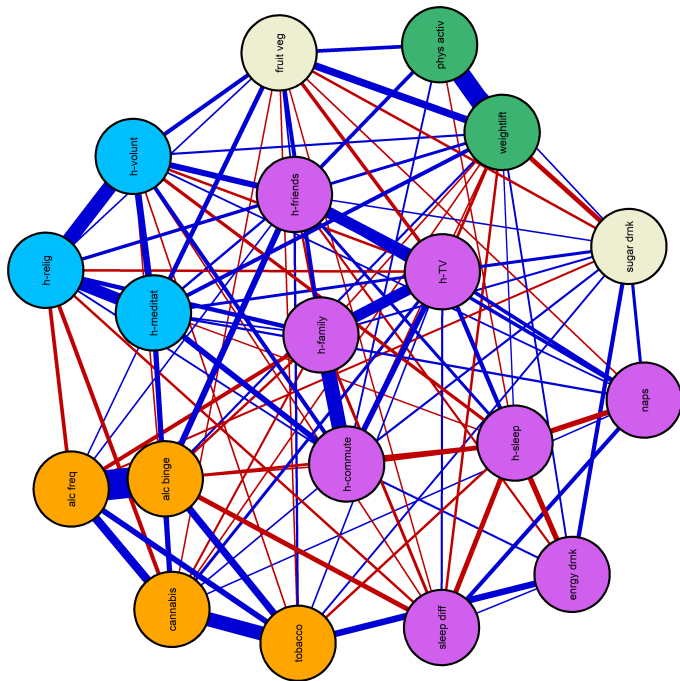
```
## Model: BGM (continuous)
## Prior SD: 0.25 (5000 iterations)
## Credible Interval: 0.95 (two-sided)
## Analytic: No
##
## Number of nodes: 19
## Number of edges: 138
## Edge density: 0.807
##
## Non-zero edge weights:
##      M      SD      Min      Max
## 0.029 0.089 -0.122 0.581
##
## ----
##
## Algorithm: Walktrap (Steps = 6)
##
## Number of communities: 4
##
##      hr_volunteer      hr_relig_spirit      hr_social
##              1              1              2
##      hr_family      hr_tv      hr_commute
##              1              1              1
##      hr_meditate      pa_weights      diet_sugardrink
##              1              3              3
##      diet_energydrink      fruitvegs      sleep_nap
##              2              3              2
##      subst_freq_alc      subst_freq_cannabis      subst_freq_tobacco
##              4              4              4
##      subst_alc_freq_binge      pa_met_tot      sleep_hrs_average
##              4              3              2
##      sleep_hrs_diff
##              2
##
##
## ----
##
## TEFI: -14.577
```

2.3 Network comparison by COVID timing

Supplemental figure 10 (Side-by-side networks)



COVID (Spring, 2021) sample



Pre-COVID (Fall, 2019) sample

Supplemental Table 10

Differences in partial correlations between the pre-COVID and COVID samples

##	Relation	Post.mean	Post.sd	Cred.lb	Cred.ub
## 53	pa_weights--fruitvegs	-0.040	0.014	-0.068	-0.013
## 10	hr_family--hr_tv	-0.037	0.014	-0.065	-0.009
## 85	hr_meditate--subst_freq_cannabis	-0.037	0.014	-0.065	-0.009
## 90	sleep_nap--subst_freq_cannabis	-0.037	0.015	-0.065	-0.008
## 120	subst_freq_tobacco--subst_alc_freq_binge	-0.035	0.014	-0.064	-0.007
## 14	hr_family--hr_commute	-0.033	0.014	-0.060	-0.007
## 39	hr_social--diet_energydrink	-0.031	0.015	-0.059	-0.003
## 105	subst_freq_cannabis--subst_freq_tobacco	-0.029	0.014	-0.055	-0.001
## 7	hr_volunteer--hr_tv	-0.028	0.015	-0.057	0.001
## 123	hr_social--pa_met_tot	-0.027	0.015	-0.056	0.002
## 42	hr_commute--diet_energydrink	-0.026	0.015	-0.054	0.004
## 96	hr_tv--subst_freq_tobacco	-0.026	0.015	-0.055	0.004
## 99	pa_weights--subst_freq_tobacco	-0.025	0.015	-0.054	0.004
## 116	fruitvegs--subst_alc_freq_binge	-0.025	0.015	-0.054	0.004
## 119	subst_freq_cannabis--subst_alc_freq_binge	-0.025	0.014	-0.054	0.003
## 108	hr_social--subst_alc_freq_binge	-0.024	0.015	-0.052	0.004
## 32	hr_family--diet_sugardrink	-0.023	0.015	-0.051	0.006
## 118	subst_freq_alc--subst_alc_freq_binge	-0.023	0.009	-0.041	-0.005
## 160	hr_meditate--sleep_hrs_diff	-0.023	0.015	-0.052	0.006
## 64	diet_sugardrink--sleep_nap	-0.022	0.015	-0.052	0.007
## 97	hr_commute--subst_freq_tobacco	-0.022	0.015	-0.051	0.006
## 122	hr_relig_spirit--pa_met_tot	-0.022	0.015	-0.050	0.007
## 52	hr_meditate--fruitvegs	-0.021	0.015	-0.050	0.007
## 159	hr_commute--sleep_hrs_diff	-0.021	0.015	-0.049	0.008
## 131	fruitvegs--pa_met_tot	-0.020	0.015	-0.048	0.010
## 146	diet_energydrink--sleep_hrs_average	-0.020	0.015	-0.048	0.009
## 36	pa_weights--diet_sugardrink	-0.019	0.015	-0.048	0.009
## 82	hr_family--subst_freq_cannabis	-0.019	0.015	-0.048	0.009
## 93	hr_relig_spirit--subst_freq_tobacco	-0.019	0.015	-0.048	0.011
## 137	hr_volunteer--sleep_hrs_average	-0.019	0.015	-0.048	0.011
## 26	hr_tv--pa_weights	-0.018	0.015	-0.046	0.010
## 49	hr_family--fruitvegs	-0.018	0.015	-0.046	0.012
## 92	hr_volunteer--subst_freq_tobacco	-0.018	0.015	-0.048	0.010
## 100	diet_sugardrink--subst_freq_tobacco	-0.018	0.015	-0.047	0.011
## 127	hr_meditate--pa_met_tot	-0.018	0.015	-0.047	0.012
## 157	hr_family--sleep_hrs_diff	-0.017	0.015	-0.046	0.011
## 9	hr_social--hr_tv	-0.016	0.014	-0.043	0.011
## 13	hr_social--hr_commute	-0.015	0.015	-0.044	0.013
## 63	pa_weights--sleep_nap	-0.015	0.015	-0.045	0.015
## 44	pa_weights--diet_energydrink	-0.014	0.015	-0.042	0.015
## 149	subst_freq_alc--sleep_hrs_average	-0.014	0.015	-0.042	0.016
## 20	hr_tv--hr_meditate	-0.013	0.015	-0.043	0.016
## 133	subst_freq_alc--pa_met_tot	-0.013	0.015	-0.042	0.016
## 139	hr_social--sleep_hrs_average	-0.013	0.015	-0.041	0.017
## 109	hr_family--subst_alc_freq_binge	-0.011	0.015	-0.040	0.018
## 167	subst_freq_cannabis--sleep_hrs_diff	-0.010	0.015	-0.039	0.018
## 43	hr_meditate--diet_energydrink	-0.009	0.015	-0.038	0.020
## 60	hr_tv--sleep_nap	-0.009	0.015	-0.039	0.019
## 117	sleep_nap--subst_alc_freq_binge	-0.009	0.015	-0.038	0.020
## 162	diet_sugardrink--sleep_hrs_diff	-0.009	0.015	-0.038	0.020

## 56	hr_volunteer--sleep_nap	-0.008	0.015	-0.038	0.020
## 71	hr_tv--subst_freq_alc	-0.008	0.015	-0.038	0.021
## 145	diet_sugardrink--sleep_hrs_average	-0.008	0.014	-0.035	0.021
## 15	hr_tv--hr_commute	-0.007	0.014	-0.035	0.022
## 24	hr_social--pa_weights	-0.006	0.015	-0.035	0.023
## 59	hr_family--sleep_nap	-0.006	0.015	-0.035	0.023
## 153	pa_met_tot--sleep_hrs_average	-0.006	0.015	-0.035	0.023
## 48	hr_social--fruitvegs	-0.005	0.015	-0.035	0.023
## 21	hr_commute--hr_meditate	-0.004	0.014	-0.033	0.024
## 22	hr_volunteer--pa_weights	-0.004	0.015	-0.033	0.025
## 72	hr_commute--subst_freq_alc	-0.004	0.015	-0.033	0.023
## 84	hr_commute--subst_freq_cannabis	-0.004	0.015	-0.033	0.026
## 138	hr_relig_spirit--sleep_hrs_average	-0.004	0.015	-0.034	0.026
## 11	hr_volunteer--hr_commute	-0.003	0.015	-0.032	0.025
## 34	hr_commute--diet_sugardrink	-0.003	0.015	-0.031	0.026
## 113	pa_weights--subst_alc_freq_binge	-0.003	0.015	-0.032	0.026
## 147	fruitvegs--sleep_hrs_average	-0.003	0.014	-0.031	0.025
## 57	hr_relig_spirit--sleep_nap	-0.002	0.015	-0.031	0.027
## 68	hr_relig_spirit--subst_freq_alc	-0.002	0.015	-0.030	0.027
## 112	hr_meditate--subst_alc_freq_binge	-0.002	0.015	-0.030	0.027
## 132	sleep_nap--pa_met_tot	-0.002	0.015	-0.031	0.028
## 163	diet_energydrink--sleep_hrs_diff	-0.002	0.014	-0.031	0.026
## 4	hr_volunteer--hr_family	-0.001	0.015	-0.030	0.027
## 29	hr_volunteer--diet_sugardrink	-0.001	0.015	-0.030	0.027
## 66	fruitvegs--sleep_nap	-0.001	0.015	-0.029	0.028
## 81	hr_social--subst_freq_cannabis	-0.001	0.015	-0.030	0.028
## 87	diet_sugardrink--subst_freq_cannabis	-0.001	0.015	-0.029	0.028
## 110	hr_tv--subst_alc_freq_binge	-0.001	0.015	-0.030	0.027
## 114	diet_sugardrink--subst_alc_freq_binge	-0.001	0.015	-0.031	0.029
## 121	hr_volunteer--pa_met_tot	-0.001	0.015	-0.030	0.029
## 136	subst_alc_freq_binge--pa_met_tot	-0.001	0.015	-0.030	0.028
## 144	pa_weights--sleep_hrs_average	-0.001	0.015	-0.030	0.029
## 169	subst_alc_freq_binge--sleep_hrs_diff	-0.001	0.014	-0.030	0.027
## 67	hr_volunteer--subst_freq_alc	0.000	0.015	-0.030	0.028
## 79	hr_volunteer--subst_freq_cannabis	0.000	0.014	-0.028	0.028
## 129	diet_sugardrink--pa_met_tot	0.000	0.015	-0.029	0.029
## 168	subst_freq_tobacco--sleep_hrs_diff	0.000	0.014	-0.028	0.028
## 65	diet_energydrink--sleep_nap	0.001	0.014	-0.027	0.030
## 106	hr_volunteer--subst_alc_freq_binge	0.001	0.015	-0.029	0.030
## 140	hr_family--sleep_hrs_average	0.001	0.015	-0.029	0.030
## 164	fruitvegs--sleep_hrs_diff	0.001	0.015	-0.028	0.030
## 45	diet_sugardrink--diet_energydrink	0.002	0.015	-0.027	0.031
## 73	hr_meditate--subst_freq_alc	0.002	0.015	-0.027	0.032
## 75	diet_sugardrink--subst_freq_alc	0.002	0.015	-0.027	0.030
## 158	hr_tv--sleep_hrs_diff	0.002	0.015	-0.027	0.030
## 88	diet_energydrink--subst_freq_cannabis	0.003	0.015	-0.025	0.032
## 37	hr_volunteer--diet_energydrink	0.004	0.015	-0.025	0.033
## 89	fruitvegs--subst_freq_cannabis	0.004	0.014	-0.024	0.033
## 5	hr_relig_spirit--hr_family	0.005	0.014	-0.023	0.033
## 51	hr_commute--fruitvegs	0.005	0.015	-0.024	0.034
## 19	hr_family--hr_meditate	0.006	0.015	-0.023	0.035
## 70	hr_family--subst_freq_alc	0.006	0.015	-0.023	0.035
## 94	hr_social--subst_freq_tobacco	0.006	0.015	-0.023	0.036
## 115	diet_energydrink--subst_alc_freq_binge	0.006	0.015	-0.023	0.034

## 134	subst_freq_cannabis--pa_met_tot	0.006	0.015	-0.022	0.036
## 135	subst_freq_tobacco--pa_met_tot	0.006	0.015	-0.022	0.035
## 74	pa_weights--subst_freq_alc	0.007	0.015	-0.021	0.037
## 35	hr_meditate--diet_sugardrink	0.008	0.015	-0.021	0.037
## 126	hr_commute--pa_met_tot	0.008	0.015	-0.021	0.037
## 58	hr_social--sleep_nap	0.009	0.015	-0.020	0.037
## 103	sleep_nap--subst_freq_tobacco	0.009	0.014	-0.019	0.037
## 165	sleep_nap--sleep_hrs_diff	0.009	0.015	-0.020	0.037
## 27	hr_commute--pa_weights	0.010	0.015	-0.019	0.039
## 40	hr_family--diet_energydrink	0.010	0.015	-0.019	0.040
## 150	subst_freq_cannabis--sleep_hrs_average	0.010	0.015	-0.019	0.038
## 1	hr_volunteer--hr_relig_spirit	0.012	0.013	-0.014	0.039
## 3	hr_relig_spirit--hr_social	0.012	0.015	-0.018	0.040
## 47	hr_relig_spirit--fruitvegs	0.012	0.015	-0.016	0.041
## 102	fruitvegs--subst_freq_tobacco	0.012	0.015	-0.017	0.041
## 151	subst_freq_tobacco--sleep_hrs_average	0.012	0.015	-0.017	0.040
## 155	hr_relig_spirit--sleep_hrs_diff	0.012	0.014	-0.017	0.040
## 170	pa_met_tot--sleep_hrs_diff	0.012	0.015	-0.017	0.041
## 23	hr_relig_spirit--pa_weights	0.013	0.015	-0.016	0.042
## 62	hr_meditate--sleep_nap	0.013	0.015	-0.016	0.042
## 128	pa_weights--pa_met_tot	0.013	0.013	-0.012	0.037
## 125	hr_tv--pa_met_tot	0.014	0.015	-0.016	0.043
## 61	hr_commute--sleep_nap	0.015	0.015	-0.014	0.045
## 124	hr_family--pa_met_tot	0.015	0.015	-0.015	0.044
## 156	hr_social--sleep_hrs_diff	0.015	0.014	-0.013	0.043
## 17	hr_relig_spirit--hr_meditate	0.017	0.014	-0.010	0.045
## 31	hr_social--diet_sugardrink	0.017	0.014	-0.011	0.046
## 77	fruitvegs--subst_freq_alc	0.017	0.015	-0.011	0.047
## 101	diet_energydrink--subst_freq_tobacco	0.017	0.015	-0.012	0.045
## 33	hr_tv--diet_sugardrink	0.018	0.015	-0.011	0.046
## 6	hr_social--hr_family	0.020	0.015	-0.008	0.049
## 76	diet_energydrink--subst_freq_alc	0.020	0.015	-0.009	0.050
## 78	sleep_nap--subst_freq_alc	0.020	0.015	-0.009	0.049
## 95	hr_family--subst_freq_tobacco	0.020	0.015	-0.009	0.049
## 8	hr_relig_spirit--hr_tv	0.021	0.015	-0.008	0.050
## 46	hr_volunteer--fruitvegs	0.021	0.015	-0.009	0.049
## 55	diet_energydrink--fruitvegs	0.021	0.015	-0.009	0.050
## 86	pa_weights--subst_freq_cannabis	0.021	0.015	-0.007	0.049
## 28	hr_meditate--pa_weights	0.022	0.015	-0.007	0.050
## 50	hr_tv--fruitvegs	0.022	0.015	-0.006	0.051
## 107	hr_relig_spirit--subst_alc_freq_binge	0.022	0.015	-0.008	0.051
## 142	hr_commute--sleep_hrs_average	0.022	0.015	-0.008	0.050
## 161	pa_weights--sleep_hrs_diff	0.022	0.015	-0.006	0.050
## 98	hr_meditate--subst_freq_tobacco	0.023	0.015	-0.006	0.052
## 141	hr_tv--sleep_hrs_average	0.023	0.015	-0.006	0.051
## 152	subst_alc_freq_binge--sleep_hrs_average	0.023	0.015	-0.006	0.052
## 2	hr_volunteer--hr_social	0.024	0.014	-0.004	0.051
## 54	diet_sugardrink--fruitvegs	0.024	0.014	-0.004	0.052
## 80	hr_relig_spirit--subst_freq_cannabis	0.024	0.015	-0.005	0.054
## 166	subst_freq_alc--sleep_hrs_diff	0.024	0.015	-0.005	0.054
## 130	diet_energydrink--pa_met_tot	0.025	0.015	-0.005	0.053
## 38	hr_relig_spirit--diet_energydrink	0.026	0.015	-0.003	0.054
## 25	hr_family--pa_weights	0.028	0.015	-0.001	0.056
## 30	hr_relig_spirit--diet_sugardrink	0.028	0.015	-0.001	0.057

## 41	hr_tv--diet_energydrink	0.028	0.015	-0.001	0.058
## 83	hr_tv--subst_freq_cannabis	0.028	0.015	-0.001	0.057
## 69	hr_social--subst_freq_alc	0.030	0.015	0.001	0.060
## 111	hr_commute--subst_alc_freq_binge	0.032	0.015	0.003	0.060
## 143	hr_meditate--sleep_hrs_average	0.033	0.015	0.004	0.061
## 171	sleep_hrs_average--sleep_hrs_diff	0.033	0.015	0.004	0.062
## 16	hr_volunteer--hr_meditate	0.037	0.015	0.008	0.065
## 104	subst_freq_alc--subst_freq_tobacco	0.039	0.015	0.010	0.067
## 154	hr_volunteer--sleep_hrs_diff	0.041	0.015	0.013	0.070
## 12	hr_relig_spirit--hr_commute	0.044	0.015	0.015	0.073
## 18	hr_social--hr_meditate	0.049	0.015	0.020	0.077
## 91	subst_freq_alc--subst_freq_cannabis	0.052	0.014	0.024	0.080
## 148	sleep_nap--sleep_hrs_average	0.052	0.014	0.024	0.080

3.0 Lifestyle & Well-being Clustering by COVID time period

3.1 Pre-COVID (Lifestyle & Well-being)

3.1.a Pre-COVID (Lifestyle & Well-being) - partial correlations

Supplemental Table 11

```
summary(fit_precovid_k6fhr)
```

```
## BGGM: Bayesian Gaussian Graphical Models
## ---
## Type: continuous
## Analytic: FALSE
## Formula:
## Posterior Samples: 30050
## Observations (n):
## Nodes (p): 23
## Relations: 253
## ---
## Call:
## estimate(Y = as.matrix(subset(Y, .imp == x)[, -1]), type = "continuous",
##   iter = iter, impute = FALSE, cores = 7)
## ---
## Estimates:
```

	Relation	Post.mean	Post.sd	Cred.lb	Cred.ub
##	hr_volunteer--hr_relig_spirit	0.273	0.005	0.263	0.284
##	hr_volunteer--hr_social	0.103	0.006	0.092	0.114
##	hr_relig_spirit--hr_social	0.045	0.006	0.035	0.056
##	hr_volunteer--hr_family	0.006	0.006	-0.006	0.017
##	hr_relig_spirit--hr_family	0.075	0.006	0.062	0.085
##	hr_social--hr_family	-0.043	0.006	-0.054	-0.031
##	hr_volunteer--hr_tv	-0.034	0.006	-0.046	-0.023
##	hr_relig_spirit--hr_tv	-0.032	0.006	-0.042	-0.019
##	hr_social--hr_tv	0.242	0.006	0.232	0.254
##	hr_family--hr_tv	0.228	0.005	0.218	0.239
##	hr_volunteer--hr_commute	0.075	0.006	0.064	0.087
##	hr_relig_spirit--hr_commute	0.034	0.006	0.023	0.046
##	hr_social--hr_commute	-0.029	0.006	-0.041	-0.017
##	hr_family--hr_commute	0.295	0.005	0.285	0.305
##	hr_tv--hr_commute	0.099	0.006	0.088	0.110
##	hr_volunteer--hr_meditate	0.128	0.006	0.117	0.139
##	hr_relig_spirit--hr_meditate	0.232	0.006	0.222	0.244
##	hr_social--hr_meditate	0.042	0.006	0.032	0.055
##	hr_family--hr_meditate	0.030	0.006	0.018	0.041
##	hr_tv--hr_meditate	0.046	0.006	0.035	0.057
##	hr_commute--hr_meditate	0.105	0.006	0.095	0.119
##	hr_volunteer--pa_weights	0.028	0.006	0.016	0.040
##	hr_relig_spirit--pa_weights	0.012	0.006	0.001	0.024
##	hr_social--pa_weights	0.031	0.006	0.019	0.040
##	hr_family--pa_weights	-0.029	0.006	-0.042	-0.019
##	hr_tv--pa_weights	-0.029	0.006	-0.040	-0.017
##	hr_commute--pa_weights	-0.017	0.006	-0.029	-0.006

##	hr_meditate--pa_weights	0.073	0.006	0.063	0.085
##	hr_volunteer--diet_sugardrink	-0.004	0.006	-0.015	0.008
##	hr_relig_spirit--diet_sugardrink	0.007	0.006	-0.005	0.019
##	hr_social--diet_sugardrink	0.026	0.006	0.016	0.038
##	hr_family--diet_sugardrink	0.036	0.006	0.024	0.047
##	hr_tv--diet_sugardrink	0.049	0.006	0.038	0.061
##	hr_commute--diet_sugardrink	0.032	0.006	0.021	0.043
##	hr_meditate--diet_sugardrink	-0.010	0.006	-0.022	0.001
##	pa_weights--diet_sugardrink	-0.076	0.006	-0.086	-0.063
##	hr_volunteer--diet_energydrink	0.003	0.006	-0.010	0.013
##	hr_relig_spirit--diet_energydrink	-0.015	0.006	-0.025	-0.002
##	hr_social--diet_energydrink	-0.025	0.006	-0.034	-0.011
##	hr_family--diet_energydrink	0.015	0.006	0.002	0.026
##	hr_tv--diet_energydrink	0.019	0.006	0.007	0.030
##	hr_commute--diet_energydrink	0.033	0.006	0.021	0.044
##	hr_meditate--diet_energydrink	0.016	0.006	0.004	0.027
##	pa_weights--diet_energydrink	0.039	0.006	0.027	0.050
##	diet_sugardrink--diet_energydrink	0.073	0.006	0.059	0.082
##	hr_volunteer--fruitvegs	0.069	0.006	0.057	0.080
##	hr_relig_spirit--fruitvegs	0.015	0.006	0.004	0.027
##	hr_social--fruitvegs	0.014	0.006	0.003	0.026
##	hr_family--fruitvegs	0.069	0.006	0.059	0.082
##	hr_tv--fruitvegs	-0.054	0.006	-0.065	-0.042
##	hr_commute--fruitvegs	0.011	0.006	-0.001	0.022
##	hr_meditate--fruitvegs	0.086	0.006	0.074	0.096
##	pa_weights--fruitvegs	0.124	0.006	0.113	0.135
##	diet_sugardrink--fruitvegs	-0.039	0.006	-0.051	-0.028
##	diet_energydrink--fruitvegs	0.000	0.006	-0.011	0.012
##	hr_volunteer--sleep_nap	0.029	0.006	0.017	0.040
##	hr_relig_spirit--sleep_nap	0.001	0.006	-0.012	0.011
##	hr_social--sleep_nap	0.064	0.006	0.052	0.075
##	hr_family--sleep_nap	-0.011	0.006	-0.023	0.000
##	hr_tv--sleep_nap	0.060	0.006	0.049	0.072
##	hr_commute--sleep_nap	-0.020	0.006	-0.031	-0.008
##	hr_meditate--sleep_nap	0.036	0.006	0.026	0.049
##	pa_weights--sleep_nap	0.019	0.006	0.008	0.031
##	diet_sugardrink--sleep_nap	0.052	0.006	0.041	0.064
##	diet_energydrink--sleep_nap	0.010	0.006	-0.001	0.023
##	fruitvegs--sleep_nap	-0.019	0.006	-0.030	-0.008
##	hr_volunteer--subst_freq_alc	-0.002	0.006	-0.013	0.010
##	hr_relig_spirit--subst_freq_alc	-0.067	0.006	-0.077	-0.055
##	hr_social--subst_freq_alc	0.018	0.006	0.006	0.029
##	hr_family--subst_freq_alc	-0.076	0.006	-0.089	-0.067
##	hr_tv--subst_freq_alc	-0.006	0.006	-0.017	0.005
##	hr_commute--subst_freq_alc	-0.012	0.006	-0.022	0.000
##	hr_meditate--subst_freq_alc	0.002	0.006	-0.008	0.015
##	pa_weights--subst_freq_alc	0.000	0.006	-0.011	0.012
##	diet_sugardrink--subst_freq_alc	-0.033	0.006	-0.044	-0.021
##	diet_energydrink--subst_freq_alc	0.013	0.006	0.001	0.023
##	fruitvegs--subst_freq_alc	0.025	0.006	0.015	0.037
##	sleep_nap--subst_freq_alc	-0.016	0.006	-0.027	-0.004
##	hr_volunteer--subst_freq_cannabis	-0.020	0.006	-0.030	-0.008
##	hr_relig_spirit--subst_freq_cannabis	-0.064	0.006	-0.074	-0.052
##	hr_social--subst_freq_cannabis	0.031	0.006	0.020	0.042

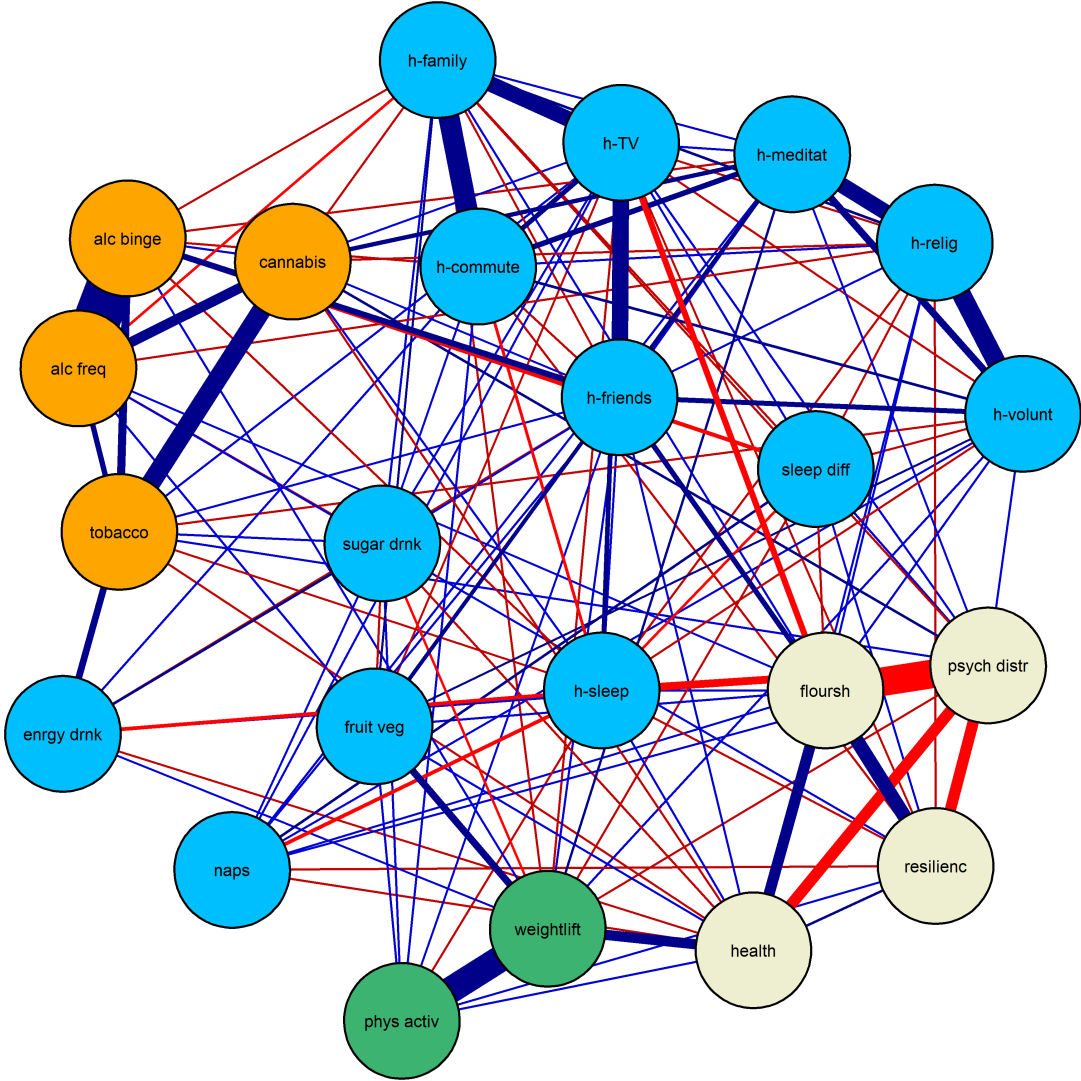
##	hr_family--subst_freq_cannabis	-0.028	0.006	-0.040	-0.017
##	hr_tv--subst_freq_cannabis	0.041	0.006	0.028	0.051
##	hr_commute--subst_freq_cannabis	0.019	0.006	0.008	0.030
##	hr_meditate--subst_freq_cannabis	0.092	0.006	0.080	0.102
##	pa_weights--subst_freq_cannabis	-0.005	0.006	-0.017	0.006
##	diet_sugardrink--subst_freq_cannabis	-0.006	0.006	-0.016	0.006
##	diet_energydrink--subst_freq_cannabis	-0.007	0.006	-0.020	0.003
##	fruitvegs--subst_freq_cannabis	-0.015	0.006	-0.027	-0.004
##	sleep_nap--subst_freq_cannabis	0.015	0.006	0.003	0.026
##	subst_freq_alc--subst_freq_cannabis	0.167	0.006	0.156	0.179
##	hr_volunteer--subst_freq_tobacco	-0.024	0.006	-0.036	-0.013
##	hr_relig_spirit--subst_freq_tobacco	-0.004	0.006	-0.016	0.006
##	hr_social--subst_freq_tobacco	0.043	0.006	0.031	0.054
##	hr_family--subst_freq_tobacco	0.017	0.006	0.006	0.029
##	hr_tv--subst_freq_tobacco	0.024	0.006	0.012	0.035
##	hr_commute--subst_freq_tobacco	0.001	0.006	-0.011	0.011
##	hr_meditate--subst_freq_tobacco	0.005	0.006	-0.004	0.019
##	pa_weights--subst_freq_tobacco	0.008	0.006	-0.004	0.020
##	diet_sugardrink--subst_freq_tobacco	0.027	0.006	0.016	0.038
##	diet_energydrink--subst_freq_tobacco	0.123	0.006	0.114	0.136
##	fruitvegs--subst_freq_tobacco	-0.019	0.006	-0.030	-0.008
##	sleep_nap--subst_freq_tobacco	0.010	0.006	-0.001	0.021
##	subst_freq_alc--subst_freq_tobacco	0.106	0.006	0.095	0.118
##	subst_freq_cannabis--subst_freq_tobacco	0.273	0.005	0.261	0.282
##	hr_volunteer--subst_alc_freq_binge	0.008	0.006	-0.003	0.021
##	hr_relig_spirit--subst_alc_freq_binge	-0.008	0.006	-0.020	0.003
##	hr_social--subst_alc_freq_binge	0.111	0.006	0.101	0.123
##	hr_family--subst_alc_freq_binge	-0.037	0.006	-0.048	-0.024
##	hr_tv--subst_alc_freq_binge	-0.020	0.006	-0.030	-0.008
##	hr_commute--subst_alc_freq_binge	-0.023	0.006	-0.035	-0.012
##	hr_meditate--subst_alc_freq_binge	-0.035	0.006	-0.049	-0.025
##	pa_weights--subst_alc_freq_binge	0.034	0.006	0.024	0.046
##	diet_sugardrink--subst_alc_freq_binge	-0.004	0.006	-0.015	0.007
##	diet_energydrink--subst_alc_freq_binge	0.014	0.006	0.003	0.026
##	fruitvegs--subst_alc_freq_binge	-0.013	0.006	-0.025	-0.002
##	sleep_nap--subst_alc_freq_binge	0.020	0.006	0.008	0.030
##	subst_freq_alc--subst_alc_freq_binge	0.606	0.004	0.599	0.613
##	subst_freq_cannabis--subst_alc_freq_binge	0.061	0.006	0.049	0.072
##	subst_freq_tobacco--subst_alc_freq_binge	0.139	0.006	0.128	0.150
##	hr_volunteer--pa_met_tot	-0.005	0.006	-0.018	0.005
##	hr_relig_spirit--pa_met_tot	-0.004	0.006	-0.015	0.008
##	hr_social--pa_met_tot	0.059	0.006	0.050	0.073
##	hr_family--pa_met_tot	0.010	0.006	-0.002	0.022
##	hr_tv--pa_met_tot	-0.011	0.006	-0.024	-0.001
##	hr_commute--pa_met_tot	0.030	0.006	0.020	0.042
##	hr_meditate--pa_met_tot	-0.018	0.006	-0.029	-0.006
##	pa_weights--pa_met_tot	0.366	0.005	0.356	0.376
##	diet_sugardrink--pa_met_tot	0.029	0.006	0.017	0.040
##	diet_energydrink--pa_met_tot	-0.002	0.006	-0.013	0.009
##	fruitvegs--pa_met_tot	0.059	0.006	0.046	0.070
##	sleep_nap--pa_met_tot	-0.004	0.006	-0.016	0.007
##	subst_freq_alc--pa_met_tot	0.015	0.006	0.004	0.027
##	subst_freq_cannabis--pa_met_tot	0.001	0.006	-0.011	0.012
##	subst_freq_tobacco--pa_met_tot	-0.010	0.006	-0.021	0.002

##	subst_alc_freq_binge--pa_met_tot	-0.002	0.006	-0.014	0.009
##	hr_volunteer--sleep_hrs_average	-0.058	0.006	-0.069	-0.047
##	hr_relig_spirit--sleep_hrs_average	-0.037	0.006	-0.049	-0.026
##	hr_social--sleep_hrs_average	0.021	0.006	0.009	0.032
##	hr_family--sleep_hrs_average	-0.010	0.006	-0.022	0.001
##	hr_tv--sleep_hrs_average	0.097	0.006	0.087	0.109
##	hr_commute--sleep_hrs_average	-0.080	0.006	-0.092	-0.069
##	hr_meditate--sleep_hrs_average	-0.003	0.006	-0.016	0.007
##	pa_weights--sleep_hrs_average	-0.008	0.006	-0.020	0.003
##	diet_sugardrink--sleep_hrs_average	-0.014	0.006	-0.025	-0.003
##	diet_energydrink--sleep_hrs_average	-0.085	0.006	-0.096	-0.073
##	fruitvegs--sleep_hrs_average	0.008	0.006	-0.004	0.020
##	sleep_nap--sleep_hrs_average	-0.086	0.006	-0.097	-0.074
##	subst_freq_alc--sleep_hrs_average	0.013	0.006	0.002	0.025
##	subst_freq_cannabis--sleep_hrs_average	0.024	0.006	0.013	0.035
##	subst_freq_tobacco--sleep_hrs_average	-0.027	0.006	-0.039	-0.015
##	subst_alc_freq_binge--sleep_hrs_average	-0.048	0.006	-0.060	-0.037
##	pa_met_tot--sleep_hrs_average	-0.026	0.006	-0.039	-0.016
##	hr_volunteer--sleep_hrs_diff	-0.022	0.006	-0.033	-0.010
##	hr_relig_spirit--sleep_hrs_diff	-0.036	0.006	-0.047	-0.025
##	hr_social--sleep_hrs_diff	-0.010	0.006	-0.021	0.002
##	hr_family--sleep_hrs_diff	-0.042	0.006	-0.054	-0.031
##	hr_tv--sleep_hrs_diff	0.027	0.006	0.015	0.038
##	hr_commute--sleep_hrs_diff	-0.019	0.006	-0.030	-0.007
##	hr_meditate--sleep_hrs_diff	-0.020	0.006	-0.033	-0.011
##	pa_weights--sleep_hrs_diff	-0.035	0.006	-0.046	-0.024
##	diet_sugardrink--sleep_hrs_diff	-0.010	0.006	-0.022	0.001
##	diet_energydrink--sleep_hrs_diff	0.018	0.006	0.006	0.029
##	fruitvegs--sleep_hrs_diff	-0.018	0.006	-0.029	-0.007
##	sleep_nap--sleep_hrs_diff	0.070	0.006	0.060	0.082
##	subst_freq_alc--sleep_hrs_diff	0.011	0.006	0.000	0.022
##	subst_freq_cannabis--sleep_hrs_diff	-0.008	0.006	-0.019	0.004
##	subst_freq_tobacco--sleep_hrs_diff	0.013	0.006	0.002	0.025
##	subst_alc_freq_binge--sleep_hrs_diff	-0.089	0.006	-0.100	-0.078
##	pa_met_tot--sleep_hrs_diff	-0.001	0.006	-0.013	0.010
##	sleep_hrs_average--sleep_hrs_diff	-0.073	0.006	-0.085	-0.062
##	hr_volunteer--psych_distress	0.037	0.006	0.026	0.049
##	hr_relig_spirit--psych_distress	-0.020	0.006	-0.030	-0.008
##	hr_social--psych_distress	-0.020	0.006	-0.032	-0.009
##	hr_family--psych_distress	-0.036	0.006	-0.046	-0.023
##	hr_tv--psych_distress	0.022	0.006	0.010	0.034
##	hr_commute--psych_distress	0.019	0.006	0.007	0.030
##	hr_meditate--psych_distress	0.046	0.006	0.033	0.057
##	pa_weights--psych_distress	-0.030	0.006	-0.041	-0.018
##	diet_sugardrink--psych_distress	0.015	0.006	0.003	0.026
##	diet_energydrink--psych_distress	0.034	0.006	0.023	0.045
##	fruitvegs--psych_distress	0.016	0.006	0.005	0.027
##	sleep_nap--psych_distress	0.042	0.006	0.030	0.053
##	subst_freq_alc--psych_distress	0.008	0.006	-0.003	0.020
##	subst_freq_cannabis--psych_distress	0.070	0.006	0.058	0.081
##	subst_freq_tobacco--psych_distress	0.024	0.006	0.013	0.036
##	subst_alc_freq_binge--psych_distress	-0.007	0.006	-0.019	0.004
##	pa_met_tot--psych_distress	0.016	0.006	0.004	0.027
##	sleep_hrs_average--psych_distress	-0.135	0.006	-0.147	-0.124

##	sleep_hrs_diff--psych_distress	0.035	0.006	0.023	0.046
##	hr_volunteer--flourish	0.064	0.006	0.054	0.076
##	hr_relig_spirit--flourish	0.046	0.006	0.035	0.058
##	hr_social--flourish	0.105	0.006	0.094	0.116
##	hr_family--flourish	0.055	0.006	0.043	0.067
##	hr_tv--flourish	-0.112	0.006	-0.125	-0.101
##	hr_commute--flourish	0.000	0.006	-0.012	0.011
##	hr_meditate--flourish	0.017	0.006	0.005	0.028
##	pa_weights--flourish	-0.008	0.006	-0.019	0.004
##	diet_sugardrink--flourish	0.014	0.006	0.003	0.025
##	diet_energydrink--flourish	-0.014	0.006	-0.026	-0.004
##	fruitvegs--flourish	0.035	0.006	0.024	0.046
##	sleep_nap--flourish	0.023	0.006	0.012	0.035
##	subst_freq_alc--flourish	0.038	0.006	0.026	0.048
##	subst_freq_cannabis--flourish	-0.009	0.006	-0.021	0.002
##	subst_freq_tobacco--flourish	-0.004	0.006	-0.015	0.008
##	subst_alc_freq_binge--flourish	-0.001	0.006	-0.011	0.011
##	pa_met_tot--flourish	0.010	0.006	-0.002	0.020
##	sleep_hrs_average--flourish	0.024	0.006	0.012	0.036
##	sleep_hrs_diff--flourish	-0.031	0.006	-0.042	-0.020
##	psych_distress--flourish	-0.390	0.005	-0.399	-0.380
##	hr_volunteer--health	0.013	0.006	0.002	0.024
##	hr_relig_spirit--health	0.037	0.006	0.026	0.049
##	hr_social--health	0.041	0.006	0.029	0.052
##	hr_family--health	-0.006	0.006	-0.016	0.007
##	hr_tv--health	-0.005	0.006	-0.016	0.007
##	hr_commute--health	-0.018	0.006	-0.030	-0.008
##	hr_meditate--health	0.010	0.006	-0.004	0.020
##	pa_weights--health	0.164	0.006	0.155	0.177
##	diet_sugardrink--health	-0.032	0.006	-0.045	-0.022
##	diet_energydrink--health	-0.024	0.006	-0.036	-0.013
##	fruitvegs--health	0.053	0.006	0.041	0.064
##	sleep_nap--health	-0.023	0.006	-0.033	-0.011
##	subst_freq_alc--health	-0.012	0.006	-0.022	0.000
##	subst_freq_cannabis--health	-0.043	0.006	-0.054	-0.031
##	subst_freq_tobacco--health	-0.027	0.006	-0.039	-0.016
##	subst_alc_freq_binge--health	0.001	0.006	-0.012	0.010
##	pa_met_tot--health	0.038	0.006	0.027	0.050
##	sleep_hrs_average--health	0.061	0.006	0.050	0.074
##	sleep_hrs_diff--health	-0.011	0.006	-0.022	0.001
##	psych_distress--health	-0.176	0.006	-0.187	-0.165
##	flourish--health	0.178	0.006	0.168	0.190
##	hr_volunteer--resilience	-0.007	0.006	-0.017	0.006
##	hr_relig_spirit--resilience	-0.031	0.006	-0.041	-0.019
##	hr_social--resilience	-0.009	0.006	-0.020	0.003
##	hr_family--resilience	-0.008	0.006	-0.018	0.004
##	hr_tv--resilience	-0.021	0.006	-0.032	-0.010
##	hr_commute--resilience	-0.021	0.006	-0.031	-0.009
##	hr_meditate--resilience	-0.003	0.006	-0.016	0.007
##	pa_weights--resilience	0.011	0.006	0.000	0.023
##	diet_sugardrink--resilience	-0.009	0.006	-0.021	0.001
##	diet_energydrink--resilience	0.017	0.006	0.003	0.027
##	fruitvegs--resilience	0.013	0.006	0.000	0.024
##	sleep_nap--resilience	-0.030	0.006	-0.041	-0.019

##	subst_freq_alc--resilience	0.037	0.006	0.027	0.048
##	subst_freq_cannabis--resilience	0.020	0.006	0.009	0.032
##	subst_freq_tobacco--resilience	0.020	0.006	0.009	0.032
##	subst_alc_freq_binge--resilience	-0.004	0.006	-0.015	0.008
##	pa_met_tot--resilience	0.044	0.006	0.031	0.054
##	sleep_hrs_average--resilience	-0.024	0.006	-0.035	-0.012
##	sleep_hrs_diff--resilience	0.030	0.006	0.019	0.041
##	psych_distress--resilience	-0.181	0.006	-0.193	-0.171
##	flourish--resilience	0.215	0.006	0.204	0.226
##	health--resilience	0.076	0.006	0.064	0.087
##	---				

Supplemental Figure 11



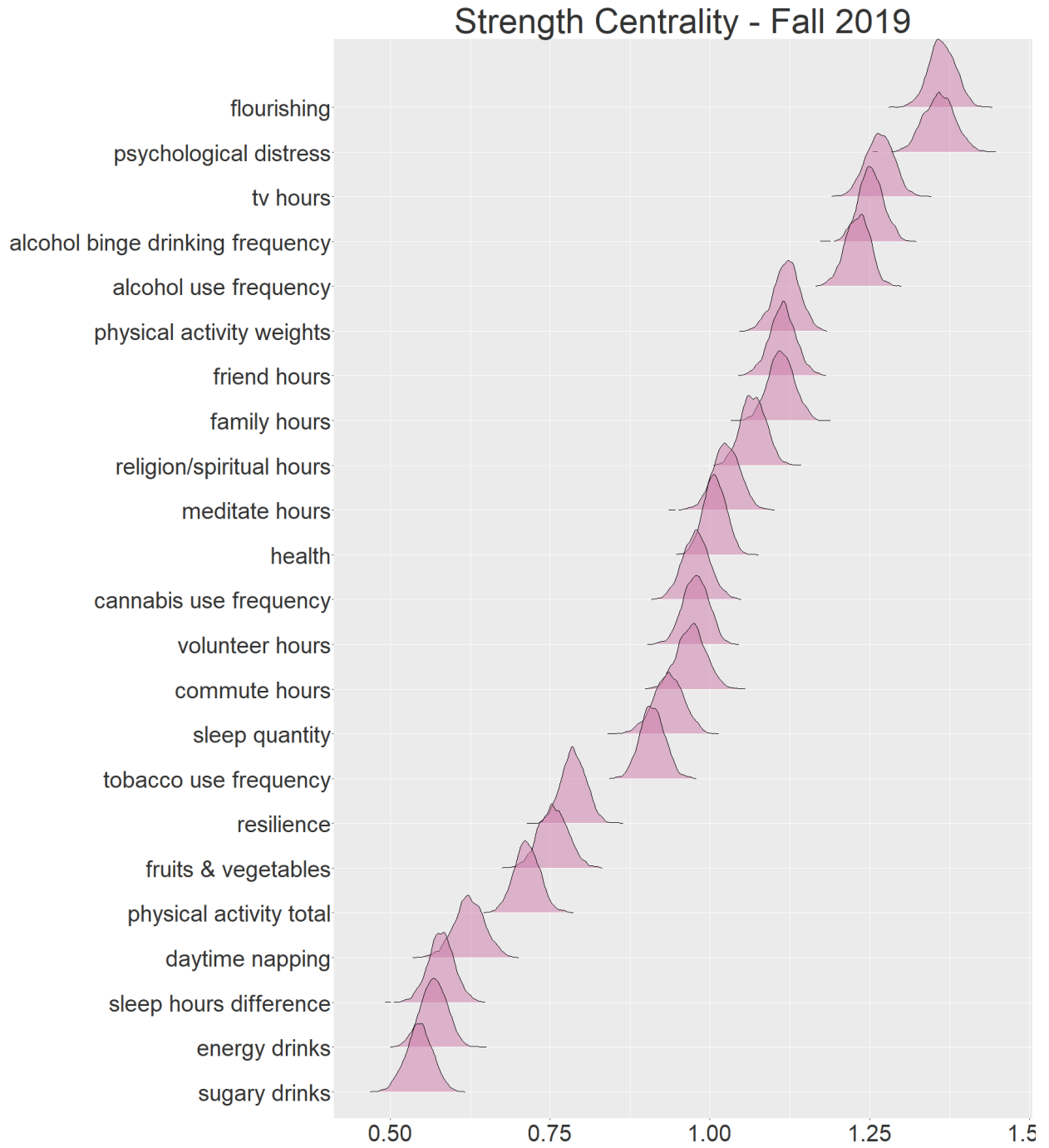
Network graph - Pre-COVID (Fall, 2019)

3.1.b Pre-COVID (Lifestyle & Well-being) - strength centrality indices

Supplemental Table 12

```
## BGGM: Bayesian Gaussian Graphical Models
## ---
## Network Stats: Roll Your Own
## Posterior Samples: 30050
## ---
## Estimates:
##
##           Node Post.mean Post.sd Cred.lb Cred.ub
## volunteer hours           1    0.978  0.020  0.939  1.015
## religion/spiritual hours   2    1.068  0.020  1.030  1.106
## friend hours               3    1.113  0.021  1.071  1.155
## family hours               4    1.111  0.020  1.072  1.152
## tv hours                   5    1.266  0.022  1.223  1.308
## commute hours             6    0.971  0.022  0.929  1.016
## meditate hours            7    1.026  0.021  0.984  1.067
## strength training         8    1.120  0.020  1.078  1.159
## sugary drinks             9    0.545  0.021  0.503  0.586
## energy drinks            10    0.568  0.020  0.528  0.608
## fruits & vegetables      11    0.755  0.023  0.711  0.801
## daytime napping          12    0.623  0.024  0.575  0.670
## alcohol use frequency    13    1.231  0.019  1.192  1.267
## cannabis use frequency   14    0.978  0.021  0.937  1.022
## tobacco use frequency    15    0.910  0.019  0.873  0.948
## alcohol binge drinking frequency 16    1.252  0.019  1.214  1.291
## physical activity total  17    0.714  0.020  0.674  0.754
## sleep quantity           18    0.935  0.024  0.886  0.981
## sleep hours difference   19    0.579  0.021  0.538  0.621
## psychological distress   20    1.359  0.024  1.313  1.407
## flourishing              21    1.363  0.021  1.322  1.404
## health                   22    1.007  0.018  0.972  1.041
## resilience               23    0.787  0.020  0.749  0.825
## ---
```

Supplemental Figure 12



3.1.c Pre-COVID (Lifestyle & Well-being) - cluster identification

```
precovid_k6fhr_communities
```

```
## Model: BGGM (continuous)
## Prior SD: 0.25 (5000 iterations)
## Credible Interval: 0.95 (two-sided)
## Analytic: No
##
## Number of nodes: 23
## Number of edges: 191
## Edge density: 0.755
##
## Non-zero edge weights:
##      M      SD      Min      Max
## 0.024 0.091 -0.392 0.606
##
## ----
##
## Algorithm: Walktrap (Steps = 3)
##
## Number of communities: 4
##
##      hr_volunteer      hr_relig_spirit      hr_social
##              1              1              1
##      hr_family      hr_tv      hr_commute
##              1              1              1
##      hr_meditate      pa_weights      diet_sugardrink
##              1              2              1
##      diet_energydrink      fruitvegs      sleep_nap
##              1              1              1
##      subst_freq_alc      subst_freq_cannabis      subst_freq_tobacco
##              3              3              3
##      subst_alc_freq_binge      pa_met_tot      sleep_hrs_average
##              3              2              1
##      sleep_hrs_diff      psych_distress      flourish
##              1              4              4
##      health      resilience
##              4              4
##
##
## ----
##
## TEFI: -16.263
```

3.2 COVID (Lifestyle & Well-being)

3.2.a COVID (Lifestyle & Well-being) - partial correlations

Supplemental Table 13

```
summary(fit_covid_k6fhr)
```

```
## BGGM: Bayesian Gaussian Graphical Models
## ---
## Type: continuous
## Analytic: FALSE
## Formula:
## Posterior Samples: 30050
## Observations (n):
## Nodes (p): 23
## Relations: 253
## ---
## Call:
## estimate(Y = as.matrix(subset(Y, .imp == x)[, -1]), type = "continuous",
##   iter = iter, impute = FALSE, cores = 7)
## ---
## Estimates:
```

	Relation	Post.mean	Post.sd	Cred.lb	Cred.ub
##	hr_volunteer--hr_relig_spirit	0.244	0.004	0.237	0.252
##	hr_volunteer--hr_social	0.083	0.004	0.076	0.091
##	hr_relig_spirit--hr_social	0.082	0.004	0.075	0.089
##	hr_volunteer--hr_family	0.028	0.004	0.019	0.034
##	hr_relig_spirit--hr_family	0.043	0.004	0.035	0.050
##	hr_social--hr_family	-0.092	0.004	-0.099	-0.084
##	hr_volunteer--hr_tv	-0.042	0.004	-0.050	-0.035
##	hr_relig_spirit--hr_tv	-0.044	0.004	-0.052	-0.037
##	hr_social--hr_tv	0.221	0.004	0.214	0.228
##	hr_family--hr_tv	0.293	0.003	0.287	0.300
##	hr_volunteer--hr_commute	0.116	0.004	0.108	0.123
##	hr_relig_spirit--hr_commute	0.065	0.004	0.057	0.072
##	hr_social--hr_commute	0.040	0.004	0.033	0.048
##	hr_family--hr_commute	0.104	0.004	0.097	0.112
##	hr_tv--hr_commute	0.049	0.004	0.041	0.056
##	hr_volunteer--hr_meditate	0.104	0.004	0.096	0.111
##	hr_relig_spirit--hr_meditate	0.245	0.004	0.238	0.253
##	hr_social--hr_meditate	0.022	0.004	0.015	0.030
##	hr_family--hr_meditate	0.049	0.004	0.042	0.057
##	hr_tv--hr_meditate	0.047	0.004	0.040	0.055
##	hr_commute--hr_meditate	0.088	0.004	0.080	0.095
##	hr_volunteer--pa_weights	0.026	0.004	0.017	0.033
##	hr_relig_spirit--pa_weights	0.030	0.004	0.023	0.038
##	hr_social--pa_weights	0.022	0.004	0.015	0.029
##	hr_family--pa_weights	-0.040	0.004	-0.048	-0.033
##	hr_tv--pa_weights	-0.040	0.004	-0.047	-0.032
##	hr_commute--pa_weights	-0.013	0.004	-0.020	-0.005
##	hr_meditate--pa_weights	0.073	0.004	0.066	0.080
##	hr_volunteer--diet_sugardrink	-0.007	0.004	-0.014	0.001
##	hr_relig_spirit--diet_sugardrink	0.004	0.004	-0.004	0.012

##	hr_social--diet_sugardrink	0.009	0.004	0.002	0.017
##	hr_family--diet_sugardrink	0.026	0.004	0.018	0.033
##	hr_tv--diet_sugardrink	0.048	0.004	0.040	0.056
##	hr_commute--diet_sugardrink	0.043	0.004	0.036	0.051
##	hr_meditate--diet_sugardrink	-0.016	0.004	-0.022	-0.007
##	pa_weights--diet_sugardrink	-0.073	0.004	-0.081	-0.066
##	hr_volunteer--diet_energydrink	-0.002	0.004	-0.009	0.006
##	hr_relig_spirit--diet_energydrink	0.001	0.004	-0.006	0.009
##	hr_social--diet_energydrink	-0.004	0.004	-0.012	0.004
##	hr_family--diet_energydrink	-0.008	0.004	-0.016	-0.001
##	hr_tv--diet_energydrink	0.004	0.004	-0.004	0.011
##	hr_commute--diet_energydrink	0.050	0.004	0.042	0.058
##	hr_meditate--diet_energydrink	0.000	0.004	-0.007	0.008
##	pa_weights--diet_energydrink	0.031	0.004	0.023	0.038
##	diet_sugardrink--diet_energydrink	0.074	0.004	0.065	0.080
##	hr_volunteer--fruitvegs	0.076	0.004	0.069	0.084
##	hr_relig_spirit--fruitvegs	-0.002	0.004	-0.010	0.005
##	hr_social--fruitvegs	-0.016	0.004	-0.023	-0.009
##	hr_family--fruitvegs	0.096	0.004	0.088	0.103
##	hr_tv--fruitvegs	-0.055	0.004	-0.063	-0.048
##	hr_commute--fruitvegs	0.001	0.004	-0.006	0.008
##	hr_meditate--fruitvegs	0.083	0.004	0.076	0.090
##	pa_weights--fruitvegs	0.131	0.004	0.124	0.139
##	diet_sugardrink--fruitvegs	-0.035	0.004	-0.043	-0.028
##	diet_energydrink--fruitvegs	-0.014	0.004	-0.022	-0.007
##	hr_volunteer--sleep_nap	0.021	0.004	0.013	0.028
##	hr_relig_spirit--sleep_nap	0.003	0.004	-0.004	0.011
##	hr_social--sleep_nap	0.040	0.004	0.032	0.047
##	hr_family--sleep_nap	-0.023	0.004	-0.031	-0.016
##	hr_tv--sleep_nap	0.056	0.004	0.049	0.064
##	hr_commute--sleep_nap	0.013	0.004	0.006	0.020
##	hr_meditate--sleep_nap	0.029	0.004	0.022	0.036
##	pa_weights--sleep_nap	-0.005	0.004	-0.013	0.002
##	diet_sugardrink--sleep_nap	0.045	0.004	0.037	0.052
##	diet_energydrink--sleep_nap	0.025	0.004	0.018	0.033
##	fruitvegs--sleep_nap	-0.002	0.004	-0.008	0.006
##	hr_volunteer--subst_freq_alc	0.011	0.004	0.002	0.017
##	hr_relig_spirit--subst_freq_alc	-0.094	0.004	-0.102	-0.087
##	hr_social--subst_freq_alc	0.030	0.004	0.022	0.037
##	hr_family--subst_freq_alc	-0.073	0.004	-0.080	-0.066
##	hr_tv--subst_freq_alc	0.011	0.004	0.005	0.019
##	hr_commute--subst_freq_alc	0.011	0.004	0.004	0.018
##	hr_meditate--subst_freq_alc	-0.003	0.004	-0.010	0.005
##	pa_weights--subst_freq_alc	0.010	0.004	0.003	0.018
##	diet_sugardrink--subst_freq_alc	-0.011	0.004	-0.018	-0.004
##	diet_energydrink--subst_freq_alc	0.014	0.004	0.007	0.022
##	fruitvegs--subst_freq_alc	0.000	0.004	-0.007	0.007
##	sleep_nap--subst_freq_alc	-0.018	0.004	-0.025	-0.011
##	hr_volunteer--subst_freq_cannabis	-0.020	0.004	-0.027	-0.013
##	hr_relig_spirit--subst_freq_cannabis	-0.067	0.004	-0.074	-0.060
##	hr_social--subst_freq_cannabis	0.020	0.004	0.012	0.027
##	hr_family--subst_freq_cannabis	-0.046	0.004	-0.054	-0.039
##	hr_tv--subst_freq_cannabis	0.038	0.004	0.030	0.045
##	hr_commute--subst_freq_cannabis	-0.025	0.004	-0.032	-0.018

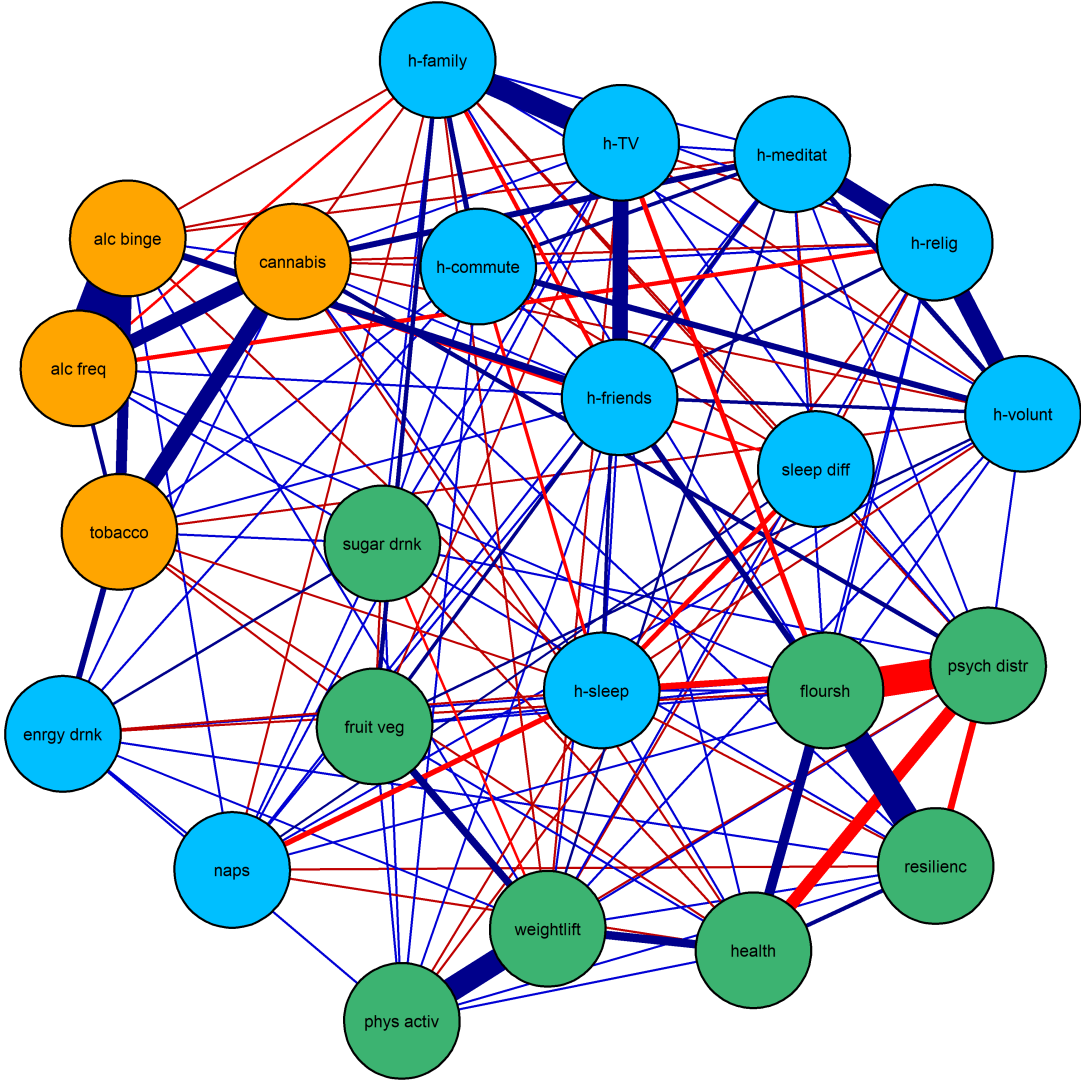
##	hr_meditate--subst_freq_cannabis	0.116	0.004	0.108	0.123
##	pa_weights--subst_freq_cannabis	-0.013	0.004	-0.021	-0.006
##	diet_sugardrink--subst_freq_cannabis	-0.004	0.004	-0.011	0.004
##	diet_energydrink--subst_freq_cannabis	0.021	0.004	0.013	0.028
##	fruitvegs--subst_freq_cannabis	-0.007	0.004	-0.014	0.001
##	sleep_nap--subst_freq_cannabis	-0.013	0.004	-0.021	-0.005
##	subst_freq_alc--subst_freq_cannabis	0.209	0.004	0.202	0.217
##	hr_volunteer--subst_freq_tobacco	-0.024	0.004	-0.031	-0.016
##	hr_relig_spirit--subst_freq_tobacco	0.003	0.004	-0.004	0.010
##	hr_social--subst_freq_tobacco	0.030	0.004	0.023	0.038
##	hr_family--subst_freq_tobacco	-0.011	0.004	-0.019	-0.004
##	hr_tv--subst_freq_tobacco	0.010	0.004	0.002	0.017
##	hr_commute--subst_freq_tobacco	0.023	0.004	0.015	0.030
##	hr_meditate--subst_freq_tobacco	0.015	0.004	0.008	0.023
##	pa_weights--subst_freq_tobacco	-0.008	0.004	-0.016	0.000
##	diet_sugardrink--subst_freq_tobacco	0.022	0.004	0.015	0.029
##	diet_energydrink--subst_freq_tobacco	0.111	0.004	0.104	0.118
##	fruitvegs--subst_freq_tobacco	-0.021	0.004	-0.028	-0.013
##	sleep_nap--subst_freq_tobacco	0.006	0.004	-0.002	0.013
##	subst_freq_alc--subst_freq_tobacco	0.092	0.004	0.085	0.099
##	subst_freq_cannabis--subst_freq_tobacco	0.228	0.004	0.220	0.234
##	hr_volunteer--subst_alc_freq_binge	-0.005	0.004	-0.013	0.003
##	hr_relig_spirit--subst_alc_freq_binge	-0.001	0.004	-0.009	0.007
##	hr_social--subst_alc_freq_binge	0.125	0.004	0.119	0.133
##	hr_family--subst_alc_freq_binge	-0.037	0.004	-0.044	-0.029
##	hr_tv--subst_alc_freq_binge	-0.021	0.004	-0.028	-0.014
##	hr_commute--subst_alc_freq_binge	-0.005	0.004	-0.013	0.002
##	hr_meditate--subst_alc_freq_binge	-0.022	0.004	-0.031	-0.015
##	pa_weights--subst_alc_freq_binge	0.033	0.004	0.025	0.040
##	diet_sugardrink--subst_alc_freq_binge	0.005	0.004	-0.003	0.012
##	diet_energydrink--subst_alc_freq_binge	0.018	0.004	0.010	0.025
##	fruitvegs--subst_alc_freq_binge	-0.007	0.004	-0.014	0.001
##	sleep_nap--subst_alc_freq_binge	0.022	0.004	0.015	0.030
##	subst_freq_alc--subst_alc_freq_binge	0.580	0.003	0.575	0.585
##	subst_freq_cannabis--subst_alc_freq_binge	0.032	0.004	0.024	0.040
##	subst_freq_tobacco--subst_alc_freq_binge	0.169	0.004	0.162	0.177
##	hr_volunteer--pa_met_tot	-0.008	0.004	-0.016	-0.001
##	hr_relig_spirit--pa_met_tot	0.005	0.004	-0.002	0.013
##	hr_social--pa_met_tot	0.050	0.004	0.043	0.058
##	hr_family--pa_met_tot	0.016	0.004	0.008	0.023
##	hr_tv--pa_met_tot	-0.017	0.004	-0.025	-0.010
##	hr_commute--pa_met_tot	0.053	0.004	0.046	0.060
##	hr_meditate--pa_met_tot	-0.001	0.004	-0.009	0.006
##	pa_weights--pa_met_tot	0.320	0.003	0.313	0.327
##	diet_sugardrink--pa_met_tot	0.025	0.004	0.017	0.032
##	diet_energydrink--pa_met_tot	0.029	0.004	0.020	0.035
##	fruitvegs--pa_met_tot	0.067	0.004	0.059	0.074
##	sleep_nap--pa_met_tot	-0.005	0.004	-0.012	0.003
##	subst_freq_alc--pa_met_tot	0.011	0.004	0.004	0.019
##	subst_freq_cannabis--pa_met_tot	0.011	0.004	0.004	0.019
##	subst_freq_tobacco--pa_met_tot	0.006	0.004	-0.001	0.014
##	subst_alc_freq_binge--pa_met_tot	0.002	0.004	-0.006	0.009
##	hr_volunteer--sleep_hrs_average	-0.062	0.004	-0.070	-0.055
##	hr_relig_spirit--sleep_hrs_average	-0.022	0.004	-0.029	-0.014

##	hr_social--sleep_hrs_average	0.031	0.004	0.024	0.038
##	hr_family--sleep_hrs_average	-0.020	0.004	-0.028	-0.013
##	hr_tv--sleep_hrs_average	0.085	0.004	0.078	0.093
##	hr_commute--sleep_hrs_average	-0.085	0.004	-0.093	-0.078
##	hr_meditate--sleep_hrs_average	0.013	0.004	0.005	0.020
##	pa_weights--sleep_hrs_average	-0.007	0.004	-0.014	0.001
##	diet_sugardrink--sleep_hrs_average	-0.014	0.004	-0.021	-0.006
##	diet_energydrink--sleep_hrs_average	-0.070	0.004	-0.077	-0.063
##	fruitvegs--sleep_hrs_average	-0.012	0.004	-0.020	-0.004
##	sleep_nap--sleep_hrs_average	-0.104	0.004	-0.111	-0.097
##	subst_freq_alc--sleep_hrs_average	0.018	0.004	0.011	0.026
##	subst_freq_cannabis--sleep_hrs_average	0.040	0.004	0.033	0.048
##	subst_freq_tobacco--sleep_hrs_average	-0.053	0.004	-0.060	-0.045
##	subst_alc_freq_binge--sleep_hrs_average	-0.028	0.004	-0.036	-0.021
##	pa_met_tot--sleep_hrs_average	-0.038	0.004	-0.046	-0.031
##	hr_volunteer--sleep_hrs_diff	-0.015	0.004	-0.023	-0.008
##	hr_relig_spirit--sleep_hrs_diff	-0.024	0.004	-0.032	-0.017
##	hr_social--sleep_hrs_diff	0.001	0.004	-0.006	0.009
##	hr_family--sleep_hrs_diff	-0.026	0.004	-0.033	-0.018
##	hr_tv--sleep_hrs_diff	0.018	0.004	0.011	0.026
##	hr_commute--sleep_hrs_diff	-0.035	0.004	-0.043	-0.028
##	hr_meditate--sleep_hrs_diff	-0.026	0.004	-0.033	-0.019
##	pa_weights--sleep_hrs_diff	-0.029	0.004	-0.037	-0.022
##	diet_sugardrink--sleep_hrs_diff	-0.003	0.004	-0.011	0.004
##	diet_energydrink--sleep_hrs_diff	0.009	0.004	0.001	0.016
##	fruitvegs--sleep_hrs_diff	-0.011	0.004	-0.018	-0.004
##	sleep_nap--sleep_hrs_diff	0.071	0.004	0.063	0.078
##	subst_freq_alc--sleep_hrs_diff	0.014	0.004	0.007	0.022
##	subst_freq_cannabis--sleep_hrs_diff	-0.006	0.004	-0.013	0.002
##	subst_freq_tobacco--sleep_hrs_diff	-0.008	0.004	-0.015	0.000
##	subst_alc_freq_binge--sleep_hrs_diff	-0.076	0.004	-0.083	-0.068
##	pa_met_tot--sleep_hrs_diff	-0.022	0.004	-0.030	-0.015
##	sleep_hrs_average--sleep_hrs_diff	-0.098	0.004	-0.106	-0.090
##	hr_volunteer--psych_distress	0.034	0.004	0.027	0.042
##	hr_relig_spirit--psych_distress	-0.017	0.004	-0.024	-0.010
##	hr_social--psych_distress	-0.009	0.004	-0.016	-0.001
##	hr_family--psych_distress	-0.035	0.004	-0.043	-0.028
##	hr_tv--psych_distress	0.020	0.004	0.012	0.028
##	hr_commute--psych_distress	0.009	0.004	0.001	0.016
##	hr_meditate--psych_distress	0.059	0.004	0.051	0.066
##	pa_weights--psych_distress	-0.028	0.004	-0.035	-0.020
##	diet_sugardrink--psych_distress	0.026	0.004	0.018	0.033
##	diet_energydrink--psych_distress	0.021	0.004	0.014	0.029
##	fruitvegs--psych_distress	0.031	0.004	0.024	0.038
##	sleep_nap--psych_distress	0.055	0.004	0.047	0.062
##	subst_freq_alc--psych_distress	-0.005	0.004	-0.012	0.003
##	subst_freq_cannabis--psych_distress	0.093	0.004	0.085	0.100
##	subst_freq_tobacco--psych_distress	0.013	0.004	0.005	0.020
##	subst_alc_freq_binge--psych_distress	-0.006	0.004	-0.014	0.001
##	pa_met_tot--psych_distress	0.024	0.004	0.016	0.031
##	sleep_hrs_average--psych_distress	-0.120	0.004	-0.127	-0.112
##	sleep_hrs_diff--psych_distress	0.038	0.004	0.030	0.045
##	hr_volunteer--flourish	0.045	0.004	0.037	0.051
##	hr_relig_spirit--flourish	0.049	0.004	0.042	0.057

##	hr_social--flourish	0.111	0.004	0.104	0.119
##	hr_family--flourish	0.070	0.004	0.062	0.077
##	hr_tv--flourish	-0.102	0.004	-0.110	-0.094
##	hr_commute--flourish	0.010	0.004	0.003	0.018
##	hr_meditate--flourish	0.040	0.004	0.032	0.047
##	pa_weights--flourish	-0.016	0.004	-0.023	-0.008
##	diet_sugardrink--flourish	0.020	0.004	0.012	0.027
##	diet_energydrink--flourish	-0.035	0.004	-0.041	-0.027
##	fruitvegs--flourish	0.037	0.004	0.029	0.044
##	sleep_nap--flourish	0.006	0.004	-0.001	0.014
##	subst_freq_alc--flourish	0.048	0.004	0.040	0.055
##	subst_freq_cannabis--flourish	-0.001	0.004	-0.009	0.006
##	subst_freq_tobacco--flourish	-0.001	0.004	-0.008	0.007
##	subst_alc_freq_binge--flourish	-0.007	0.004	-0.015	0.000
##	pa_met_tot--flourish	0.017	0.004	0.009	0.023
##	sleep_hrs_average--flourish	0.047	0.004	0.040	0.055
##	sleep_hrs_diff--flourish	-0.013	0.004	-0.021	-0.006
##	psych_distress--flourish	-0.395	0.003	-0.401	-0.388
##	hr_volunteer--health	0.011	0.004	0.005	0.020
##	hr_relig_spirit--health	0.027	0.004	0.018	0.034
##	hr_social--health	0.043	0.004	0.035	0.051
##	hr_family--health	-0.002	0.004	-0.009	0.006
##	hr_tv--health	-0.018	0.004	-0.026	-0.010
##	hr_commute--health	0.011	0.004	0.003	0.018
##	hr_meditate--health	-0.003	0.004	-0.011	0.005
##	pa_weights--health	0.141	0.004	0.133	0.148
##	diet_sugardrink--health	-0.030	0.004	-0.037	-0.022
##	diet_energydrink--health	-0.012	0.004	-0.019	-0.004
##	fruitvegs--health	0.043	0.004	0.035	0.050
##	sleep_nap--health	-0.026	0.004	-0.035	-0.020
##	subst_freq_alc--health	-0.013	0.004	-0.020	-0.005
##	subst_freq_cannabis--health	-0.035	0.004	-0.042	-0.028
##	subst_freq_tobacco--health	-0.024	0.004	-0.033	-0.017
##	subst_alc_freq_binge--health	0.001	0.004	-0.005	0.010
##	pa_met_tot--health	0.042	0.004	0.034	0.049
##	sleep_hrs_average--health	0.066	0.004	0.059	0.075
##	sleep_hrs_diff--health	-0.012	0.004	-0.020	-0.005
##	psych_distress--health	-0.189	0.004	-0.197	-0.183
##	flourish--health	0.158	0.004	0.151	0.166
##	hr_volunteer--resilience	0.004	0.004	-0.003	0.012
##	hr_relig_spirit--resilience	-0.016	0.004	-0.023	-0.008
##	hr_social--resilience	-0.020	0.004	-0.027	-0.011
##	hr_family--resilience	-0.010	0.004	-0.016	-0.002
##	hr_tv--resilience	-0.001	0.004	-0.008	0.007
##	hr_commute--resilience	-0.006	0.004	-0.014	0.001
##	hr_meditate--resilience	0.005	0.004	-0.002	0.013
##	pa_weights--resilience	0.025	0.004	0.017	0.032
##	diet_sugardrink--resilience	-0.018	0.004	-0.026	-0.012
##	diet_energydrink--resilience	0.021	0.004	0.013	0.028
##	fruitvegs--resilience	0.015	0.004	0.008	0.023
##	sleep_nap--resilience	-0.020	0.004	-0.027	-0.013
##	subst_freq_alc--resilience	0.029	0.004	0.022	0.036
##	subst_freq_cannabis--resilience	0.025	0.004	0.019	0.034
##	subst_freq_tobacco--resilience	0.018	0.004	0.011	0.026

##	subst_alc_freq_binge--resilience	0.001	0.004	-0.006	0.009
##	pa_met_tot--resilience	0.051	0.004	0.043	0.058
##	sleep_hrs_average--resilience	-0.054	0.004	-0.061	-0.046
##	sleep_hrs_diff--resilience	0.014	0.004	0.006	0.021
##	psych_distress--resilience	-0.122	0.004	-0.129	-0.115
##	flourish--resilience	0.354	0.003	0.347	0.360
##	health--resilience	0.091	0.004	0.084	0.099
##	---				

Supplemental Figure 13



Network graph - COVID (Spring, 2021)

3.2.b COVID (Lifestyle & Well-being) - strength centrality indices

Supplemental Table 14

```
## BGGM: Bayesian Gaussian Graphical Models
## ---
## Network Stats: Roll Your Own
## Posterior Samples: 30050
## ---
## Estimates:
##
##           Node Post.mean Post.sd Cred.lb Cred.ub
## volunteer hours           1    0.969  0.015  0.938  0.997
## religion/spiritual hours   2    1.068  0.013  1.043  1.094
## friend hours              3    1.095  0.015  1.068  1.124
## family hours              4    1.145  0.016  1.114  1.177
## tv hours                  5    1.237  0.015  1.208  1.267
## commute hours            6    0.842  0.016  0.813  0.875
## meditate hours           7    1.047  0.014  1.018  1.075
## strength training        8    1.098  0.016  1.068  1.130
## sugary drinks            9    0.532  0.015  0.502  0.563
## energy drinks           10    0.559  0.013  0.533  0.584
## fruits & vegetables     11    0.742  0.013  0.716  0.768
## daytime napping         12    0.582  0.015  0.554  0.610
## alcohol use frequency   13    1.297  0.016  1.267  1.327
## cannabis use frequency  14    1.054  0.015  1.025  1.083
## tobacco use frequency   15    0.881  0.014  0.854  0.909
## alcohol binge drinking  16    1.171  0.013  1.147  1.196
## physical activity total  17    0.797  0.015  0.768  0.828
## sleep quantity         18    1.081  0.017  1.046  1.114
## sleep hours difference  19    0.558  0.015  0.530  0.587
## psychological distress  20    1.334  0.016  1.305  1.365
## flourishing            21    1.570  0.015  1.540  1.601
## health                 22    0.994  0.013  0.970  1.020
## resilience             23    0.902  0.014  0.875  0.929
## ---
```

Supplemental Figure 14



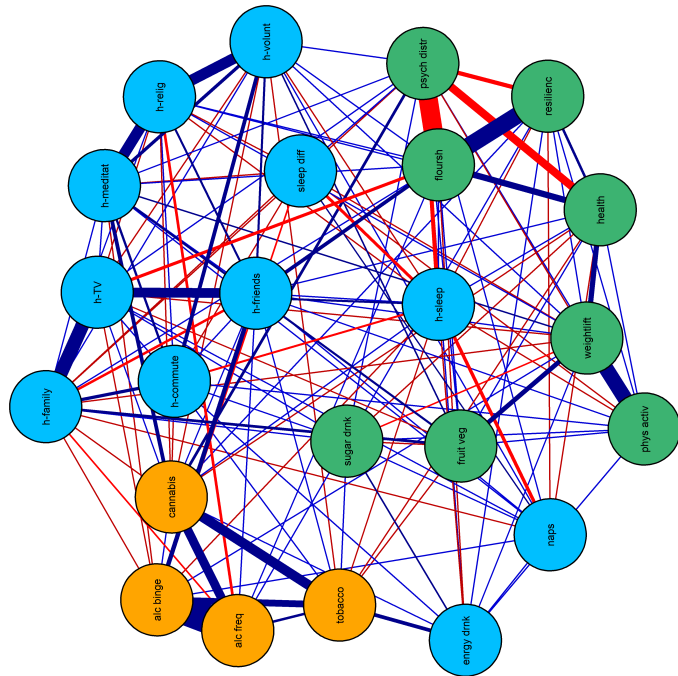
3.2.c COVID (Lifestyle & Well-being) - cluster identification

```
covid_k6fhr_communities
```

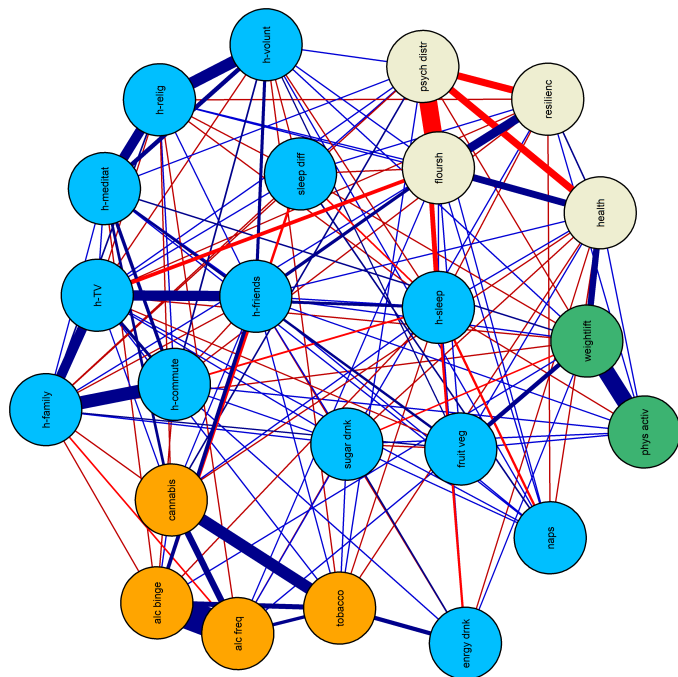
```
## Model: BGGM (continuous)
## Prior SD: 0.25 (5000 iterations)
## Credible Interval: 0.95 (two-sided)
## Analytic: No
##
## Number of nodes: 23
## Number of edges: 207
## Edge density: 0.818
##
## Non-zero edge weights:
##      M      SD      Min      Max
## 0.022 0.087 -0.397 0.580
##
## ----
##
## Algorithm: Walktrap (Steps = 3)
##
## Number of communities: 3
##
##      hr_volunteer      hr_relig_spirit      hr_social
##              1              1              1
##      hr_family      hr_tv      hr_commute
##              1              1              1
##      hr_meditate      pa_weights      diet_sugardrink
##              1              2              2
##      diet_energydrink      fruitvegs      sleep_nap
##              1              2              1
##      subst_freq_alc      subst_freq_cannabis      subst_freq_tobacco
##              3              3              3
##      subst_alc_freq_binge      pa_met_tot      sleep_hrs_average
##              3              2              1
##      sleep_hrs_diff      psych_distress      flourish
##              1              2              2
##      health      resilience
##              2              2
##
##
## ----
##
## TEFI: -14.192
```

3.3 Network comparison (Lifestyle & Well-being) by COVID timing

Supplemental figure 15 (Side-by-side networks)



COVID (Spring, 2021) sample



Pre-COVID (Fall, 2019) sample

Supplemental Table 15

Differences in partial correlations between the pre-COVID and COVID samples

##	Relation	Post.mean	Post.sd	Cred.lb	Cred.ub
## 252	flourish--resilience	-0.140	0.006	-0.153	-0.128
## 13	hr_social--hr_commute	-0.070	0.007	-0.084	-0.056
## 10	hr_family--hr_tv	-0.066	0.007	-0.079	-0.053
## 251	psych_distress--resilience	-0.062	0.007	-0.076	-0.049
## 91	subst_freq_alc--subst_freq_cannabis	-0.043	0.007	-0.055	-0.030
## 11	hr_volunteer--hr_commute	-0.042	0.007	-0.055	-0.029
## 3	hr_relig_spirit--hr_social	-0.037	0.007	-0.051	-0.024
## 61	hr_commute--sleep_nap	-0.033	0.007	-0.047	-0.019
## 12	hr_relig_spirit--hr_commute	-0.032	0.007	-0.045	-0.019
## 120	subst_freq_tobacco--subst_alc_freq_binge	-0.031	0.007	-0.044	-0.017
## 216	hr_commute--health	-0.030	0.007	-0.044	-0.016
## 130	diet_energydrink--pa_met_tot	-0.029	0.007	-0.043	-0.016
## 88	diet_energydrink--subst_freq_cannabis	-0.028	0.007	-0.042	-0.014
## 85	hr_meditate--subst_freq_cannabis	-0.026	0.007	-0.039	-0.012
## 49	hr_family--fruitvegs	-0.024	0.007	-0.038	-0.011
## 97	hr_commute--subst_freq_tobacco	-0.024	0.007	-0.037	-0.010
## 208	sleep_hrs_average--flourish	-0.024	0.007	-0.038	-0.011
## 72	hr_commute--subst_freq_alc	-0.023	0.007	-0.037	-0.009
## 75	diet_sugardrink--subst_freq_alc	-0.023	0.007	-0.036	-0.009
## 185	subst_freq_cannabis--psych_distress	-0.022	0.007	-0.035	-0.008
## 4	hr_volunteer--hr_family	-0.021	0.007	-0.034	-0.007
## 197	hr_meditate--flourish	-0.021	0.007	-0.034	-0.007
## 236	hr_tv--resilience	-0.021	0.007	-0.035	-0.007
## 126	hr_commute--pa_met_tot	-0.020	0.007	-0.034	-0.006
## 19	hr_family--hr_meditate	-0.019	0.007	-0.033	-0.006
## 39	hr_social--diet_energydrink	-0.019	0.007	-0.033	-0.006
## 143	hr_meditate--sleep_hrs_average	-0.019	0.007	-0.033	-0.005
## 152	subst_alc_freq_binge--sleep_hrs_average	-0.019	0.007	-0.032	-0.005
## 23	hr_relig_spirit--pa_weights	-0.018	0.007	-0.032	-0.005
## 71	hr_tv--subst_freq_alc	-0.018	0.007	-0.031	-0.004
## 209	sleep_hrs_diff--flourish	-0.018	0.007	-0.031	-0.004
## 42	hr_commute--diet_energydrink	-0.017	0.007	-0.030	-0.003
## 66	fruitvegs--sleep_nap	-0.017	0.007	-0.030	-0.004
## 189	sleep_hrs_average--psych_distress	-0.017	0.007	-0.031	-0.004
## 111	hr_commute--subst_alc_freq_binge	-0.016	0.007	-0.030	-0.002
## 157	hr_family--sleep_hrs_diff	-0.016	0.007	-0.030	-0.003
## 17	hr_relig_spirit--hr_meditate	-0.015	0.007	-0.028	-0.002
## 108	hr_social--subst_alc_freq_binge	-0.015	0.007	-0.029	-0.001
## 127	hr_meditate--pa_met_tot	-0.015	0.007	-0.029	-0.002
## 150	subst_freq_cannabis--sleep_hrs_average	-0.015	0.007	-0.029	-0.002
## 194	hr_family--flourish	-0.015	0.007	-0.028	-0.001
## 233	hr_relig_spirit--resilience	-0.015	0.007	-0.028	-0.001
## 253	health--resilience	-0.015	0.007	-0.029	-0.001
## 38	hr_relig_spirit--diet_energydrink	-0.014	0.007	-0.028	0.000
## 65	diet_energydrink--sleep_nap	-0.014	0.007	-0.028	0.000
## 112	hr_meditate--subst_alc_freq_binge	-0.014	0.007	-0.027	0.000
## 135	subst_freq_tobacco--pa_met_tot	-0.014	0.007	-0.028	-0.001
## 138	hr_relig_spirit--sleep_hrs_average	-0.014	0.007	-0.028	0.000
## 182	fruitvegs--psych_distress	-0.014	0.007	-0.028	0.000
## 196	hr_commute--flourish	-0.013	0.007	-0.027	0.001

## 237	hr_commute--resilience	-0.013	0.007	-0.027	0.001
## 239	pa_weights--resilience	-0.013	0.007	-0.027	0.000
## 34	hr_commute--diet_sugardrink	-0.012	0.007	-0.025	0.002
## 67	hr_volunteer--subst_freq_alc	-0.012	0.007	-0.026	0.001
## 146	diet_energydrink--sleep_hrs_average	-0.012	0.007	-0.026	0.001
## 155	hr_relig_spirit--sleep_hrs_diff	-0.012	0.007	-0.026	0.002
## 156	hr_social--sleep_hrs_diff	-0.012	0.007	-0.025	0.002
## 169	subst_alc_freq_binge--sleep_hrs_diff	-0.012	0.007	-0.025	0.002
## 178	hr_meditate--psych_distress	-0.012	0.007	-0.025	0.002
## 195	hr_tv--flourish	-0.012	0.007	-0.025	0.002
## 220	diet_energydrink--health	-0.012	0.007	-0.026	0.002
## 69	hr_social--subst_freq_alc	-0.011	0.007	-0.025	0.003
## 134	subst_freq_cannabis--pa_met_tot	-0.011	0.007	-0.024	0.003
## 139	hr_social--sleep_hrs_average	-0.011	0.007	-0.025	0.002
## 174	hr_social--psych_distress	-0.011	0.007	-0.025	0.002
## 183	sleep_nap--psych_distress	-0.011	0.007	-0.025	0.002
## 74	pa_weights--subst_freq_alc	-0.010	0.007	-0.024	0.003
## 122	hr_relig_spirit--pa_met_tot	-0.010	0.007	-0.023	0.004
## 180	diet_sugardrink--psych_distress	-0.010	0.007	-0.023	0.004
## 232	hr_volunteer--resilience	-0.010	0.007	-0.023	0.004
## 243	sleep_nap--resilience	-0.010	0.007	-0.023	0.004
## 89	fruitvegs--subst_freq_cannabis	-0.009	0.007	-0.023	0.004
## 53	pa_weights--fruitvegs	-0.008	0.007	-0.022	0.005
## 93	hr_relig_spirit--subst_freq_tobacco	-0.008	0.007	-0.022	0.006
## 98	hr_meditate--subst_freq_tobacco	-0.008	0.007	-0.022	0.005
## 114	diet_sugardrink--subst_alc_freq_binge	-0.008	0.007	-0.022	0.005
## 131	fruitvegs--pa_met_tot	-0.008	0.007	-0.021	0.006
## 162	diet_sugardrink--sleep_hrs_diff	-0.008	0.007	-0.022	0.005
## 164	fruitvegs--sleep_hrs_diff	-0.008	0.007	-0.022	0.006
## 203	subst_freq_alc--flourish	-0.008	0.007	-0.022	0.005
## 204	subst_freq_cannabis--flourish	-0.008	0.007	-0.022	0.005
## 238	hr_meditate--resilience	-0.008	0.007	-0.022	0.006
## 248	pa_met_tot--resilience	-0.008	0.007	-0.022	0.006
## 27	hr_commute--pa_weights	-0.007	0.007	-0.020	0.007
## 46	hr_volunteer--fruitvegs	-0.007	0.007	-0.020	0.007
## 188	pa_met_tot--psych_distress	-0.007	0.007	-0.021	0.006
## 199	diet_sugardrink--flourish	-0.007	0.007	-0.020	0.007
## 207	pa_met_tot--flourish	-0.007	0.007	-0.021	0.006
## 224	subst_freq_cannabis--health	-0.007	0.007	-0.022	0.006
## 107	hr_relig_spirit--subst_alc_freq_binge	-0.006	0.007	-0.020	0.008
## 116	fruitvegs--subst_alc_freq_binge	-0.006	0.007	-0.019	0.008
## 124	hr_family--pa_met_tot	-0.006	0.007	-0.020	0.007
## 149	subst_freq_alc--sleep_hrs_average	-0.006	0.007	-0.019	0.008
## 154	hr_volunteer--sleep_hrs_diff	-0.006	0.007	-0.019	0.008
## 161	pa_weights--sleep_hrs_diff	-0.006	0.007	-0.019	0.008
## 193	hr_social--flourish	-0.006	0.007	-0.019	0.008
## 241	diet_energydrink--resilience	-0.006	0.007	-0.020	0.008
## 247	subst_alc_freq_binge--resilience	-0.006	0.007	-0.020	0.008
## 70	hr_family--subst_freq_alc	-0.005	0.007	-0.018	0.009
## 213	hr_social--health	-0.005	0.007	-0.018	0.009
## 228	sleep_hrs_average--health	-0.005	0.007	-0.019	0.008
## 245	subst_freq_cannabis--resilience	-0.005	0.007	-0.019	0.008
## 76	diet_energydrink--subst_freq_alc	-0.004	0.007	-0.017	0.010
## 166	subst_freq_alc--sleep_hrs_diff	-0.004	0.007	-0.017	0.010

## 190	sleep_hrs_diff--psych_distress	-0.004	0.007	-0.017	0.010
## 54	diet_sugardrink--fruitvegs	-0.003	0.007	-0.016	0.011
## 57	hr_relig_spirit--sleep_nap	-0.003	0.007	-0.017	0.010
## 117	sleep_nap--subst_alc_freq_binge	-0.003	0.007	-0.017	0.011
## 136	subst_alc_freq_binge--pa_met_tot	-0.003	0.007	-0.016	0.011
## 144	pa_weights--sleep_hrs_average	-0.003	0.007	-0.016	0.010
## 201	fruitvegs--flourish	-0.003	0.007	-0.016	0.011
## 214	hr_family--health	-0.003	0.007	-0.017	0.011
## 219	diet_sugardrink--health	-0.003	0.007	-0.017	0.012
## 225	subst_freq_tobacco--health	-0.003	0.007	-0.017	0.011
## 226	subst_alc_freq_binge--health	-0.003	0.007	-0.017	0.011
## 227	pa_met_tot--health	-0.003	0.007	-0.017	0.010
## 20	hr_tv--hr_meditate	-0.002	0.007	-0.015	0.012
## 36	pa_weights--diet_sugardrink	-0.002	0.007	-0.015	0.012
## 87	diet_sugardrink--subst_freq_cannabis	-0.002	0.007	-0.015	0.012
## 115	diet_energydrink--subst_alc_freq_binge	-0.002	0.007	-0.015	0.012
## 167	subst_freq_cannabis--sleep_hrs_diff	-0.002	0.007	-0.016	0.011
## 179	pa_weights--psych_distress	-0.002	0.007	-0.016	0.012
## 187	subst_alc_freq_binge--psych_distress	-0.002	0.007	-0.016	0.012
## 205	subst_freq_tobacco--flourish	-0.002	0.007	-0.015	0.012
## 242	fruitvegs--resilience	-0.002	0.007	-0.015	0.012
## 92	hr_volunteer--subst_freq_tobacco	-0.001	0.007	-0.014	0.013
## 192	hr_relig_spirit--flourish	-0.001	0.007	-0.015	0.012
## 45	diet_sugardrink--diet_energydrink	0.000	0.007	-0.014	0.014
## 50	hr_tv--fruitvegs	0.000	0.007	-0.013	0.014
## 109	hr_family--subst_alc_freq_binge	0.000	0.007	-0.014	0.014
## 165	sleep_nap--sleep_hrs_diff	0.000	0.007	-0.013	0.014
## 173	hr_relig_spirit--psych_distress	0.000	0.007	-0.014	0.014
## 175	hr_family--psych_distress	0.000	0.007	-0.014	0.014
## 22	hr_volunteer--pa_weights	0.001	0.007	-0.012	0.015
## 28	hr_meditate--pa_weights	0.001	0.007	-0.013	0.014
## 78	sleep_nap--subst_freq_alc	0.001	0.007	-0.012	0.015
## 79	hr_volunteer--subst_freq_cannabis	0.001	0.007	-0.013	0.015
## 83	hr_tv--subst_freq_cannabis	0.001	0.007	-0.013	0.015
## 102	fruitvegs--subst_freq_tobacco	0.001	0.007	-0.012	0.015
## 113	pa_weights--subst_alc_freq_binge	0.001	0.007	-0.013	0.014
## 132	sleep_nap--pa_met_tot	0.001	0.007	-0.012	0.015
## 145	diet_sugardrink--sleep_hrs_average	0.001	0.007	-0.013	0.015
## 223	subst_freq_alc--health	0.001	0.007	-0.013	0.015
## 229	sleep_hrs_diff--health	0.001	0.007	-0.013	0.015
## 33	hr_tv--diet_sugardrink	0.002	0.007	-0.012	0.016
## 176	hr_tv--psych_distress	0.002	0.007	-0.012	0.016
## 211	hr_volunteer--health	0.002	0.007	-0.011	0.016
## 235	hr_family--resilience	0.002	0.007	-0.012	0.016
## 246	subst_freq_tobacco--resilience	0.002	0.007	-0.011	0.016
## 37	hr_volunteer--diet_energydrink	0.003	0.007	-0.011	0.017
## 52	hr_meditate--fruitvegs	0.003	0.007	-0.011	0.016
## 110	hr_tv--subst_alc_freq_binge	0.003	0.007	-0.011	0.016
## 172	hr_volunteer--psych_distress	0.003	0.007	-0.011	0.017
## 29	hr_volunteer--diet_sugardrink	0.004	0.007	-0.010	0.017
## 30	hr_relig_spirit--diet_sugardrink	0.004	0.007	-0.010	0.018
## 60	hr_tv--sleep_nap	0.004	0.007	-0.010	0.018
## 80	hr_relig_spirit--subst_freq_cannabis	0.004	0.007	-0.010	0.017
## 103	sleep_nap--subst_freq_tobacco	0.004	0.007	-0.010	0.017

## 121	hr_volunteer--pa_met_tot	0.004	0.007	-0.010	0.018
## 125	hr_tv--pa_met_tot	0.004	0.007	-0.010	0.018
## 133	subst_freq_alc--pa_met_tot	0.004	0.007	-0.009	0.018
## 160	hr_meditate--sleep_hrs_diff	0.004	0.007	-0.010	0.017
## 222	sleep_nap--health	0.004	0.007	-0.009	0.018
## 35	hr_meditate--diet_sugardrink	0.005	0.007	-0.009	0.018
## 73	hr_meditate--subst_freq_alc	0.005	0.007	-0.008	0.020
## 100	diet_sugardrink--subst_freq_tobacco	0.005	0.007	-0.009	0.019
## 129	diet_sugardrink--pa_met_tot	0.005	0.007	-0.009	0.019
## 137	hr_volunteer--sleep_hrs_average	0.005	0.007	-0.009	0.018
## 142	hr_commute--sleep_hrs_average	0.005	0.007	-0.008	0.019
## 206	subst_alc_freq_binge--flourish	0.005	0.007	-0.009	0.019
## 210	psych_distress--flourish	0.005	0.006	-0.006	0.016
## 56	hr_volunteer--sleep_nap	0.007	0.007	-0.006	0.020
## 62	hr_meditate--sleep_nap	0.007	0.007	-0.007	0.021
## 177	hr_commute--psych_distress	0.007	0.007	-0.007	0.021
## 7	hr_volunteer--hr_tv	0.008	0.007	-0.005	0.022
## 24	hr_social--pa_weights	0.008	0.007	-0.006	0.021
## 44	pa_weights--diet_energydrink	0.008	0.007	-0.005	0.022
## 64	diet_sugardrink--sleep_nap	0.008	0.007	-0.005	0.022
## 158	hr_tv--sleep_hrs_diff	0.008	0.007	-0.006	0.021
## 163	diet_energydrink--sleep_hrs_diff	0.008	0.007	-0.006	0.022
## 32	hr_family--diet_sugardrink	0.009	0.007	-0.004	0.023
## 86	pa_weights--subst_freq_cannabis	0.009	0.007	-0.005	0.023
## 140	hr_family--sleep_hrs_average	0.009	0.007	-0.004	0.023
## 198	pa_weights--flourish	0.009	0.007	-0.005	0.022
## 221	fruitvegs--health	0.009	0.007	-0.004	0.022
## 244	subst_freq_alc--resilience	0.009	0.007	-0.005	0.023
## 51	hr_commute--fruitvegs	0.010	0.007	-0.003	0.024
## 240	diet_sugardrink--resilience	0.010	0.007	-0.004	0.023
## 25	hr_family--pa_weights	0.011	0.007	-0.002	0.025
## 26	hr_tv--pa_weights	0.011	0.007	-0.003	0.024
## 81	hr_social--subst_freq_cannabis	0.011	0.007	-0.002	0.024
## 59	hr_family--sleep_nap	0.012	0.007	-0.001	0.025
## 94	hr_social--subst_freq_tobacco	0.012	0.007	-0.002	0.026
## 123	hr_social--pa_met_tot	0.012	0.007	-0.002	0.025
## 186	subst_freq_tobacco--psych_distress	0.012	0.007	-0.001	0.026
## 212	hr_relig_spirit--health	0.012	0.007	-0.002	0.026
## 217	hr_meditate--health	0.012	0.007	-0.002	0.025
## 234	hr_social--resilience	0.012	0.007	-0.002	0.025
## 101	diet_energydrink--subst_freq_tobacco	0.013	0.007	0.000	0.027
## 141	hr_tv--sleep_hrs_average	0.013	0.007	0.000	0.026
## 8	hr_relig_spirit--hr_tv	0.014	0.007	0.001	0.027
## 43	hr_meditate--diet_energydrink	0.014	0.007	0.000	0.028
## 96	hr_tv--subst_freq_tobacco	0.014	0.007	0.000	0.028
## 153	pa_met_tot--sleep_hrs_average	0.014	0.007	0.001	0.027
## 181	diet_energydrink--psych_distress	0.014	0.007	0.000	0.027
## 184	subst_freq_alc--psych_distress	0.014	0.007	0.000	0.027
## 215	hr_tv--health	0.014	0.007	0.000	0.028
## 41	hr_tv--diet_energydrink	0.015	0.007	0.002	0.029
## 104	subst_freq_alc--subst_freq_tobacco	0.015	0.007	0.001	0.029
## 106	hr_volunteer--subst_alc_freq_binge	0.015	0.007	0.001	0.029
## 230	psych_distress--health	0.015	0.007	0.001	0.028
## 250	sleep_hrs_diff--resilience	0.015	0.007	0.002	0.029

## 55	diet_energydrink--fruitvegs	0.016	0.007	0.002	0.029
## 99	pa_weights--subst_freq_tobacco	0.016	0.007	0.002	0.029
## 31	hr_social--diet_sugardrink	0.017	0.007	0.003	0.031
## 159	hr_commute--sleep_hrs_diff	0.017	0.007	0.003	0.030
## 202	sleep_nap--flourish	0.017	0.007	0.003	0.030
## 18	hr_social--hr_meditate	0.018	0.007	0.005	0.032
## 200	diet_energydrink--flourish	0.018	0.007	0.004	0.032
## 82	hr_family--subst_freq_cannabis	0.019	0.007	0.006	0.033
## 148	sleep_nap--sleep_hrs_average	0.019	0.007	0.005	0.032
## 231	flourish--health	0.019	0.007	0.006	0.033
## 2	hr_volunteer--hr_social	0.020	0.007	0.006	0.033
## 21	hr_commute--hr_meditate	0.020	0.007	0.006	0.034
## 191	hr_volunteer--flourish	0.020	0.007	0.007	0.034
## 9	hr_social--hr_tv	0.021	0.007	0.009	0.034
## 47	hr_relig_spirit--fruitvegs	0.021	0.007	0.007	0.034
## 147	fruitvegs--sleep_hrs_average	0.021	0.007	0.008	0.035
## 168	subst_freq_tobacco--sleep_hrs_diff	0.021	0.007	0.007	0.035
## 170	pa_met_tot--sleep_hrs_diff	0.021	0.007	0.007	0.035
## 40	hr_family--diet_energydrink	0.022	0.007	0.008	0.036
## 16	hr_volunteer--hr_meditate	0.023	0.007	0.009	0.036
## 58	hr_social--sleep_nap	0.023	0.007	0.009	0.036
## 171	sleep_hrs_average--sleep_hrs_diff	0.024	0.007	0.011	0.037
## 63	pa_weights--sleep_nap	0.025	0.007	0.012	0.039
## 77	fruitvegs--subst_freq_alc	0.025	0.007	0.012	0.039
## 151	subst_freq_tobacco--sleep_hrs_average	0.025	0.007	0.012	0.039
## 118	subst_freq_alc--subst_alc_freq_binge	0.026	0.004	0.018	0.035
## 218	pa_weights--health	0.026	0.007	0.012	0.039
## 1	hr_volunteer--hr_relig_spirit	0.027	0.006	0.015	0.040
## 68	hr_relig_spirit--subst_freq_alc	0.028	0.007	0.015	0.041
## 90	sleep_nap--subst_freq_cannabis	0.028	0.007	0.015	0.041
## 95	hr_family--subst_freq_tobacco	0.029	0.007	0.016	0.042
## 249	sleep_hrs_average--resilience	0.029	0.007	0.016	0.043
## 119	subst_freq_cannabis--subst_alc_freq_binge	0.030	0.007	0.016	0.043
## 5	hr_relig_spirit--hr_family	0.031	0.007	0.017	0.044
## 48	hr_social--fruitvegs	0.031	0.007	0.017	0.044
## 84	hr_commute--subst_freq_cannabis	0.044	0.007	0.030	0.057
## 105	subst_freq_cannabis--subst_freq_tobacco	0.045	0.007	0.033	0.058
## 128	pa_weights--pa_met_tot	0.045	0.006	0.033	0.057
## 6	hr_social--hr_family	0.049	0.007	0.036	0.063
## 15	hr_tv--hr_commute	0.050	0.007	0.037	0.063
## 14	hr_family--hr_commute	0.191	0.006	0.178	0.203

4.0 Lifestyle & Well-being Behavior Clustering by Sex

4.1 Female Group

4.1.a Female group - partial correlations

Supplemental Table 16

```
summary(fit_female)
```

```
## BGGM: Bayesian Gaussian Graphical Models
## ---
## Type: continuous
## Analytic: FALSE
## Formula:
## Posterior Samples: 30050
## Observations (n):
## Nodes (p): 23
## Relations: 253
## ---
## Call:
## estimate(Y = as.matrix(subset(Y, .imp == x)[, -1]), type = "continuous",
##   iter = iter, impute = FALSE, cores = 7)
## ---
## Estimates:
```

	Relation	Post.mean	Post.sd	Cred.lb	Cred.ub
##	hr_volunteer--hr_relig_spirit	0.256	0.007	0.242	0.269
##	hr_volunteer--hr_social	0.101	0.007	0.087	0.115
##	hr_relig_spirit--hr_social	0.042	0.007	0.030	0.057
##	hr_volunteer--hr_family	-0.012	0.007	-0.027	0.003
##	hr_relig_spirit--hr_family	0.079	0.007	0.062	0.090
##	hr_social--hr_family	-0.047	0.007	-0.060	-0.031
##	hr_volunteer--hr_tv	-0.027	0.007	-0.042	-0.014
##	hr_relig_spirit--hr_tv	-0.037	0.007	-0.049	-0.021
##	hr_social--hr_tv	0.240	0.007	0.228	0.254
##	hr_family--hr_tv	0.228	0.007	0.215	0.242
##	hr_volunteer--hr_commute	0.074	0.007	0.060	0.089
##	hr_relig_spirit--hr_commute	0.030	0.007	0.017	0.046
##	hr_social--hr_commute	-0.037	0.007	-0.052	-0.024
##	hr_family--hr_commute	0.292	0.007	0.279	0.304
##	hr_tv--hr_commute	0.105	0.007	0.091	0.119
##	hr_volunteer--hr_meditate	0.101	0.007	0.089	0.117
##	hr_relig_spirit--hr_meditate	0.215	0.007	0.201	0.229
##	hr_social--hr_meditate	0.038	0.007	0.026	0.054
##	hr_family--hr_meditate	0.038	0.007	0.023	0.052
##	hr_tv--hr_meditate	0.033	0.007	0.021	0.048
##	hr_commute--hr_meditate	0.091	0.007	0.078	0.107
##	hr_volunteer--pa_weights	0.039	0.007	0.024	0.053
##	hr_relig_spirit--pa_weights	0.001	0.007	-0.012	0.016
##	hr_social--pa_weights	0.013	0.007	-0.002	0.025
##	hr_family--pa_weights	-0.023	0.007	-0.038	-0.010
##	hr_tv--pa_weights	-0.030	0.007	-0.045	-0.016
##	hr_commute--pa_weights	-0.015	0.007	-0.030	-0.002

##	hr_meditate--pa_weights	0.082	0.007	0.068	0.097
##	hr_volunteer--diet_sugardrink	-0.005	0.007	-0.019	0.009
##	hr_relig_spirit--diet_sugardrink	0.006	0.007	-0.006	0.022
##	hr_social--diet_sugardrink	0.019	0.007	0.007	0.034
##	hr_family--diet_sugardrink	0.043	0.007	0.027	0.055
##	hr_tv--diet_sugardrink	0.040	0.007	0.026	0.055
##	hr_commute--diet_sugardrink	0.046	0.007	0.033	0.061
##	hr_meditate--diet_sugardrink	-0.015	0.007	-0.030	-0.002
##	pa_weights--diet_sugardrink	-0.079	0.007	-0.091	-0.063
##	hr_volunteer--diet_energydrink	-0.001	0.007	-0.016	0.012
##	hr_relig_spirit--diet_energydrink	-0.006	0.007	-0.020	0.008
##	hr_social--diet_energydrink	-0.023	0.007	-0.036	-0.007
##	hr_family--diet_energydrink	0.012	0.007	-0.003	0.026
##	hr_tv--diet_energydrink	0.005	0.007	-0.009	0.020
##	hr_commute--diet_energydrink	0.037	0.007	0.023	0.052
##	hr_meditate--diet_energydrink	0.003	0.007	-0.013	0.016
##	pa_weights--diet_energydrink	0.016	0.007	0.002	0.030
##	diet_sugardrink--diet_energydrink	0.060	0.007	0.042	0.071
##	hr_volunteer--fruitvegs	0.060	0.007	0.045	0.073
##	hr_relig_spirit--fruitvegs	0.026	0.007	0.012	0.040
##	hr_social--fruitvegs	0.011	0.007	-0.003	0.025
##	hr_family--fruitvegs	0.063	0.007	0.051	0.079
##	hr_tv--fruitvegs	-0.046	0.007	-0.060	-0.032
##	hr_commute--fruitvegs	0.013	0.007	-0.003	0.026
##	hr_meditate--fruitvegs	0.082	0.007	0.068	0.095
##	pa_weights--fruitvegs	0.136	0.007	0.123	0.150
##	diet_sugardrink--fruitvegs	-0.035	0.007	-0.050	-0.021
##	diet_energydrink--fruitvegs	0.005	0.007	-0.009	0.019
##	hr_volunteer--sleep_nap	0.021	0.007	0.006	0.035
##	hr_relig_spirit--sleep_nap	-0.010	0.007	-0.025	0.003
##	hr_social--sleep_nap	0.072	0.007	0.057	0.086
##	hr_family--sleep_nap	-0.018	0.007	-0.033	-0.005
##	hr_tv--sleep_nap	0.074	0.007	0.061	0.089
##	hr_commute--sleep_nap	-0.029	0.007	-0.042	-0.014
##	hr_meditate--sleep_nap	0.029	0.007	0.017	0.045
##	pa_weights--sleep_nap	0.010	0.007	-0.004	0.024
##	diet_sugardrink--sleep_nap	0.055	0.007	0.041	0.069
##	diet_energydrink--sleep_nap	0.008	0.007	-0.005	0.023
##	fruitvegs--sleep_nap	-0.026	0.007	-0.040	-0.012
##	hr_volunteer--subst_freq_alc	-0.007	0.007	-0.021	0.007
##	hr_relig_spirit--subst_freq_alc	-0.074	0.007	-0.087	-0.059
##	hr_social--subst_freq_alc	0.023	0.007	0.009	0.038
##	hr_family--subst_freq_alc	-0.087	0.007	-0.103	-0.075
##	hr_tv--subst_freq_alc	0.010	0.007	-0.005	0.022
##	hr_commute--subst_freq_alc	-0.016	0.007	-0.029	-0.001
##	hr_meditate--subst_freq_alc	0.001	0.007	-0.012	0.017
##	pa_weights--subst_freq_alc	0.023	0.007	0.009	0.038
##	diet_sugardrink--subst_freq_alc	-0.033	0.007	-0.047	-0.019
##	diet_energydrink--subst_freq_alc	0.023	0.007	0.008	0.036
##	fruitvegs--subst_freq_alc	0.023	0.007	0.009	0.037
##	sleep_nap--subst_freq_alc	-0.034	0.007	-0.047	-0.019
##	hr_volunteer--subst_freq_cannabis	-0.017	0.007	-0.030	-0.003
##	hr_relig_spirit--subst_freq_cannabis	-0.055	0.007	-0.068	-0.040
##	hr_social--subst_freq_cannabis	0.024	0.007	0.010	0.038

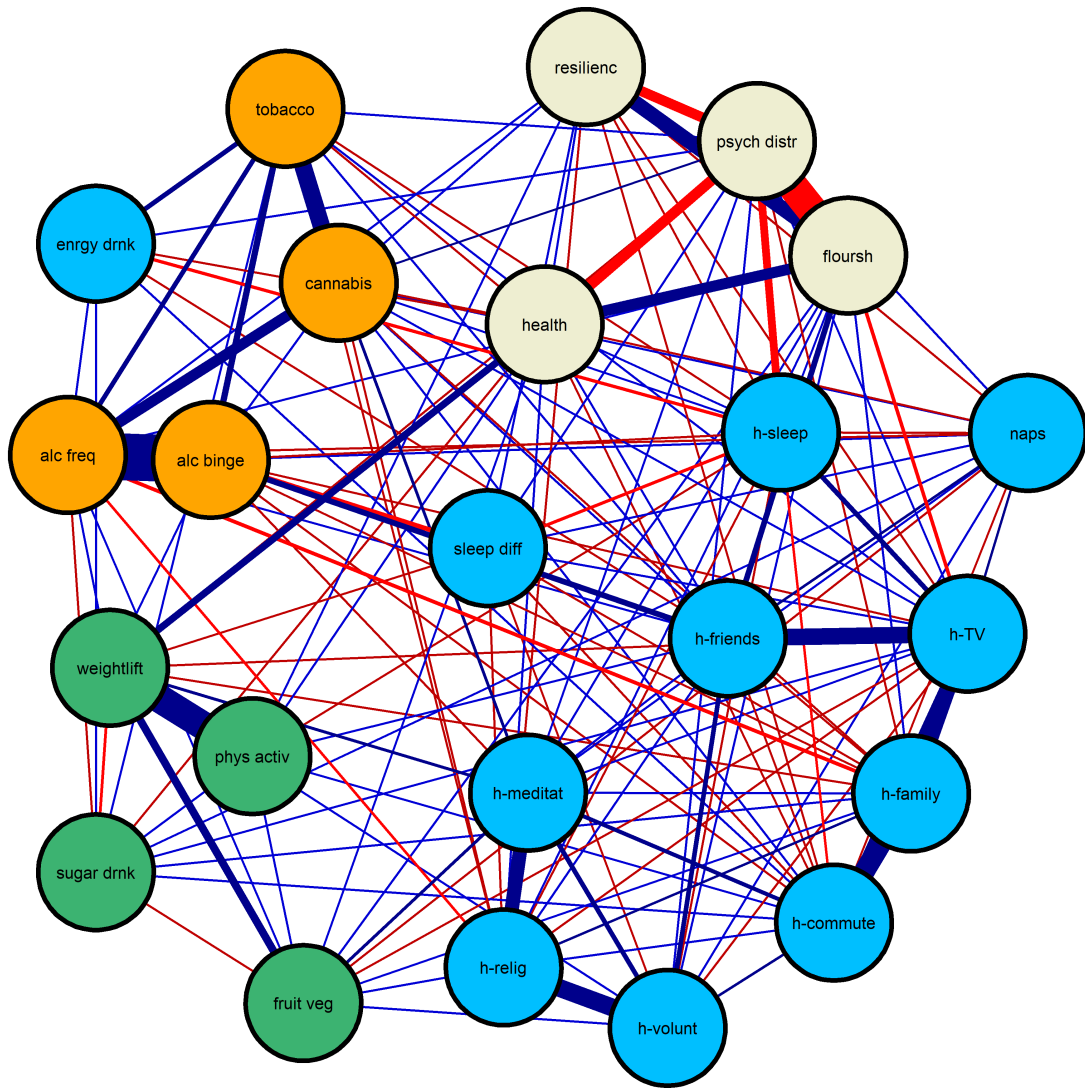
##	hr_family--subst_freq_cannabis	-0.030	0.007	-0.044	-0.016
##	hr_tv--subst_freq_cannabis	0.045	0.007	0.030	0.058
##	hr_commute--subst_freq_cannabis	0.027	0.007	0.013	0.041
##	hr_meditate--subst_freq_cannabis	0.082	0.007	0.068	0.095
##	pa_weights--subst_freq_cannabis	-0.010	0.007	-0.025	0.004
##	diet_sugardrink--subst_freq_cannabis	0.001	0.007	-0.012	0.015
##	diet_energydrink--subst_freq_cannabis	0.013	0.007	-0.003	0.026
##	fruitvegs--subst_freq_cannabis	-0.011	0.007	-0.025	0.002
##	sleep_nap--subst_freq_cannabis	0.026	0.007	0.011	0.040
##	subst_freq_alc--subst_freq_cannabis	0.175	0.007	0.160	0.189
##	hr_volunteer--subst_freq_tobacco	-0.020	0.007	-0.034	-0.006
##	hr_relig_spirit--subst_freq_tobacco	-0.021	0.007	-0.036	-0.009
##	hr_social--subst_freq_tobacco	0.048	0.007	0.033	0.061
##	hr_family--subst_freq_tobacco	0.019	0.007	0.006	0.035
##	hr_tv--subst_freq_tobacco	0.024	0.007	0.009	0.038
##	hr_commute--subst_freq_tobacco	-0.006	0.007	-0.021	0.006
##	hr_meditate--subst_freq_tobacco	0.012	0.007	0.000	0.028
##	pa_weights--subst_freq_tobacco	-0.016	0.007	-0.031	-0.002
##	diet_sugardrink--subst_freq_tobacco	0.024	0.007	0.010	0.038
##	diet_energydrink--subst_freq_tobacco	0.100	0.007	0.088	0.116
##	fruitvegs--subst_freq_tobacco	-0.017	0.007	-0.032	-0.004
##	sleep_nap--subst_freq_tobacco	0.006	0.007	-0.008	0.020
##	subst_freq_alc--subst_freq_tobacco	0.098	0.007	0.086	0.114
##	subst_freq_cannabis--subst_freq_tobacco	0.252	0.007	0.238	0.264
##	hr_volunteer--subst_alc_freq_binge	0.008	0.008	-0.006	0.024
##	hr_relig_spirit--subst_alc_freq_binge	-0.007	0.007	-0.023	0.006
##	hr_social--subst_alc_freq_binge	0.110	0.007	0.096	0.125
##	hr_family--subst_alc_freq_binge	-0.034	0.007	-0.048	-0.020
##	hr_tv--subst_alc_freq_binge	-0.028	0.007	-0.040	-0.012
##	hr_commute--subst_alc_freq_binge	-0.021	0.007	-0.036	-0.008
##	hr_meditate--subst_alc_freq_binge	-0.031	0.007	-0.048	-0.019
##	pa_weights--subst_alc_freq_binge	0.023	0.007	0.011	0.038
##	diet_sugardrink--subst_alc_freq_binge	-0.007	0.007	-0.019	0.009
##	diet_energydrink--subst_alc_freq_binge	0.011	0.007	-0.003	0.026
##	fruitvegs--subst_alc_freq_binge	-0.003	0.007	-0.017	0.011
##	sleep_nap--subst_alc_freq_binge	0.025	0.007	0.010	0.038
##	subst_freq_alc--subst_alc_freq_binge	0.603	0.005	0.593	0.611
##	subst_freq_cannabis--subst_alc_freq_binge	0.065	0.007	0.052	0.080
##	subst_freq_tobacco--subst_alc_freq_binge	0.123	0.007	0.109	0.137
##	hr_volunteer--pa_met_tot	-0.011	0.007	-0.026	0.002
##	hr_relig_spirit--pa_met_tot	0.002	0.007	-0.013	0.016
##	hr_social--pa_met_tot	0.062	0.007	0.050	0.078
##	hr_family--pa_met_tot	0.004	0.007	-0.011	0.019
##	hr_tv--pa_met_tot	-0.010	0.007	-0.024	0.004
##	hr_commute--pa_met_tot	0.024	0.007	0.012	0.040
##	hr_meditate--pa_met_tot	-0.019	0.007	-0.033	-0.004
##	pa_weights--pa_met_tot	0.385	0.006	0.373	0.397
##	diet_sugardrink--pa_met_tot	0.035	0.007	0.020	0.049
##	diet_energydrink--pa_met_tot	-0.008	0.007	-0.022	0.006
##	fruitvegs--pa_met_tot	0.049	0.007	0.033	0.063
##	sleep_nap--pa_met_tot	0.003	0.007	-0.013	0.016
##	subst_freq_alc--pa_met_tot	0.005	0.007	-0.008	0.020
##	subst_freq_cannabis--pa_met_tot	-0.007	0.007	-0.021	0.007
##	subst_freq_tobacco--pa_met_tot	-0.012	0.007	-0.025	0.003

##	subst_alc_freq_binge--pa_met_tot	0.003	0.007	-0.011	0.017
##	hr_volunteer--sleep_hrs_average	-0.061	0.007	-0.075	-0.047
##	hr_relig_spirit--sleep_hrs_average	-0.043	0.007	-0.058	-0.029
##	hr_social--sleep_hrs_average	0.017	0.007	0.002	0.030
##	hr_family--sleep_hrs_average	-0.007	0.007	-0.022	0.006
##	hr_tv--sleep_hrs_average	0.101	0.007	0.089	0.117
##	hr_commute--sleep_hrs_average	-0.074	0.007	-0.089	-0.061
##	hr_meditate--sleep_hrs_average	0.001	0.007	-0.015	0.014
##	pa_weights--sleep_hrs_average	-0.012	0.007	-0.025	0.003
##	diet_sugardrink--sleep_hrs_average	-0.003	0.007	-0.017	0.011
##	diet_energydrink--sleep_hrs_average	-0.083	0.007	-0.096	-0.068
##	fruitvegs--sleep_hrs_average	-0.009	0.007	-0.024	0.005
##	sleep_nap--sleep_hrs_average	-0.058	0.007	-0.072	-0.045
##	subst_freq_alc--sleep_hrs_average	0.012	0.007	-0.002	0.026
##	subst_freq_cannabis--sleep_hrs_average	0.026	0.007	0.012	0.040
##	subst_freq_tobacco--sleep_hrs_average	-0.025	0.007	-0.040	-0.011
##	subst_alc_freq_binge--sleep_hrs_average	-0.052	0.007	-0.066	-0.038
##	pa_met_tot--sleep_hrs_average	-0.027	0.007	-0.042	-0.014
##	hr_volunteer--sleep_hrs_diff	-0.024	0.007	-0.038	-0.010
##	hr_relig_spirit--sleep_hrs_diff	-0.031	0.007	-0.045	-0.018
##	hr_social--sleep_hrs_diff	-0.018	0.007	-0.031	-0.004
##	hr_family--sleep_hrs_diff	-0.032	0.007	-0.047	-0.018
##	hr_tv--sleep_hrs_diff	0.032	0.007	0.018	0.047
##	hr_commute--sleep_hrs_diff	-0.023	0.007	-0.037	-0.009
##	hr_meditate--sleep_hrs_diff	-0.011	0.007	-0.027	0.001
##	pa_weights--sleep_hrs_diff	-0.040	0.007	-0.054	-0.026
##	diet_sugardrink--sleep_hrs_diff	-0.010	0.007	-0.024	0.004
##	diet_energydrink--sleep_hrs_diff	0.018	0.007	0.004	0.032
##	fruitvegs--sleep_hrs_diff	-0.008	0.007	-0.022	0.006
##	sleep_nap--sleep_hrs_diff	0.065	0.007	0.051	0.079
##	subst_freq_alc--sleep_hrs_diff	0.014	0.007	-0.001	0.027
##	subst_freq_cannabis--sleep_hrs_diff	-0.004	0.007	-0.018	0.010
##	subst_freq_tobacco--sleep_hrs_diff	-0.004	0.007	-0.018	0.010
##	subst_alc_freq_binge--sleep_hrs_diff	-0.101	0.007	-0.115	-0.087
##	pa_met_tot--sleep_hrs_diff	0.001	0.007	-0.013	0.015
##	sleep_hrs_average--sleep_hrs_diff	-0.086	0.007	-0.100	-0.072
##	hr_volunteer--psych_distress	0.033	0.007	0.019	0.048
##	hr_relig_spirit--psych_distress	-0.018	0.007	-0.030	-0.003
##	hr_social--psych_distress	-0.012	0.007	-0.027	0.001
##	hr_family--psych_distress	-0.042	0.007	-0.054	-0.026
##	hr_tv--psych_distress	0.037	0.007	0.023	0.053
##	hr_commute--psych_distress	0.013	0.007	-0.003	0.026
##	hr_meditate--psych_distress	0.042	0.007	0.026	0.056
##	pa_weights--psych_distress	-0.021	0.007	-0.034	-0.007
##	diet_sugardrink--psych_distress	0.013	0.007	-0.002	0.026
##	diet_energydrink--psych_distress	0.051	0.007	0.038	0.066
##	fruitvegs--psych_distress	0.012	0.007	-0.002	0.026
##	sleep_nap--psych_distress	0.036	0.007	0.022	0.050
##	subst_freq_alc--psych_distress	-0.005	0.007	-0.019	0.010
##	subst_freq_cannabis--psych_distress	0.071	0.007	0.058	0.086
##	subst_freq_tobacco--psych_distress	0.036	0.007	0.021	0.049
##	subst_alc_freq_binge--psych_distress	0.003	0.007	-0.011	0.017
##	pa_met_tot--psych_distress	0.010	0.007	-0.004	0.024
##	sleep_hrs_average--psych_distress	-0.137	0.007	-0.151	-0.123

##	sleep_hrs_diff--psych_distress	0.039	0.007	0.024	0.052
##	hr_volunteer--flourish	0.067	0.007	0.053	0.081
##	hr_relig_spirit--flourish	0.051	0.007	0.037	0.066
##	hr_social--flourish	0.110	0.007	0.095	0.123
##	hr_family--flourish	0.051	0.007	0.037	0.065
##	hr_tv--flourish	-0.090	0.007	-0.105	-0.076
##	hr_commute--flourish	-0.002	0.007	-0.017	0.011
##	hr_meditate--flourish	0.026	0.007	0.011	0.040
##	pa_weights--flourish	0.016	0.007	0.002	0.030
##	diet_sugardrink--flourish	0.013	0.007	-0.001	0.027
##	diet_energydrink--flourish	-0.001	0.007	-0.015	0.013
##	fruitvegs--flourish	0.033	0.007	0.019	0.047
##	sleep_nap--flourish	0.014	0.007	-0.001	0.028
##	subst_freq_alc--flourish	0.035	0.007	0.020	0.047
##	subst_freq_cannabis--flourish	-0.006	0.007	-0.021	0.008
##	subst_freq_tobacco--flourish	-0.001	0.007	-0.015	0.013
##	subst_alc_freq_binge--flourish	-0.003	0.007	-0.015	0.013
##	pa_met_tot--flourish	-0.002	0.007	-0.017	0.011
##	sleep_hrs_average--flourish	0.023	0.007	0.009	0.038
##	sleep_hrs_diff--flourish	-0.013	0.007	-0.027	0.001
##	psych_distress--flourish	-0.408	0.006	-0.419	-0.396
##	hr_volunteer--health	0.010	0.007	-0.003	0.024
##	hr_relig_spirit--health	0.031	0.007	0.017	0.046
##	hr_social--health	0.041	0.007	0.026	0.055
##	hr_family--health	0.000	0.007	-0.014	0.014
##	hr_tv--health	-0.014	0.007	-0.028	0.001
##	hr_commute--health	-0.021	0.007	-0.035	-0.007
##	hr_meditate--health	-0.005	0.007	-0.020	0.009
##	pa_weights--health	0.125	0.007	0.111	0.140
##	diet_sugardrink--health	-0.037	0.007	-0.055	-0.026
##	diet_energydrink--health	-0.030	0.007	-0.045	-0.017
##	fruitvegs--health	0.055	0.007	0.040	0.069
##	sleep_nap--health	-0.030	0.007	-0.041	-0.013
##	subst_freq_alc--health	-0.001	0.007	-0.014	0.013
##	subst_freq_cannabis--health	-0.044	0.007	-0.056	-0.028
##	subst_freq_tobacco--health	-0.033	0.007	-0.048	-0.020
##	subst_alc_freq_binge--health	0.004	0.007	-0.011	0.016
##	pa_met_tot--health	0.035	0.007	0.021	0.049
##	sleep_hrs_average--health	0.068	0.007	0.054	0.083
##	sleep_hrs_diff--health	-0.015	0.007	-0.028	-0.001
##	psych_distress--health	-0.171	0.007	-0.184	-0.157
##	flourish--health	0.179	0.007	0.165	0.193
##	hr_volunteer--resilience	0.006	0.007	-0.008	0.021
##	hr_relig_spirit--resilience	-0.028	0.007	-0.042	-0.014
##	hr_social--resilience	-0.013	0.007	-0.027	0.002
##	hr_family--resilience	-0.001	0.007	-0.013	0.015
##	hr_tv--resilience	-0.029	0.007	-0.043	-0.014
##	hr_commute--resilience	-0.026	0.007	-0.038	-0.010
##	hr_meditate--resilience	0.007	0.007	-0.008	0.020
##	pa_weights--resilience	-0.001	0.007	-0.014	0.014
##	diet_sugardrink--resilience	-0.016	0.007	-0.030	-0.002
##	diet_energydrink--resilience	0.012	0.007	-0.005	0.023
##	fruitvegs--resilience	0.015	0.007	0.000	0.029
##	sleep_nap--resilience	-0.023	0.007	-0.038	-0.010

##	subst_freq_alc--resilience	0.039	0.007	0.026	0.053
##	subst_freq_cannabis--resilience	0.026	0.007	0.012	0.040
##	subst_freq_tobacco--resilience	0.005	0.007	-0.009	0.019
##	subst_alc_freq_binge--resilience	-0.011	0.007	-0.024	0.004
##	pa_met_tot--resilience	0.038	0.007	0.023	0.050
##	sleep_hrs_average--resilience	-0.030	0.007	-0.044	-0.016
##	sleep_hrs_diff--resilience	0.026	0.007	0.012	0.040
##	psych_distress--resilience	-0.166	0.007	-0.180	-0.153
##	flourish--resilience	0.223	0.007	0.209	0.236
##	health--resilience	0.069	0.007	0.056	0.084
##	---				

Supplemental Figure 16



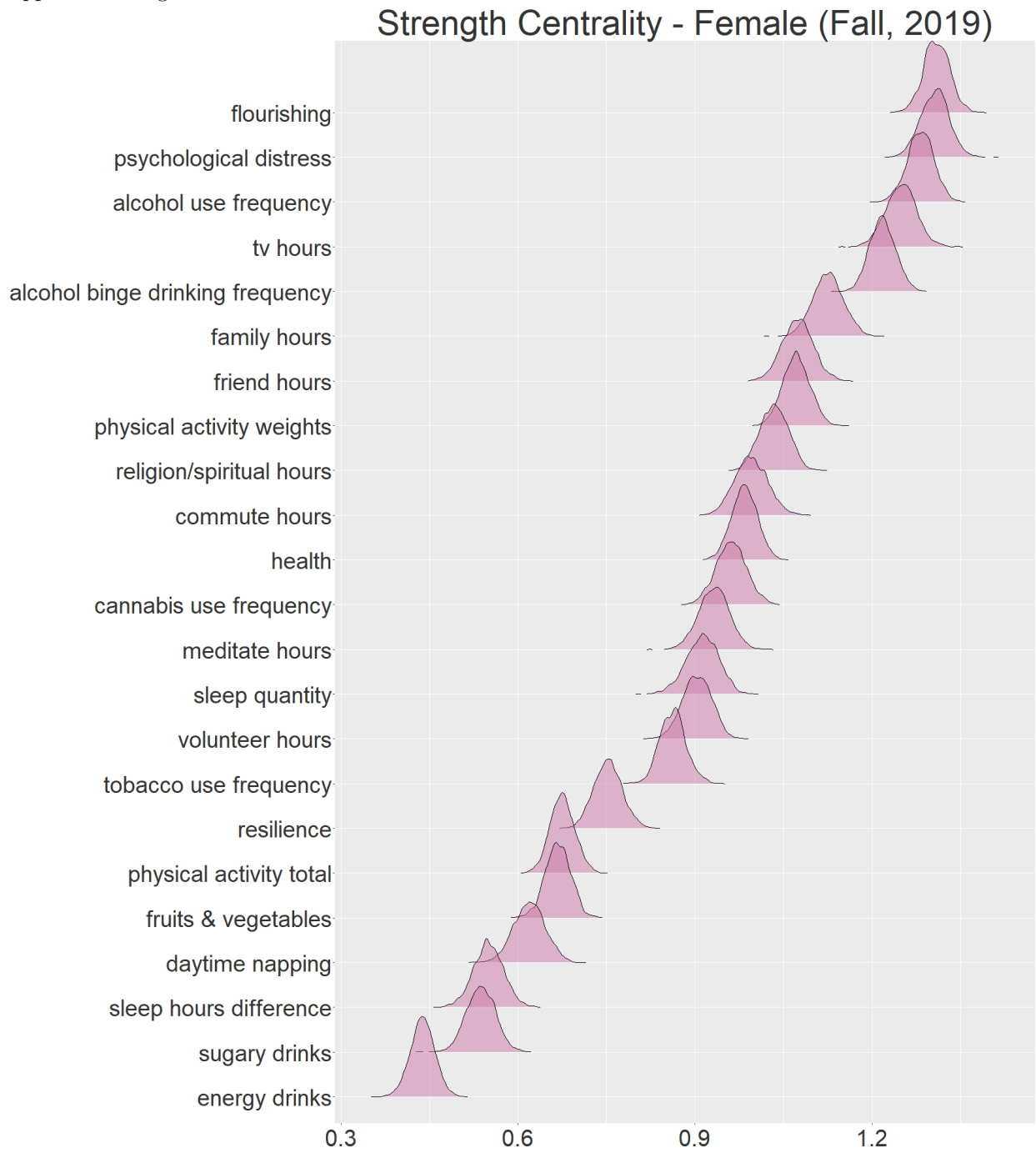
Network graph - Females

4.1.b Female group - strength centrality indices

Supplemental Table 17

```
## BGGM: Bayesian Gaussian Graphical Models
## ---
## Network Stats: Roll Your Own
## Posterior Samples: 30050
## ---
## Estimates:
##
##           Node Post.mean Post.sd Cred.lb Cred.ub
## volunteer hours           1    0.903  0.025  0.854  0.950
## religion/spiritual hours    2    1.034  0.024  0.989  1.080
## friend hours                3    1.074  0.026  1.022  1.127
## family hours                4    1.126  0.026  1.075  1.177
## tv hours                    5    1.249  0.026  1.198  1.301
## commute hours              6    0.995  0.028  0.943  1.051
## meditate hours             7    0.932  0.026  0.881  0.983
## strength training          8    1.072  0.023  1.027  1.117
## sugary drinks              9    0.537  0.024  0.490  0.584
## energy drinks             10    0.438  0.021  0.396  0.479
## fruits & vegetables       11    0.668  0.022  0.623  0.708
## daytime napping           12    0.619  0.027  0.566  0.671
## alcohol use frequency     13    1.282  0.023  1.236  1.326
## cannabis use frequency    14    0.961  0.026  0.911  1.014
## tobacco use frequency     15    0.862  0.022  0.821  0.909
## alcohol binge drinking frequency 16    1.218  0.022  1.176  1.262
## physical activity total   17    0.675  0.021  0.634  0.717
## sleep quantity            18    0.912  0.028  0.855  0.964
## sleep hours difference    19    0.550  0.026  0.499  0.600
## psychological distress    20    1.307  0.024  1.259  1.354
## flourishing               21    1.310  0.022  1.266  1.354
## health                    22    0.984  0.022  0.941  1.027
## resilience                23    0.753  0.024  0.707  0.801
## ---
```

Supplemental Figure 17



4.1.c Female group - cluster identification

```
female_k6fhr_communities
```

```
## Model: BGGM (continuous)
## Prior SD: 0.25 (5000 iterations)
## Credible Interval: 0.95 (two-sided)
## Analytic: No
##
## Number of nodes: 23
## Number of edges: 170
## Edge density: 0.672
##
## Non-zero edge weights:
##      M      SD      Min      Max
## 0.025 0.095 -0.410 0.602
##
## ----
##
## Algorithm: Walktrap (Steps = 3)
##
## Number of communities: 4
##
##      hr_volunteer      hr_relig_spirit      hr_social
##              1              1              1
##      hr_family      hr_tv      hr_commute
##              1              1              1
##      hr_meditate      pa_weights      diet_sugardrink
##              1              2              2
##      diet_energydrink      fruitvegs      sleep_nap
##              1              2              1
##      subst_freq_alc      subst_freq_cannabis      subst_freq_tobacco
##              3              3              3
##      subst_alc_freq_binge      pa_met_tot      sleep_hrs_average
##              3              2              1
##      sleep_hrs_diff      psych_distress      flourish
##              1              4              4
##      health      resilience
##              4              4
##
##
## ----
##
## TEFI: -16.948
```

4.2 Male Group

4.2.a Male group - partial correlations

Supplemental Table 18

```
summary(fit_male)
```

```
## BGGM: Bayesian Gaussian Graphical Models
## ---
## Type: continuous
## Analytic: FALSE
## Formula:
## Posterior Samples: 30050
## Observations (n):
## Nodes (p): 23
## Relations: 253
## ---
## Call:
## estimate(Y = as.matrix(subset(Y, .imp == x)[, -1]), type = "continuous",
##       iter = iter, impute = FALSE, cores = 7)
## ---
## Estimates:
```

	Relation	Post.mean	Post.sd	Cred.lb	Cred.ub
##	hr_volunteer--hr_relig_spirit	0.300	0.009	0.283	0.320
##	hr_volunteer--hr_social	0.109	0.010	0.089	0.128
##	hr_relig_spirit--hr_social	0.046	0.010	0.027	0.064
##	hr_volunteer--hr_family	0.034	0.010	0.012	0.053
##	hr_relig_spirit--hr_family	0.070	0.010	0.050	0.090
##	hr_social--hr_family	-0.029	0.010	-0.050	-0.011
##	hr_volunteer--hr_tv	-0.036	0.010	-0.054	-0.015
##	hr_relig_spirit--hr_tv	-0.029	0.010	-0.049	-0.010
##	hr_social--hr_tv	0.234	0.009	0.218	0.254
##	hr_family--hr_tv	0.236	0.009	0.218	0.255
##	hr_volunteer--hr_commute	0.076	0.010	0.057	0.096
##	hr_relig_spirit--hr_commute	0.035	0.010	0.016	0.056
##	hr_social--hr_commute	-0.011	0.010	-0.030	0.009
##	hr_family--hr_commute	0.297	0.009	0.281	0.316
##	hr_tv--hr_commute	0.088	0.010	0.067	0.105
##	hr_volunteer--hr_meditate	0.167	0.010	0.146	0.185
##	hr_relig_spirit--hr_meditate	0.244	0.010	0.228	0.266
##	hr_social--hr_meditate	0.045	0.010	0.027	0.066
##	hr_family--hr_meditate	0.014	0.010	-0.006	0.033
##	hr_tv--hr_meditate	0.058	0.010	0.037	0.075
##	hr_commute--hr_meditate	0.131	0.010	0.113	0.152
##	hr_volunteer--pa_weights	0.032	0.010	0.012	0.051
##	hr_relig_spirit--pa_weights	0.015	0.010	-0.005	0.034
##	hr_social--pa_weights	0.047	0.010	0.028	0.065
##	hr_family--pa_weights	-0.024	0.010	-0.046	-0.008
##	hr_tv--pa_weights	-0.050	0.010	-0.069	-0.030
##	hr_commute--pa_weights	-0.026	0.010	-0.044	-0.006
##	hr_meditate--pa_weights	0.049	0.010	0.031	0.069
##	hr_volunteer--diet_sugardrink	0.001	0.010	-0.017	0.022
##	hr_relig_spirit--diet_sugardrink	0.005	0.010	-0.016	0.023

##	hr_social--diet_sugardrink	0.039	0.010	0.020	0.057
##	hr_family--diet_sugardrink	0.023	0.010	0.007	0.046
##	hr_tv--diet_sugardrink	0.063	0.010	0.042	0.082
##	hr_commute--diet_sugardrink	0.002	0.010	-0.019	0.019
##	hr_meditate--diet_sugardrink	-0.003	0.010	-0.022	0.016
##	pa_weights--diet_sugardrink	-0.077	0.010	-0.095	-0.057
##	hr_volunteer--diet_energydrink	0.017	0.010	-0.004	0.036
##	hr_relig_spirit--diet_energydrink	-0.035	0.010	-0.052	-0.014
##	hr_social--diet_energydrink	-0.032	0.010	-0.049	-0.010
##	hr_family--diet_energydrink	0.026	0.010	0.006	0.046
##	hr_tv--diet_energydrink	0.024	0.010	0.004	0.043
##	hr_commute--diet_energydrink	0.025	0.010	0.005	0.045
##	hr_meditate--diet_energydrink	0.028	0.010	0.008	0.046
##	pa_weights--diet_energydrink	0.047	0.010	0.027	0.066
##	diet_sugardrink--diet_energydrink	0.087	0.010	0.066	0.105
##	hr_volunteer--fruitvegs	0.076	0.010	0.056	0.094
##	hr_relig_spirit--fruitvegs	0.000	0.010	-0.018	0.021
##	hr_social--fruitvegs	0.024	0.010	0.005	0.043
##	hr_family--fruitvegs	0.072	0.010	0.054	0.093
##	hr_tv--fruitvegs	-0.057	0.010	-0.076	-0.038
##	hr_commute--fruitvegs	0.012	0.010	-0.009	0.030
##	hr_meditate--fruitvegs	0.092	0.010	0.072	0.109
##	pa_weights--fruitvegs	0.117	0.010	0.099	0.137
##	diet_sugardrink--fruitvegs	-0.042	0.010	-0.062	-0.023
##	diet_energydrink--fruitvegs	0.001	0.010	-0.019	0.020
##	hr_volunteer--sleep_nap	0.029	0.010	0.010	0.049
##	hr_relig_spirit--sleep_nap	0.023	0.010	0.002	0.041
##	hr_social--sleep_nap	0.052	0.010	0.031	0.071
##	hr_family--sleep_nap	-0.004	0.010	-0.024	0.016
##	hr_tv--sleep_nap	0.047	0.010	0.029	0.067
##	hr_commute--sleep_nap	-0.003	0.010	-0.022	0.016
##	hr_meditate--sleep_nap	0.049	0.010	0.031	0.070
##	pa_weights--sleep_nap	0.055	0.010	0.036	0.075
##	diet_sugardrink--sleep_nap	0.047	0.010	0.028	0.066
##	diet_energydrink--sleep_nap	0.022	0.010	0.003	0.042
##	fruitvegs--sleep_nap	-0.006	0.010	-0.026	0.012
##	hr_volunteer--subst_freq_alc	-0.008	0.010	-0.027	0.012
##	hr_relig_spirit--subst_freq_alc	-0.049	0.010	-0.067	-0.029
##	hr_social--subst_freq_alc	0.013	0.010	-0.008	0.031
##	hr_family--subst_freq_alc	-0.063	0.010	-0.084	-0.046
##	hr_tv--subst_freq_alc	-0.019	0.010	-0.037	0.001
##	hr_commute--subst_freq_alc	-0.003	0.010	-0.022	0.016
##	hr_meditate--subst_freq_alc	0.007	0.010	-0.013	0.026
##	pa_weights--subst_freq_alc	-0.011	0.010	-0.030	0.009
##	diet_sugardrink--subst_freq_alc	-0.028	0.010	-0.045	-0.007
##	diet_energydrink--subst_freq_alc	0.010	0.010	-0.010	0.029
##	fruitvegs--subst_freq_alc	0.019	0.010	0.002	0.040
##	sleep_nap--subst_freq_alc	0.007	0.010	-0.012	0.027
##	hr_volunteer--subst_freq_cannabis	-0.024	0.010	-0.042	-0.004
##	hr_relig_spirit--subst_freq_cannabis	-0.078	0.010	-0.096	-0.058
##	hr_social--subst_freq_cannabis	0.044	0.010	0.024	0.062
##	hr_family--subst_freq_cannabis	-0.026	0.010	-0.045	-0.007
##	hr_tv--subst_freq_cannabis	0.035	0.010	0.015	0.053
##	hr_commute--subst_freq_cannabis	0.004	0.010	-0.016	0.021

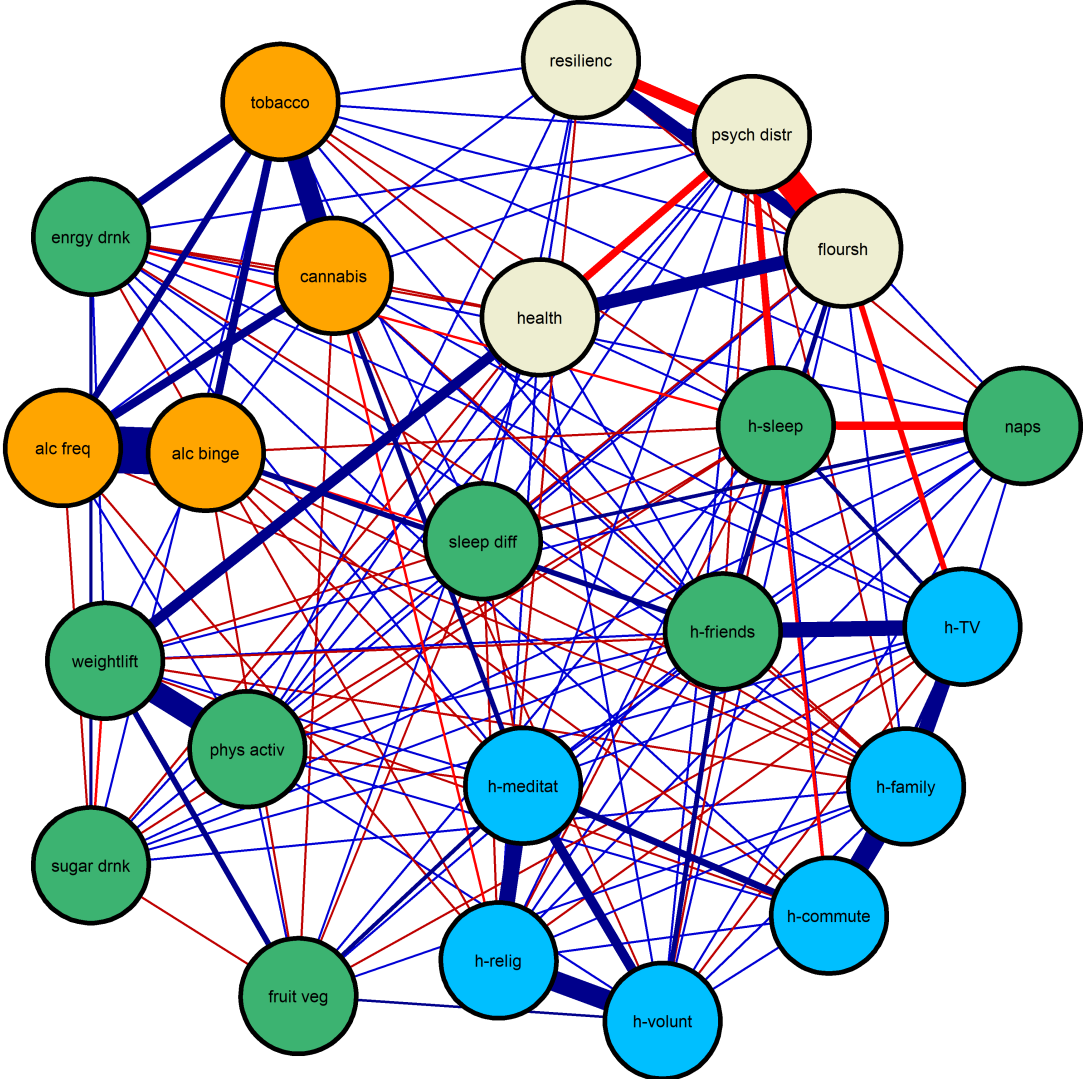
##	hr_meditate--subst_freq_cannabis	0.109	0.010	0.087	0.126
##	pa_weights--subst_freq_cannabis	0.006	0.010	-0.014	0.026
##	diet_sugardrink--subst_freq_cannabis	-0.018	0.010	-0.035	0.002
##	diet_energydrink--subst_freq_cannabis	-0.039	0.010	-0.060	-0.021
##	fruitvegs--subst_freq_cannabis	-0.023	0.010	-0.042	-0.004
##	sleep_nap--subst_freq_cannabis	-0.007	0.010	-0.026	0.013
##	subst_freq_alc--subst_freq_cannabis	0.151	0.010	0.134	0.173
##	hr_volunteer--subst_freq_tobacco	-0.019	0.010	-0.039	0.000
##	hr_relig_spirit--subst_freq_tobacco	0.014	0.010	-0.005	0.033
##	hr_social--subst_freq_tobacco	0.027	0.010	0.008	0.047
##	hr_family--subst_freq_tobacco	0.017	0.010	-0.001	0.038
##	hr_tv--subst_freq_tobacco	0.012	0.010	-0.007	0.032
##	hr_commute--subst_freq_tobacco	0.010	0.010	-0.011	0.027
##	hr_meditate--subst_freq_tobacco	-0.009	0.010	-0.025	0.014
##	pa_weights--subst_freq_tobacco	0.012	0.010	-0.009	0.032
##	diet_sugardrink--subst_freq_tobacco	0.028	0.010	0.009	0.047
##	diet_energydrink--subst_freq_tobacco	0.143	0.010	0.126	0.163
##	fruitvegs--subst_freq_tobacco	-0.005	0.010	-0.024	0.014
##	sleep_nap--subst_freq_tobacco	0.024	0.010	0.005	0.043
##	subst_freq_alc--subst_freq_tobacco	0.132	0.010	0.113	0.150
##	subst_freq_cannabis--subst_freq_tobacco	0.307	0.009	0.289	0.323
##	hr_volunteer--subst_alc_freq_binge	0.018	0.010	-0.002	0.039
##	hr_relig_spirit--subst_alc_freq_binge	-0.013	0.010	-0.033	0.007
##	hr_social--subst_alc_freq_binge	0.111	0.010	0.093	0.132
##	hr_family--subst_alc_freq_binge	-0.038	0.010	-0.056	-0.017
##	hr_tv--subst_alc_freq_binge	-0.012	0.010	-0.033	0.005
##	hr_commute--subst_alc_freq_binge	-0.029	0.010	-0.047	-0.008
##	hr_meditate--subst_alc_freq_binge	-0.041	0.010	-0.062	-0.023
##	pa_weights--subst_alc_freq_binge	0.034	0.009	0.017	0.054
##	diet_sugardrink--subst_alc_freq_binge	-0.005	0.010	-0.025	0.013
##	diet_energydrink--subst_alc_freq_binge	0.007	0.010	-0.014	0.027
##	fruitvegs--subst_alc_freq_binge	-0.024	0.010	-0.044	-0.006
##	sleep_nap--subst_alc_freq_binge	0.017	0.010	-0.002	0.036
##	subst_freq_alc--subst_alc_freq_binge	0.616	0.006	0.604	0.628
##	subst_freq_cannabis--subst_alc_freq_binge	0.055	0.010	0.033	0.072
##	subst_freq_tobacco--subst_alc_freq_binge	0.145	0.010	0.126	0.165
##	hr_volunteer--pa_met_tot	0.003	0.010	-0.019	0.020
##	hr_relig_spirit--pa_met_tot	-0.010	0.010	-0.030	0.011
##	hr_social--pa_met_tot	0.056	0.010	0.039	0.078
##	hr_family--pa_met_tot	0.019	0.010	0.000	0.039
##	hr_tv--pa_met_tot	-0.010	0.010	-0.031	0.007
##	hr_commute--pa_met_tot	0.042	0.010	0.023	0.060
##	hr_meditate--pa_met_tot	-0.022	0.010	-0.041	-0.002
##	pa_weights--pa_met_tot	0.332	0.009	0.313	0.347
##	diet_sugardrink--pa_met_tot	0.019	0.010	-0.001	0.038
##	diet_energydrink--pa_met_tot	0.011	0.010	-0.008	0.030
##	fruitvegs--pa_met_tot	0.072	0.010	0.052	0.091
##	sleep_nap--pa_met_tot	-0.017	0.010	-0.035	0.005
##	subst_freq_alc--pa_met_tot	0.031	0.010	0.011	0.050
##	subst_freq_cannabis--pa_met_tot	0.014	0.010	-0.005	0.034
##	subst_freq_tobacco--pa_met_tot	-0.007	0.010	-0.026	0.013
##	subst_alc_freq_binge--pa_met_tot	-0.010	0.010	-0.031	0.007
##	hr_volunteer--sleep_hrs_average	-0.055	0.010	-0.074	-0.036
##	hr_relig_spirit--sleep_hrs_average	-0.023	0.010	-0.042	-0.003

##	hr_social--sleep_hrs_average	0.031	0.010	0.012	0.050
##	hr_family--sleep_hrs_average	-0.020	0.010	-0.038	0.001
##	hr_tv--sleep_hrs_average	0.095	0.010	0.075	0.113
##	hr_commute--sleep_hrs_average	-0.091	0.010	-0.111	-0.072
##	hr_meditate--sleep_hrs_average	-0.004	0.010	-0.027	0.013
##	pa_weights--sleep_hrs_average	0.005	0.010	-0.015	0.024
##	diet_sugardrink--sleep_hrs_average	-0.033	0.010	-0.054	-0.015
##	diet_energydrink--sleep_hrs_average	-0.080	0.010	-0.099	-0.062
##	fruitvegs--sleep_hrs_average	0.042	0.010	0.021	0.061
##	sleep_nap--sleep_hrs_average	-0.150	0.010	-0.168	-0.131
##	subst_freq_alc--sleep_hrs_average	0.014	0.010	-0.004	0.034
##	subst_freq_cannabis--sleep_hrs_average	0.020	0.010	0.001	0.039
##	subst_freq_tobacco--sleep_hrs_average	-0.030	0.010	-0.049	-0.010
##	subst_alc_freq_binge--sleep_hrs_average	-0.039	0.010	-0.059	-0.020
##	pa_met_tot--sleep_hrs_average	-0.025	0.010	-0.045	-0.006
##	hr_volunteer--sleep_hrs_diff	-0.004	0.010	-0.023	0.015
##	hr_relig_spirit--sleep_hrs_diff	-0.050	0.010	-0.069	-0.032
##	hr_social--sleep_hrs_diff	0.006	0.010	-0.013	0.025
##	hr_family--sleep_hrs_diff	-0.061	0.010	-0.081	-0.042
##	hr_tv--sleep_hrs_diff	0.011	0.010	-0.011	0.028
##	hr_commute--sleep_hrs_diff	-0.014	0.010	-0.033	0.007
##	hr_meditate--sleep_hrs_diff	-0.038	0.010	-0.058	-0.021
##	pa_weights--sleep_hrs_diff	-0.047	0.010	-0.067	-0.028
##	diet_sugardrink--sleep_hrs_diff	-0.014	0.010	-0.033	0.005
##	diet_energydrink--sleep_hrs_diff	0.010	0.010	-0.010	0.029
##	fruitvegs--sleep_hrs_diff	-0.030	0.010	-0.049	-0.010
##	sleep_nap--sleep_hrs_diff	0.092	0.010	0.075	0.113
##	subst_freq_alc--sleep_hrs_diff	0.018	0.010	-0.001	0.037
##	subst_freq_cannabis--sleep_hrs_diff	-0.014	0.010	-0.033	0.006
##	subst_freq_tobacco--sleep_hrs_diff	0.028	0.010	0.008	0.047
##	subst_alc_freq_binge--sleep_hrs_diff	-0.076	0.010	-0.095	-0.057
##	pa_met_tot--sleep_hrs_diff	-0.003	0.010	-0.024	0.015
##	sleep_hrs_average--sleep_hrs_diff	-0.045	0.010	-0.064	-0.024
##	hr_volunteer--psych_distress	0.021	0.010	0.001	0.041
##	hr_relig_spirit--psych_distress	-0.012	0.010	-0.031	0.006
##	hr_social--psych_distress	-0.028	0.010	-0.046	-0.008
##	hr_family--psych_distress	-0.034	0.010	-0.053	-0.015
##	hr_tv--psych_distress	0.018	0.010	-0.003	0.037
##	hr_commute--psych_distress	0.035	0.010	0.014	0.054
##	hr_meditate--psych_distress	0.061	0.010	0.040	0.081
##	pa_weights--psych_distress	0.000	0.010	-0.020	0.018
##	diet_sugardrink--psych_distress	0.029	0.010	0.009	0.048
##	diet_energydrink--psych_distress	0.028	0.010	0.008	0.046
##	fruitvegs--psych_distress	0.005	0.010	-0.014	0.025
##	sleep_nap--psych_distress	0.026	0.010	0.005	0.045
##	subst_freq_alc--psych_distress	0.010	0.010	-0.008	0.030
##	subst_freq_cannabis--psych_distress	0.063	0.010	0.042	0.081
##	subst_freq_tobacco--psych_distress	0.030	0.010	0.011	0.050
##	subst_alc_freq_binge--psych_distress	-0.012	0.010	-0.033	0.007
##	pa_met_tot--psych_distress	0.025	0.010	0.005	0.044
##	sleep_hrs_average--psych_distress	-0.136	0.010	-0.154	-0.116
##	sleep_hrs_diff--psych_distress	0.050	0.010	0.030	0.069
##	hr_volunteer--flourish	0.036	0.010	0.018	0.056
##	hr_relig_spirit--flourish	0.051	0.010	0.031	0.070

##	hr_social--flourish	0.105	0.010	0.086	0.124
##	hr_family--flourish	0.044	0.010	0.024	0.064
##	hr_tv--flourish	-0.116	0.010	-0.136	-0.097
##	hr_commute--flourish	0.010	0.010	-0.011	0.028
##	hr_meditate--flourish	0.016	0.010	-0.003	0.036
##	pa_weights--flourish	0.003	0.010	-0.017	0.022
##	diet_sugardrink--flourish	0.022	0.010	0.003	0.041
##	diet_energydrink--flourish	-0.007	0.010	-0.028	0.010
##	fruitvegs--flourish	0.017	0.010	-0.002	0.037
##	sleep_nap--flourish	0.016	0.010	-0.004	0.036
##	subst_freq_alc--flourish	0.017	0.010	-0.003	0.036
##	subst_freq_cannabis--flourish	-0.013	0.010	-0.033	0.007
##	subst_freq_tobacco--flourish	0.021	0.010	0.002	0.040
##	subst_alc_freq_binge--flourish	0.016	0.010	-0.003	0.035
##	pa_met_tot--flourish	0.026	0.010	0.006	0.044
##	sleep_hrs_average--flourish	0.017	0.010	-0.003	0.037
##	sleep_hrs_diff--flourish	-0.041	0.010	-0.059	-0.021
##	psych_distress--flourish	-0.388	0.008	-0.404	-0.371
##	hr_volunteer--health	0.035	0.010	0.015	0.053
##	hr_relig_spirit--health	0.032	0.010	0.014	0.053
##	hr_social--health	0.031	0.010	0.009	0.049
##	hr_family--health	-0.001	0.010	-0.019	0.020
##	hr_tv--health	-0.012	0.010	-0.031	0.008
##	hr_commute--health	-0.019	0.010	-0.039	-0.001
##	hr_meditate--health	0.021	0.010	-0.002	0.038
##	pa_weights--health	0.177	0.010	0.161	0.200
##	diet_sugardrink--health	-0.028	0.010	-0.046	-0.007
##	diet_energydrink--health	-0.039	0.010	-0.059	-0.020
##	fruitvegs--health	0.066	0.010	0.044	0.084
##	sleep_nap--health	0.004	0.010	-0.015	0.023
##	subst_freq_alc--health	-0.014	0.010	-0.030	0.008
##	subst_freq_cannabis--health	-0.042	0.010	-0.061	-0.023
##	subst_freq_tobacco--health	-0.039	0.010	-0.058	-0.020
##	subst_alc_freq_binge--health	-0.014	0.010	-0.035	0.003
##	pa_met_tot--health	0.048	0.010	0.029	0.069
##	sleep_hrs_average--health	0.054	0.010	0.036	0.076
##	sleep_hrs_diff--health	-0.017	0.010	-0.036	0.002
##	psych_distress--health	-0.140	0.010	-0.158	-0.120
##	flourish--health	0.214	0.010	0.197	0.234
##	hr_volunteer--resilience	-0.020	0.010	-0.038	0.001
##	hr_relig_spirit--resilience	-0.038	0.010	-0.057	-0.019
##	hr_social--resilience	-0.005	0.010	-0.024	0.016
##	hr_family--resilience	-0.016	0.010	-0.034	0.004
##	hr_tv--resilience	-0.018	0.010	-0.038	0.000
##	hr_commute--resilience	-0.013	0.010	-0.032	0.006
##	hr_meditate--resilience	-0.018	0.010	-0.038	0.000
##	pa_weights--resilience	0.010	0.010	-0.009	0.030
##	diet_sugardrink--resilience	0.003	0.010	-0.019	0.020
##	diet_energydrink--resilience	0.017	0.010	-0.002	0.037
##	fruitvegs--resilience	0.014	0.010	-0.007	0.033
##	sleep_nap--resilience	-0.030	0.010	-0.048	-0.011
##	subst_freq_alc--resilience	0.045	0.010	0.026	0.063
##	subst_freq_cannabis--resilience	0.011	0.010	-0.008	0.030
##	subst_freq_tobacco--resilience	0.031	0.010	0.011	0.050

##	subst_alc_freq_binge--resilience	0.001	0.010	-0.017	0.022
##	pa_met_tot--resilience	0.056	0.010	0.036	0.075
##	sleep_hrs_average--resilience	-0.007	0.010	-0.026	0.012
##	sleep_hrs_diff--resilience	0.024	0.010	0.004	0.043
##	psych_distress--resilience	-0.181	0.010	-0.201	-0.164
##	flourish--resilience	0.213	0.010	0.195	0.232
##	health--resilience	0.074	0.010	0.051	0.089
##	---				

Supplemental Figure 18



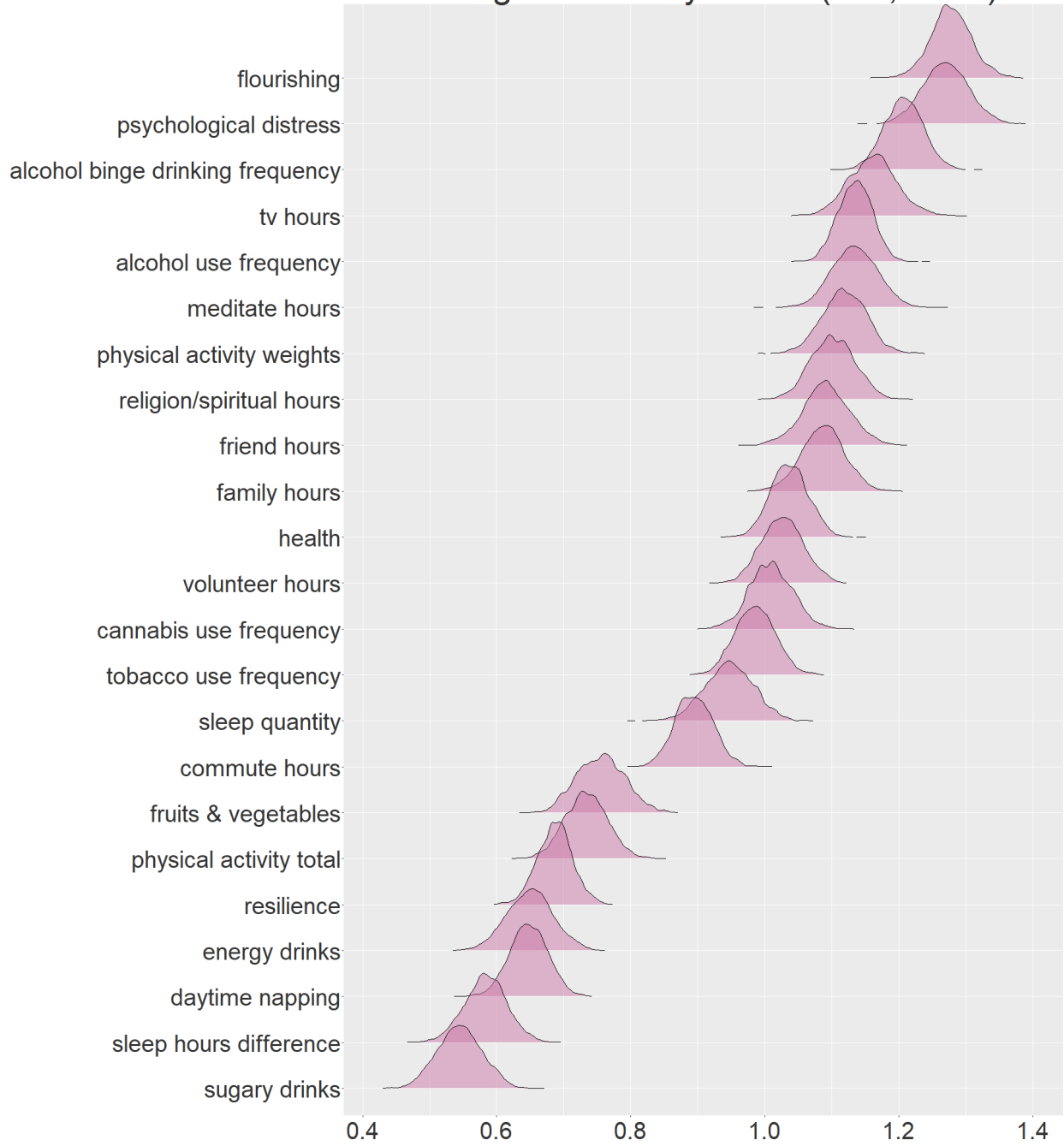
Network graph - Males

4.2.b Male group - strength centrality indices

Supplemental Table 19

```
## BGGM: Bayesian Gaussian Graphical Models
## ---
## Network Stats: Roll Your Own
## Posterior Samples: 30050
## ---
## Estimates:
##
##           Node Post.mean Post.sd Cred.lb Cred.ub
## volunteer hours           1    1.026  0.031  0.967  1.088
## religion/spiritual hours    2    1.102  0.033  1.039  1.166
## friend hours                3    1.092  0.035  1.021  1.162
## family hours                4    1.087  0.032  1.022  1.150
## tv hours                    5    1.161  0.036  1.093  1.234
## commute hours              6    0.895  0.028  0.840  0.952
## meditate hours             7    1.134  0.034  1.069  1.201
## strength training          8    1.119  0.033  1.054  1.183
## sugary drinks              9    0.545  0.033  0.481  0.609
## energy drinks             10    0.650  0.035  0.582  0.718
## fruits & vegetables       11    0.755  0.035  0.690  0.826
## daytime napping           12    0.648  0.029  0.592  0.703
## alcohol use frequency     13    1.135  0.025  1.085  1.183
## cannabis use frequency    14    1.010  0.032  0.947  1.074
## tobacco use frequency     15    0.986  0.030  0.928  1.044
## alcohol binge drinking frequency 16    1.208  0.029  1.151  1.264
## physical activity total   17    0.734  0.032  0.672  0.796
## sleep quantity            18    0.947  0.037  0.876  1.017
## sleep hours difference    19    0.584  0.032  0.521  0.646
## psychological distress    20    1.270  0.034  1.204  1.338
## flourishing               21    1.278  0.030  1.219  1.340
## health                    22    1.037  0.028  0.982  1.092
## resilience                23    0.687  0.026  0.636  0.739
## ---
```

Strength Centrality - Male (Fall, 2019)



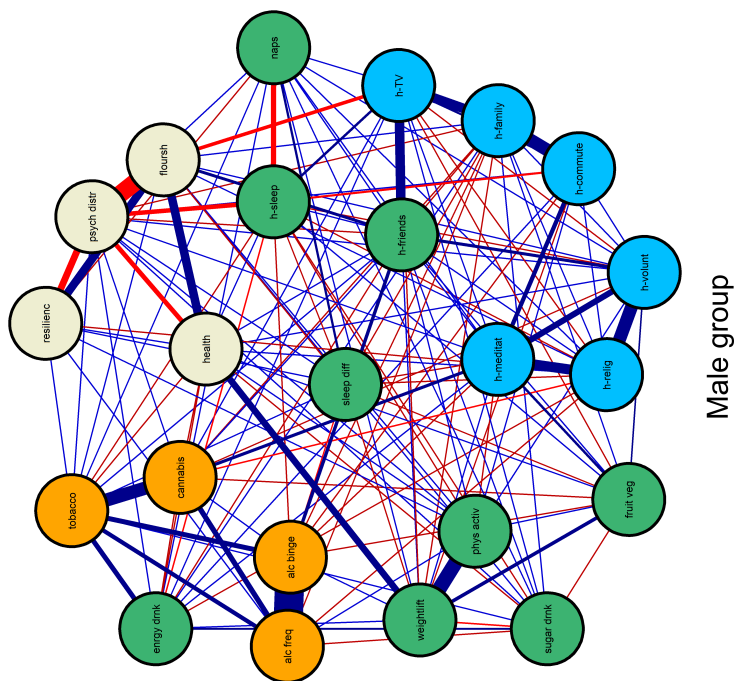
4.1.c Male group - cluster identification

```
male_k6fhr_communities
```

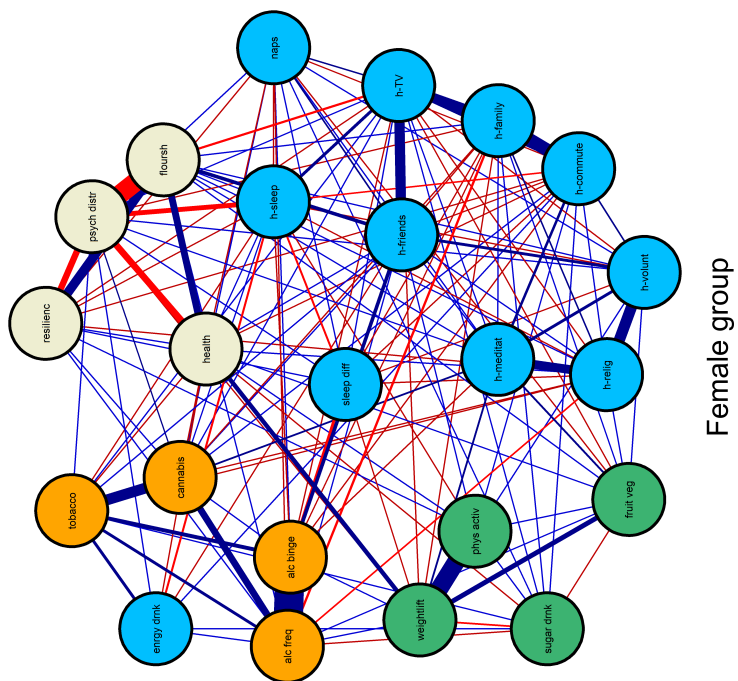
```
## Model: BGGM (continuous)
## Prior SD: 0.25 (5000 iterations)
## Credible Interval: 0.95 (two-sided)
## Analytic: No
##
## Number of nodes: 23
## Number of edges: 160
## Edge density: 0.632
##
## Non-zero edge weights:
##      M      SD      Min      Max
## 0.030 0.101 -0.391 0.616
##
## ----
##
## Algorithm: Walktrap (Steps = 3)
##
## Number of communities: 4
##
##      hr_volunteer      hr_relig_spirit      hr_social
##          1              1                  2
##      hr_family          hr_tv              hr_commute
##          1              1                  1
##      hr_meditate      pa_weights      diet_sugardrink
##          1              2                  2
##      diet_energydrink      fruitvegs      sleep_nap
##          2              2                  2
##      subst_freq_alc      subst_freq_cannabis      subst_freq_tobacco
##          3              3                  3
##      subst_alc_freq_binge      pa_met_tot      sleep_hrs_average
##          3              2                  2
##      sleep_hrs_diff      psych_distress      flourish
##          2              4                  4
##          health          resilience
##          4              4
##
##
## ----
##
## TEFI: -18.523
```

4.3 Network comparison

Supplemental figure 20



Male group



Female group

Supplemental Table 20

Differences in partial correlations between the male and female groups

##	Relation	Post.mean	Post.sd	Cred.lb	Cred.ub
## 148	sleep_nap--sleep_hrs_average	-0.091	0.012	-0.115	-0.068
## 128	pa_weights--pa_met_tot	-0.053	0.011	-0.075	-0.032
## 88	diet_energydrink--subst_freq_cannabis	-0.052	0.012	-0.077	-0.029
## 34	hr_commute--diet_sugardrink	-0.048	0.012	-0.072	-0.024
## 74	pa_weights--subst_freq_alc	-0.035	0.012	-0.059	-0.010
## 90	sleep_nap--subst_freq_cannabis	-0.033	0.012	-0.057	-0.008
## 145	diet_sugardrink--sleep_hrs_average	-0.033	0.012	-0.057	-0.009
## 28	hr_meditate--pa_weights	-0.031	0.012	-0.055	-0.007
## 38	hr_relig_spirit--diet_energydrink	-0.030	0.012	-0.054	-0.005
## 160	hr_meditate--sleep_hrs_diff	-0.030	0.012	-0.054	-0.005
## 191	hr_volunteer--flourish	-0.030	0.012	-0.055	-0.007
## 60	hr_tv--sleep_nap	-0.028	0.012	-0.052	-0.005
## 232	hr_volunteer--resilience	-0.028	0.012	-0.051	-0.004
## 157	hr_family--sleep_hrs_diff	-0.027	0.012	-0.050	-0.003
## 238	hr_meditate--resilience	-0.027	0.012	-0.051	-0.003
## 47	hr_relig_spirit--fruitvegs	-0.026	0.012	-0.050	-0.002
## 71	hr_tv--subst_freq_alc	-0.026	0.012	-0.050	-0.002
## 181	diet_energydrink--psych_distress	-0.026	0.012	-0.050	-0.002
## 195	hr_tv--flourish	-0.026	0.012	-0.049	-0.003
## 176	hr_tv--psych_distress	-0.025	0.012	-0.049	-0.001
## 209	sleep_hrs_diff--flourish	-0.025	0.012	-0.049	0.000
## 19	hr_family--hr_meditate	-0.024	0.013	-0.049	0.001
## 80	hr_relig_spirit--subst_freq_cannabis	-0.024	0.012	-0.047	0.000
## 116	fruitvegs--subst_alc_freq_binge	-0.024	0.012	-0.048	0.000
## 158	hr_tv--sleep_hrs_diff	-0.024	0.012	-0.048	0.001
## 84	hr_commute--subst_freq_cannabis	-0.023	0.012	-0.047	0.002
## 91	subst_freq_alc--subst_freq_cannabis	-0.022	0.012	-0.045	0.002
## 164	fruitvegs--sleep_hrs_diff	-0.022	0.012	-0.046	0.003
## 226	subst_alc_freq_binge--health	-0.021	0.012	-0.045	0.004
## 26	hr_tv--pa_weights	-0.020	0.012	-0.045	0.004
## 98	hr_meditate--subst_freq_tobacco	-0.020	0.012	-0.044	0.004
## 187	subst_alc_freq_binge--psych_distress	-0.020	0.012	-0.044	0.004
## 15	hr_tv--hr_commute	-0.019	0.012	-0.043	0.004
## 58	hr_social--sleep_nap	-0.019	0.012	-0.043	0.004
## 94	hr_social--subst_freq_tobacco	-0.019	0.012	-0.043	0.005
## 132	sleep_nap--pa_met_tot	-0.019	0.012	-0.043	0.004
## 142	hr_commute--sleep_hrs_average	-0.019	0.012	-0.043	0.005
## 155	hr_relig_spirit--sleep_hrs_diff	-0.019	0.013	-0.044	0.006
## 53	pa_weights--fruitvegs	-0.018	0.012	-0.041	0.005
## 87	diet_sugardrink--subst_freq_cannabis	-0.018	0.012	-0.042	0.006
## 136	subst_alc_freq_binge--pa_met_tot	-0.017	0.012	-0.041	0.007
## 198	pa_weights--flourish	-0.017	0.012	-0.041	0.008
## 32	hr_family--diet_sugardrink	-0.016	0.012	-0.040	0.008
## 172	hr_volunteer--psych_distress	-0.016	0.012	-0.040	0.008
## 201	fruitvegs--flourish	-0.016	0.012	-0.040	0.008
## 245	subst_freq_cannabis--resilience	-0.016	0.012	-0.040	0.007
## 42	hr_commute--diet_energydrink	-0.015	0.012	-0.039	0.009
## 122	hr_relig_spirit--pa_met_tot	-0.015	0.012	-0.039	0.010
## 129	diet_sugardrink--pa_met_tot	-0.015	0.012	-0.040	0.008
## 203	subst_freq_alc--flourish	-0.015	0.012	-0.039	0.009

## 228	sleep_hrs_average--health	-0.015	0.012	-0.038	0.008
## 235	hr_family--resilience	-0.015	0.012	-0.039	0.009
## 251	psych_distress--resilience	-0.015	0.012	-0.039	0.008
## 174	hr_social--psych_distress	-0.014	0.012	-0.038	0.010
## 76	diet_energydrink--subst_freq_alc	-0.013	0.012	-0.036	0.011
## 119	subst_freq_cannabis--subst_alc_freq_binge	-0.013	0.012	-0.037	0.011
## 50	hr_tv--fruitvegs	-0.012	0.012	-0.036	0.013
## 213	hr_social--health	-0.012	0.012	-0.035	0.011
## 69	hr_social--subst_freq_alc	-0.011	0.012	-0.035	0.013
## 83	hr_tv--subst_freq_cannabis	-0.011	0.012	-0.035	0.013
## 96	hr_tv--subst_freq_tobacco	-0.011	0.012	-0.034	0.013
## 140	hr_family--sleep_hrs_average	-0.011	0.012	-0.035	0.012
## 183	sleep_nap--psych_distress	-0.011	0.012	-0.035	0.013
## 39	hr_social--diet_energydrink	-0.010	0.012	-0.034	0.015
## 89	fruitvegs--subst_freq_cannabis	-0.010	0.012	-0.035	0.014
## 112	hr_meditate--subst_alc_freq_binge	-0.010	0.012	-0.034	0.013
## 167	subst_freq_cannabis--sleep_hrs_diff	-0.010	0.012	-0.034	0.014
## 182	fruitvegs--psych_distress	-0.010	0.012	-0.034	0.015
## 233	hr_relig_spirit--resilience	-0.010	0.012	-0.034	0.014
## 30	hr_relig_spirit--diet_sugardrink	-0.009	0.012	-0.033	0.016
## 141	hr_tv--sleep_hrs_average	-0.009	0.012	-0.033	0.015
## 163	diet_energydrink--sleep_hrs_diff	-0.009	0.012	-0.032	0.015
## 223	subst_freq_alc--health	-0.009	0.012	-0.033	0.015
## 252	flourish--resilience	-0.009	0.012	-0.032	0.014
## 27	hr_commute--pa_weights	-0.008	0.012	-0.032	0.015
## 127	hr_meditate--pa_met_tot	-0.008	0.012	-0.033	0.016
## 185	subst_freq_cannabis--psych_distress	-0.008	0.012	-0.032	0.015
## 200	diet_energydrink--flourish	-0.008	0.012	-0.032	0.015
## 7	hr_volunteer--hr_tv	-0.007	0.012	-0.031	0.017
## 22	hr_volunteer--pa_weights	-0.007	0.012	-0.030	0.017
## 64	diet_sugardrink--sleep_nap	-0.007	0.012	-0.031	0.017
## 79	hr_volunteer--subst_freq_cannabis	-0.007	0.012	-0.030	0.017
## 111	hr_commute--subst_alc_freq_binge	-0.007	0.012	-0.031	0.016
## 117	sleep_nap--subst_alc_freq_binge	-0.007	0.012	-0.031	0.017
## 150	subst_freq_cannabis--sleep_hrs_average	-0.007	0.012	-0.031	0.017
## 161	pa_weights--sleep_hrs_diff	-0.007	0.012	-0.030	0.017
## 186	subst_freq_tobacco--psych_distress	-0.007	0.012	-0.030	0.016
## 194	hr_family--flourish	-0.007	0.012	-0.031	0.017
## 220	diet_energydrink--health	-0.007	0.012	-0.031	0.018
## 225	subst_freq_tobacco--health	-0.007	0.012	-0.032	0.016
## 9	hr_social--hr_tv	-0.006	0.012	-0.028	0.017
## 54	diet_sugardrink--fruitvegs	-0.006	0.012	-0.030	0.018
## 107	hr_relig_spirit--subst_alc_freq_binge	-0.006	0.013	-0.030	0.018
## 115	diet_energydrink--subst_alc_freq_binge	-0.006	0.012	-0.031	0.018
## 143	hr_meditate--sleep_hrs_average	-0.006	0.012	-0.030	0.017
## 5	hr_relig_spirit--hr_family	-0.005	0.012	-0.029	0.019
## 197	hr_meditate--flourish	-0.005	0.012	-0.029	0.019
## 204	subst_freq_cannabis--flourish	-0.005	0.012	-0.030	0.019
## 208	sleep_hrs_average--flourish	-0.005	0.012	-0.030	0.018
## 250	sleep_hrs_diff--resilience	-0.005	0.012	-0.030	0.019
## 151	subst_freq_tobacco--sleep_hrs_average	-0.004	0.012	-0.027	0.021
## 193	hr_social--flourish	-0.004	0.012	-0.028	0.020
## 243	sleep_nap--resilience	-0.004	0.012	-0.028	0.019
## 55	diet_energydrink--fruitvegs	-0.003	0.012	-0.027	0.021

## 77	fruitvegs--subst_freq_alc	-0.003	0.012	-0.027	0.021
## 95	hr_family--subst_freq_tobacco	-0.003	0.012	-0.027	0.022
## 125	hr_tv--pa_met_tot	-0.003	0.012	-0.027	0.021
## 162	diet_sugardrink--sleep_hrs_diff	-0.003	0.012	-0.027	0.021
## 170	pa_met_tot--sleep_hrs_diff	-0.003	0.012	-0.028	0.021
## 114	diet_sugardrink--subst_alc_freq_binge	-0.002	0.012	-0.026	0.022
## 123	hr_social--pa_met_tot	-0.002	0.012	-0.026	0.022
## 242	fruitvegs--resilience	-0.002	0.012	-0.026	0.022
## 253	health--resilience	-0.002	0.012	-0.027	0.022
## 109	hr_family--subst_alc_freq_binge	-0.001	0.012	-0.025	0.023
## 146	diet_energydrink--sleep_hrs_average	-0.001	0.012	-0.025	0.022
## 229	sleep_hrs_diff--health	-0.001	0.012	-0.026	0.022
## 25	hr_family--pa_weights	0.000	0.012	-0.025	0.022
## 67	hr_volunteer--subst_freq_alc	0.000	0.012	-0.024	0.024
## 192	hr_relig_spirit--flourish	0.000	0.012	-0.024	0.024
## 214	hr_family--health	0.000	0.012	-0.024	0.024
## 215	hr_tv--health	0.000	0.013	-0.024	0.025
## 216	hr_commute--health	0.000	0.012	-0.024	0.024
## 3	hr_relig_spirit--hr_social	0.001	0.012	-0.022	0.025
## 11	hr_volunteer--hr_commute	0.001	0.012	-0.022	0.024
## 36	pa_weights--diet_sugardrink	0.001	0.012	-0.023	0.025
## 51	hr_commute--fruitvegs	0.001	0.012	-0.023	0.025
## 92	hr_volunteer--subst_freq_tobacco	0.001	0.012	-0.022	0.025
## 108	hr_social--subst_alc_freq_binge	0.001	0.012	-0.024	0.025
## 202	sleep_nap--flourish	0.001	0.012	-0.023	0.025
## 224	subst_freq_cannabis--health	0.001	0.012	-0.023	0.025
## 100	diet_sugardrink--subst_freq_tobacco	0.003	0.012	-0.021	0.026
## 153	pa_met_tot--sleep_hrs_average	0.003	0.012	-0.020	0.027
## 189	sleep_hrs_average--psych_distress	0.003	0.012	-0.020	0.026
## 212	hr_relig_spirit--health	0.003	0.013	-0.021	0.028
## 82	hr_family--subst_freq_cannabis	0.004	0.012	-0.019	0.027
## 166	subst_freq_alc--sleep_hrs_diff	0.004	0.012	-0.020	0.028
## 8	hr_relig_spirit--hr_tv	0.005	0.012	-0.020	0.028
## 10	hr_family--hr_tv	0.005	0.011	-0.018	0.027
## 73	hr_meditate--subst_freq_alc	0.005	0.012	-0.019	0.029
## 137	hr_volunteer--sleep_hrs_average	0.005	0.012	-0.020	0.028
## 149	subst_freq_alc--sleep_hrs_average	0.005	0.012	-0.020	0.028
## 173	hr_relig_spirit--psych_distress	0.005	0.013	-0.020	0.031
## 12	hr_relig_spirit--hr_commute	0.006	0.012	-0.017	0.029
## 75	diet_sugardrink--subst_freq_alc	0.006	0.012	-0.017	0.030
## 135	subst_freq_tobacco--pa_met_tot	0.006	0.012	-0.017	0.030
## 244	subst_freq_alc--resilience	0.006	0.012	-0.019	0.030
## 2	hr_volunteer--hr_social	0.007	0.012	-0.016	0.031
## 18	hr_social--hr_meditate	0.007	0.012	-0.017	0.031
## 29	hr_volunteer--diet_sugardrink	0.007	0.012	-0.018	0.031
## 49	hr_family--fruitvegs	0.007	0.012	-0.017	0.031
## 106	hr_volunteer--subst_alc_freq_binge	0.007	0.012	-0.017	0.031
## 241	diet_energydrink--resilience	0.007	0.012	-0.017	0.030
## 159	hr_commute--sleep_hrs_diff	0.008	0.012	-0.015	0.032
## 175	hr_family--psych_distress	0.008	0.012	-0.016	0.032
## 221	fruitvegs--health	0.008	0.012	-0.016	0.032
## 237	hr_commute--resilience	0.008	0.012	-0.016	0.031
## 52	hr_meditate--fruitvegs	0.009	0.012	-0.015	0.033
## 236	hr_tv--resilience	0.009	0.012	-0.015	0.032

## 14	hr_family--hr_commute	0.010	0.011	-0.012	0.031
## 56	hr_volunteer--sleep_nap	0.010	0.012	-0.015	0.034
## 152	subst_alc_freq_binge--sleep_hrs_average	0.010	0.012	-0.014	0.034
## 247	subst_alc_freq_binge--resilience	0.010	0.012	-0.014	0.035
## 130	diet_energydrink--pa_met_tot	0.011	0.012	-0.013	0.035
## 196	hr_commute--flourish	0.011	0.012	-0.012	0.035
## 234	hr_social--resilience	0.011	0.012	-0.013	0.035
## 102	fruitvegs--subst_freq_tobacco	0.012	0.012	-0.012	0.037
## 110	hr_tv--subst_alc_freq_binge	0.012	0.012	-0.012	0.036
## 190	sleep_hrs_diff--psych_distress	0.012	0.012	-0.012	0.036
## 199	diet_sugardrink--flourish	0.012	0.012	-0.012	0.036
## 240	diet_sugardrink--resilience	0.012	0.012	-0.011	0.036
## 23	hr_relig_spirit--pa_weights	0.013	0.012	-0.011	0.037
## 48	hr_social--fruitvegs	0.013	0.012	-0.011	0.037
## 65	diet_energydrink--sleep_nap	0.013	0.012	-0.012	0.038
## 72	hr_commute--subst_freq_alc	0.013	0.012	-0.010	0.036
## 113	pa_weights--subst_alc_freq_binge	0.013	0.012	-0.011	0.037
## 121	hr_volunteer--pa_met_tot	0.013	0.012	-0.011	0.036
## 248	pa_met_tot--resilience	0.013	0.012	-0.011	0.037
## 35	hr_meditate--diet_sugardrink	0.014	0.012	-0.010	0.037
## 40	hr_family--diet_energydrink	0.014	0.012	-0.010	0.038
## 59	hr_family--sleep_nap	0.014	0.012	-0.010	0.038
## 118	subst_freq_alc--subst_alc_freq_binge	0.014	0.008	-0.001	0.028
## 139	hr_social--sleep_hrs_average	0.014	0.012	-0.010	0.038
## 239	pa_weights--resilience	0.014	0.012	-0.009	0.038
## 6	hr_social--hr_family	0.015	0.012	-0.009	0.038
## 188	pa_met_tot--psych_distress	0.015	0.012	-0.009	0.039
## 219	diet_sugardrink--health	0.015	0.012	-0.009	0.039
## 46	hr_volunteer--fruitvegs	0.016	0.012	-0.009	0.039
## 97	hr_commute--subst_freq_tobacco	0.016	0.012	-0.008	0.039
## 124	hr_family--pa_met_tot	0.016	0.012	-0.008	0.041
## 144	pa_weights--sleep_hrs_average	0.016	0.012	-0.008	0.041
## 86	pa_weights--subst_freq_cannabis	0.017	0.012	-0.006	0.042
## 126	hr_commute--pa_met_tot	0.017	0.013	-0.008	0.041
## 177	hr_commute--psych_distress	0.017	0.013	-0.007	0.042
## 180	diet_sugardrink--psych_distress	0.017	0.012	-0.007	0.040
## 227	pa_met_tot--health	0.017	0.012	-0.007	0.042
## 31	hr_social--diet_sugardrink	0.018	0.012	-0.006	0.042
## 37	hr_volunteer--diet_energydrink	0.018	0.012	-0.006	0.041
## 41	hr_tv--diet_energydrink	0.018	0.012	-0.006	0.041
## 66	fruitvegs--sleep_nap	0.018	0.012	-0.005	0.041
## 103	sleep_nap--subst_freq_tobacco	0.018	0.012	-0.006	0.042
## 206	subst_alc_freq_binge--flourish	0.018	0.012	-0.006	0.042
## 62	hr_meditate--sleep_nap	0.019	0.013	-0.005	0.043
## 138	hr_relig_spirit--sleep_hrs_average	0.019	0.012	-0.005	0.043
## 184	subst_freq_alc--psych_distress	0.019	0.012	-0.005	0.042
## 210	psych_distress--flourish	0.019	0.010	-0.001	0.039
## 20	hr_tv--hr_meditate	0.020	0.012	-0.004	0.044
## 81	hr_social--subst_freq_cannabis	0.020	0.012	-0.004	0.043
## 205	subst_freq_tobacco--flourish	0.020	0.012	-0.004	0.044
## 179	pa_weights--psych_distress	0.021	0.012	-0.003	0.045
## 120	subst_freq_tobacco--subst_alc_freq_binge	0.022	0.012	-0.001	0.046
## 131	fruitvegs--pa_met_tot	0.022	0.012	-0.002	0.045
## 154	hr_volunteer--sleep_hrs_diff	0.022	0.012	-0.001	0.046

## 156	hr_social--sleep_hrs_diff	0.022	0.012	-0.002	0.046
## 217	hr_meditate--health	0.022	0.012	-0.002	0.046
## 33	hr_tv--diet_sugardrink	0.023	0.012	-0.002	0.047
## 70	hr_family--subst_freq_alc	0.023	0.012	0.000	0.047
## 134	subst_freq_cannabis--pa_met_tot	0.023	0.012	-0.002	0.047
## 178	hr_meditate--psych_distress	0.023	0.013	-0.001	0.048
## 133	subst_freq_alc--pa_met_tot	0.024	0.012	0.000	0.047
## 211	hr_volunteer--health	0.024	0.013	-0.001	0.048
## 43	hr_meditate--diet_energydrink	0.025	0.012	0.001	0.049
## 85	hr_meditate--subst_freq_cannabis	0.025	0.012	0.001	0.048
## 169	subst_alc_freq_binge--sleep_hrs_diff	0.025	0.012	0.001	0.049
## 249	sleep_hrs_average--resilience	0.025	0.012	0.001	0.049
## 68	hr_relig_spirit--subst_freq_alc	0.026	0.012	0.002	0.050
## 246	subst_freq_tobacco--resilience	0.026	0.012	0.002	0.051
## 61	hr_commute--sleep_nap	0.027	0.012	0.003	0.051
## 99	pa_weights--subst_freq_tobacco	0.027	0.012	0.004	0.051
## 13	hr_social--hr_commute	0.029	0.012	0.005	0.052
## 45	diet_sugardrink--diet_energydrink	0.031	0.012	0.007	0.055
## 165	sleep_nap--sleep_hrs_diff	0.031	0.012	0.008	0.054
## 207	pa_met_tot--flourish	0.031	0.012	0.007	0.055
## 57	hr_relig_spirit--sleep_nap	0.032	0.012	0.008	0.056
## 104	subst_freq_alc--subst_freq_tobacco	0.032	0.012	0.009	0.056
## 230	psych_distress--health	0.032	0.012	0.009	0.055
## 24	hr_social--pa_weights	0.033	0.012	0.009	0.057
## 168	subst_freq_tobacco--sleep_hrs_diff	0.033	0.012	0.009	0.057
## 222	sleep_nap--health	0.034	0.012	0.010	0.058
## 17	hr_relig_spirit--hr_meditate	0.035	0.012	0.012	0.058
## 231	flourish--health	0.035	0.012	0.012	0.058
## 44	pa_weights--diet_energydrink	0.036	0.013	0.011	0.060
## 93	hr_relig_spirit--subst_freq_tobacco	0.036	0.012	0.012	0.061
## 21	hr_commute--hr_meditate	0.037	0.012	0.013	0.061
## 78	sleep_nap--subst_freq_alc	0.041	0.012	0.017	0.065
## 101	diet_energydrink--subst_freq_tobacco	0.042	0.012	0.018	0.065
## 171	sleep_hrs_average--sleep_hrs_diff	0.043	0.012	0.018	0.066
## 1	hr_volunteer--hr_relig_spirit	0.044	0.011	0.023	0.066
## 4	hr_volunteer--hr_family	0.045	0.012	0.021	0.068
## 63	pa_weights--sleep_nap	0.048	0.012	0.024	0.071
## 147	fruitvegs--sleep_hrs_average	0.051	0.012	0.027	0.075
## 105	subst_freq_cannabis--subst_freq_tobacco	0.055	0.011	0.033	0.076
## 218	pa_weights--health	0.058	0.012	0.034	0.081
## 16	hr_volunteer--hr_meditate	0.063	0.012	0.039	0.087