

A network outcome analysis of psychological risk factors driving suicide risk in emergency department patients

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Table of content

Supplementary Materials Section 1: Sample Characteristics 2

Supplementary Materials Section 2: One-Month Follow-Up Network..... 7

Supplementary Materials Section 3: Six-Month Follow-Up Networks with hyperparameter = 0.5 10

Supplementary Materials Section 4: Edge Weights for Six-Month Follow-Up Networks with hyperparameter = 0.25 13

Supplementary Materials Section 5: Network Stability Analysis 16

Supplementary Materials Section 6: Networks with Demographic Covariates 20

Supplementary Materials Section 1: Sample Characteristics

Please note that the label "SocSupport" in the supplementary materials represents a lack of social support, with higher values indicating lower levels of social support. For clarity, this variable is labeled as "NoSocSupport" in the manuscript figures.

Table S1

Theory-Derived Psychological Factors and Their Respective Abbreviations and Measures

Abbreviation	Item	Construct	Measure
IntEmo	When I experience emotions, I feel them very intensely	Emotion reactivity	Emotion Reactivity Scale (1)
Hopeless	I am hopeless about the future	Hopelessness	Adapted from Brief Symptom Inventory (2)
TimeRunOut	I feel like time is running out for me	Entrapment	Desperation scale (unpublished)
TrappedProb	I feel trapped by my problems	Entrapment	Desperation scale (unpublished)
Anxious	I am constantly anxious and on edge	Anxiety/agitation	Desperation scale (unpublished)
LifeImpossible	Life is impossible if things don't change right away	Hopelessness	Desperation scale (unpublished)
Impulsive	When I am upset I often act without thinking	Impulsivity	UPPS Impulsive Behavior Scale (UPPS-P) (3)
Burden	I am a burden to others	Burdensomeness	Adapted from Interpersonal Needs Questionnaire (4)
NotBelong	I feel like I don't belong	Belongingness	Adapted from Interpersonal Needs Questionnaire (4)
NotAfraidDeath	I am not afraid of injury or death	Fearlessness of death (acquired capability)	Adapted from Acquired Capability for Suicide Scale (5)
SocSupport	I have people who care about me and are there for me whenever I need them	Social support	Self-generated by clinical experts
HavePurpose	I have a sense of direction and purpose in life	Meaning in life	Ryff's Psychological Well-Being Scales (6)

Note. UPPS-P = Urgency-Premeditation-Perseverance-Sensation Seeking-Positive Urgency.

Attrition analysis**Table S2**

Number of Observations For All Time Points and Suicide-Related Outcomes

	1-month follow-up	6-month follow-up
Suicidal ideation	900	938
Suicide plan	521	769
Suicide attempt	521	769

Predictors of attrition

We estimated a logistic regression model predicting attrition (i.e., no available data for suicidal ideation at the six-month follow-up) using relevant demographic factors (age, gender, ethnicity, race, income) and prior history of suicidal thoughts and behaviors (lifetime ideation, NSSI, suicide attempt).

Table S3

Predictors of attrition (at the six-month follow-up)

Predictors	Odds Ratios
Intercept	0.49 **
Age	1.02 ***
Gender	0.51 ***
Ethnicity (Hispanic)	0.96
Income	0.88 **
Suicidal ideation (lifetime)	0.78
NSSI (lifetime)	0.96
Suicide attempt (lifetime)	1.36 *

Note. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; NSSI = Non-Suicidal Self-Injury. The Odds Ratios were computed based on the logistic regression model. Due to too few observations, we (1) only included male and female gender, and (2) binarized ethnicity (non-hispanic, hispanic) and race (white, non-white).

Death IAT Reliability**Table S4***Correlations between block-wise D scores (used for split-half reliability)*

	D score block 3 & 6	D score block 4 & 7	average D score
D score blocks 3 & 6	1	.368**	.821**
D score blocks 4 & 7	.368**	1	.833**
average D score	.821**	.833**	1

Note. **. Pearson correlations (r) are significant at the 0.01 level (2-tailed).

Table S5*Comparison of Suicide Plan and No-Plan Group at Six-Month Follow-Up (N = 769)*

Measure	No plan at 6-month follow-up <i>M (SD)</i>	Plan at 6-month follow-up <i>M (SD)</i>	<i>t</i>	<i>p</i>	CI	
					lower	upper
<i>n</i>	584	185				
Adverse psychological states						
IntEmo	4.07 (1.08)	4.26 (1.01)	-2.13	0.034	-0.36	-0.01
Hopeless	3.34 (1.33)	4.08 (1.06)	-7.75	< 0.01	-0.93	-0.55
TimeRunOut	3.42 (1.39)	3.95 (1.24)	-4.88	< 0.01	-0.74	-0.31
TrappedProb	4.07 (1.16)	4.38 (0.97)	-3.6	< 0.01	-0.48	-0.14
Anxious	3.82 (1.18)	4.21 (1.03)	-4.3	< 0.01	-0.56	-0.21
LifeImpossible	3.41 (1.37)	3.97 (1.19)	-5.38	< 0.01	-0.77	-0.36
Impulsive	3.3 (1.34)	3.64 (1.24)	-3.19	0.002	-0.55	-0.13
Burden	3.28 (1.44)	3.97 (1.25)	-6.25	< 0.01	-0.9	-0.47
NotBelong	3.6 (1.35)	4.12 (1.15)	-5.17	< 0.01	-0.72	-0.32
NotAfraidDeath	3.07 (1.51)	3.69 (1.33)	-5.4	< 0.01	-0.85	-0.4
SocSupport	2.48 (1.37)	2.78 (1.41)	-2.6	0.01	-0.54	-0.07
NoPurpose	3.2 (1.34)	3.85 (1.24)	-6.05	< 0.01	-0.86	-0.44
Explicit-Implicit Association						
ExplAssoDeath	43.77 (31.91)	64.92 (27.89)	-8.67	< 0.01	-25.95	-16.36
IatDScore	-0.38 (0.34)	-0.35 (0.33)	-1.06	0.289	-0.09	0.03

Note. *M* = Mean, *SD* = Standard Deviation, *n* = sample size, *t* = t-statistic, *p* = p-value, CI = Confidence Interval, with *lower* and *upper* indicating the lower and upper bounds of the 95% confidence interval for the difference in means between the two groups. Two-sided t-tests were conducted without corrections for multiple comparisons. Different adverse psychological states have been abbreviated (see Table S1 in the supplementary materials). IntEmo = Intensity of Emotions/emotional reactivity, Hopeless = Hopelessness, TimeRunOut = Despair/entrapment, TrappedProb = Feeling Trapped, Anxious = Anxiety, LifeImpossible = Desperation, Impulsive = Impulsivity, Burden = Burdensomeness, NotBelong = Lack of belongingness, AfraidDeath = Acquired capability for death, SocSupport = Social Support, HavePurpose = Purposefulness. All group differences were significant at the $p \leq 0.01$ level. Standard deviations are reported in parentheses. All psychological states items range from 1 to 5. The explicit association with death score ranges on a scale from 0 to 100, and the IAT score ranges from -2 to 2.

Table S6*Comparison of Suicide Attempt and No-Attempt Groups at Six-Month Follow-Up (N = 769)*

Measure	No attempt at 6-month follow-up <i>M (SD)</i>	Attempt at 6-month follow-up <i>M (SD)</i>	<i>t</i>	<i>p</i>	CI	
					lower	upper
<i>n</i>	683	86				
Adverse psychological states						
IntEmo	4.1 (1.08)	4.19 (1.11)	-0.74	0.461	-0.34	0.15
Hopeless	3.43 (1.31)	4.08 (1.15)	-4.92	< 0.01	-0.91	-0.39
TimeRunOut	3.48 (1.38)	4.01 (1.27)	-3.68	< 0.01	-0.81	-0.24
TrappedProb	4.1 (1.14)	4.39 (1)	-2.5	0.014	-0.51	-0.06
Anxious	3.87 (1.17)	4.22 (1.06)	-2.93	0.004	-0.59	-0.11
LifeImpossible	3.49 (1.37)	3.89 (1.21)	-2.86	0.005	-0.67	-0.12
Impulsive	3.33 (1.32)	3.77 (1.27)	-3.02	0.003	-0.72	-0.15
Burden	3.42 (1.43)	3.66 (1.46)	-1.43	0.156	-0.56	0.09
NotBelong	3.67 (1.34)	4.11 (1.2)	-3.21	0.002	-0.71	-0.17
NotAfraidDeath	3.16 (1.48)	3.7 (1.5)	-3.24	0.002	-0.87	-0.21
SocSupport	2.49 (1.35)	2.92 (1.55)	-2.5	0.014	-0.77	-0.09
NoPurpose	3.34 (1.33)	3.46 (1.49)	-0.7	0.483	-0.44	0.21
Explicit-Implicit Association						
ExplAssoDeath	46.92 (32.44)	64.26 (26.34)	-5.59	< 0.01	-23.47	-11.2
IatDScore	-0.38 (0.34)	-0.36 (0.29)	-0.64	0.52	-0.09	0.04

Note. *M* = Mean, *SD* = Standard Deviation, *n* = sample size, *t* = t-statistic, *p* = p-value, CI = Confidence Interval, with *lower* and *upper* indicating the lower and upper bounds of the 95% confidence interval for the difference in means between the two groups. Two-sided t-tests were conducted without corrections for multiple comparisons. Different adverse psychological states have been abbreviated (see Table S1 in the supplementary materials). IntEmo = Intensity of Emotions/emotional reactivity, Hopeless = Hopelessness, TimeRunOut = Despair/entrapment, TrappedProb = Feeling Trapped, Anxious = Anxiety, LifeImpossible = Desperation, Impulsive = Impulsivity, Burden = Burdensomeness, NotBelong = Lack of belongingness, AfraidDeath = Acquired capability for death, SocSupport = Social Support, HavePurpose = Purposefulness. All group differences were significant at the $p \leq 0.01$ level. Standard deviations are reported in parentheses. All psychological states items range from 1 to 5. The explicit association with death score ranges on a scale from 0 to 100, and the IAT score ranges from -2 to 2.

Supplementary Materials Section 2: One-Month Follow-Up Network

Figure S1

Symptom Network with Suicidal Ideation at One-Month Follow-Up (hyperparameter = 0.25)

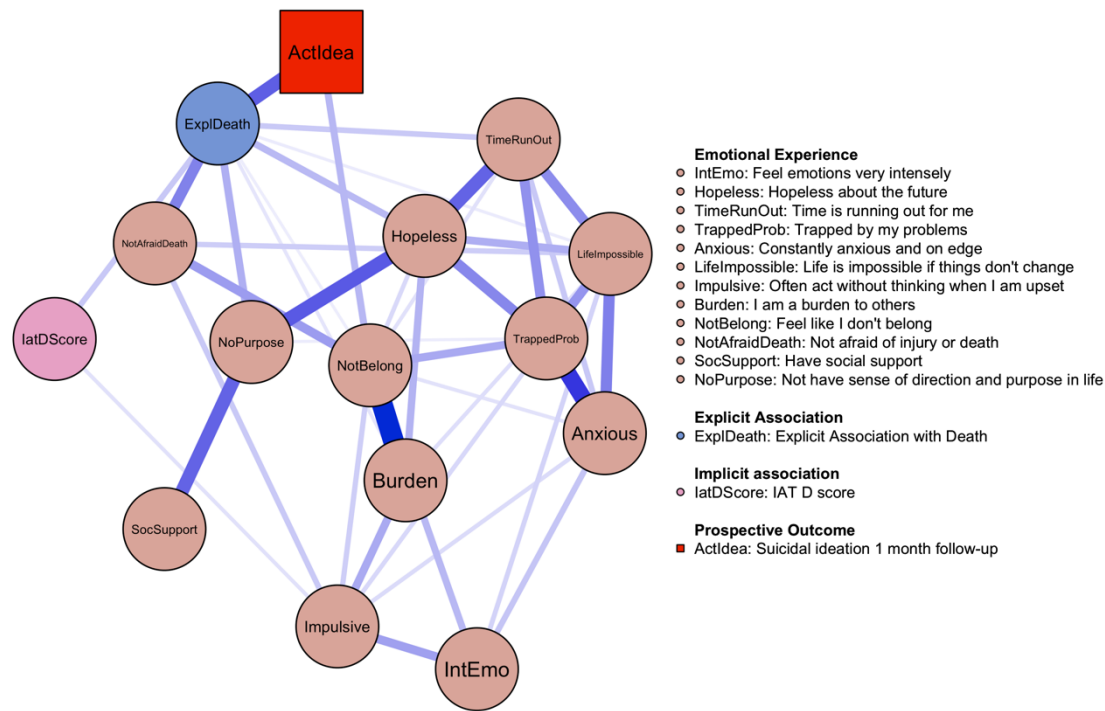


Figure S2

Symptom Network with Suicide Plan at One-Month Follow-Up (hyperparameter = 0.25)

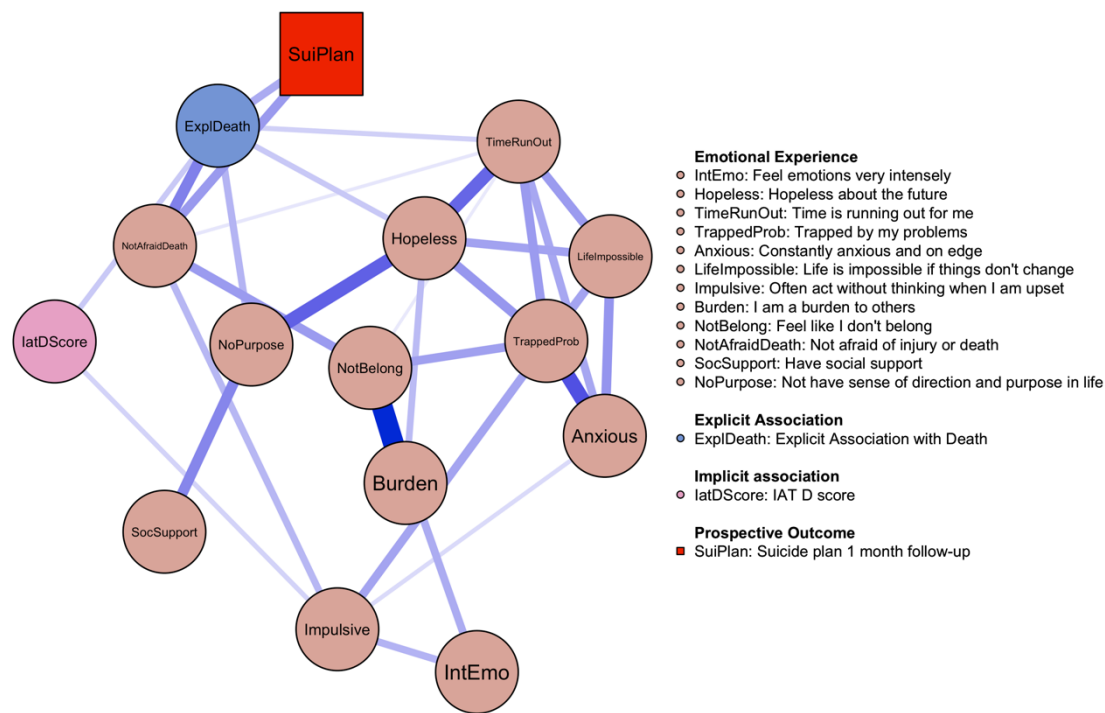
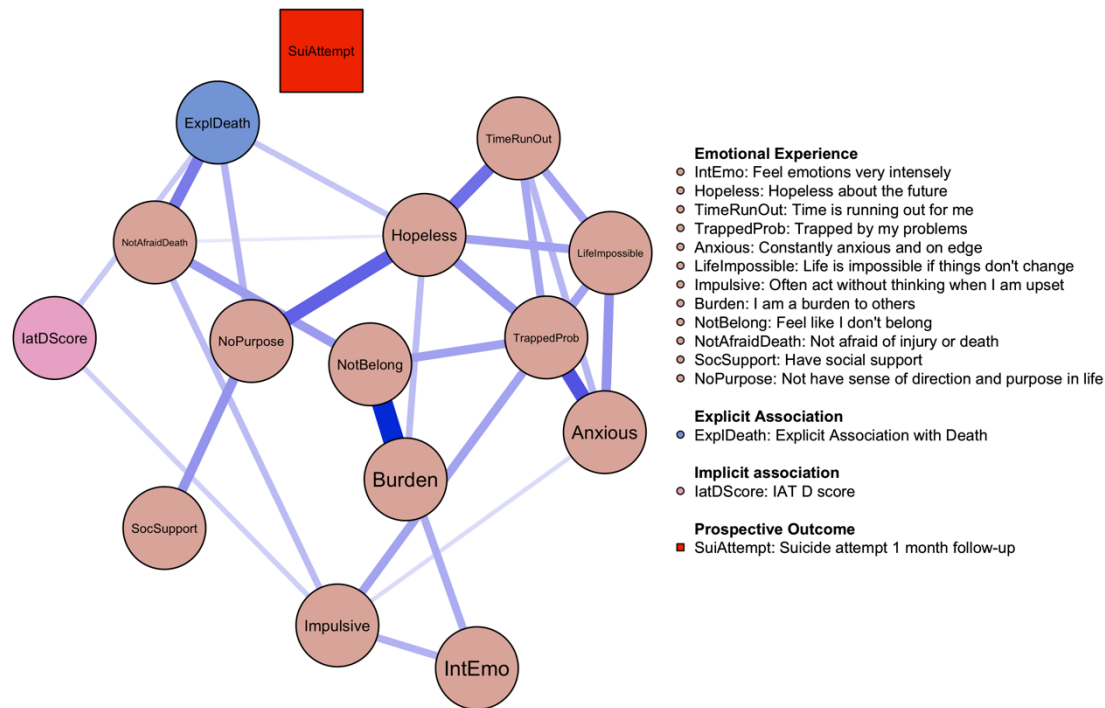


Figure S3

Symptom Network with Suicide Attempt at One-Month Follow-Up (hyperparameter = 0.25)



Supplementary Materials Section 3: Six-Month Follow-Up Networks with hyperparameter = 0.5

Figure S4

Symptom Network with Suicidal Ideation at Six-Month Follow-Up (hyperparameter = 0.5)

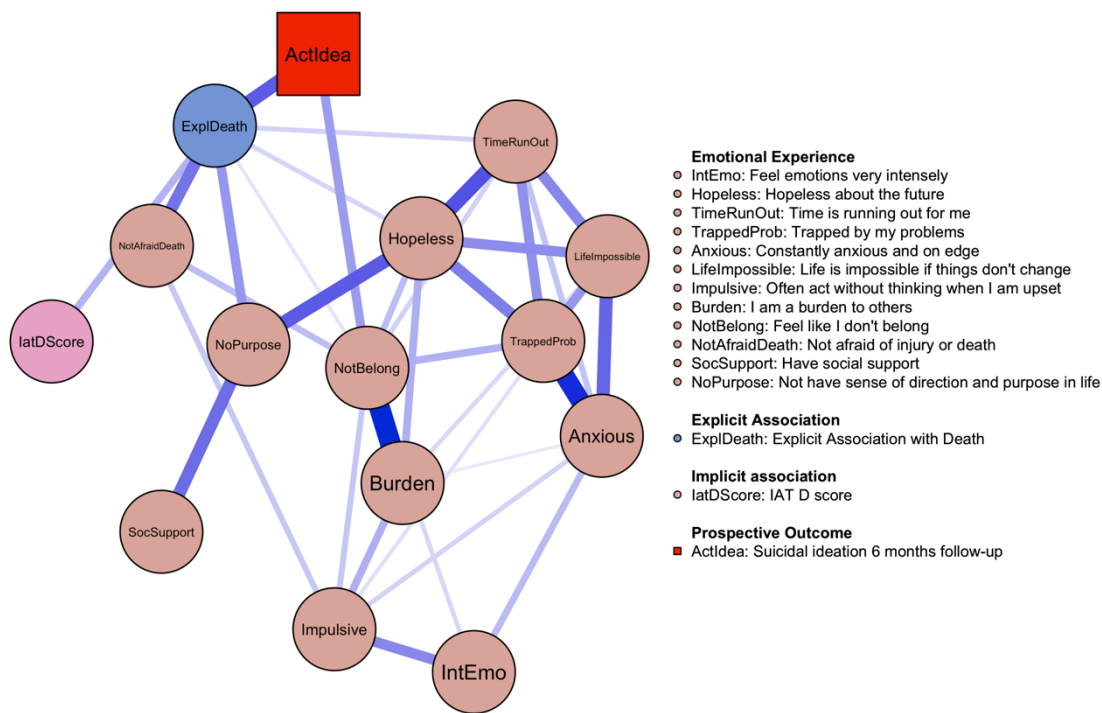


Figure S5

Symptom Network with Suicide Plan at Six-Month Follow-Up (hyperparameter = 0.5)

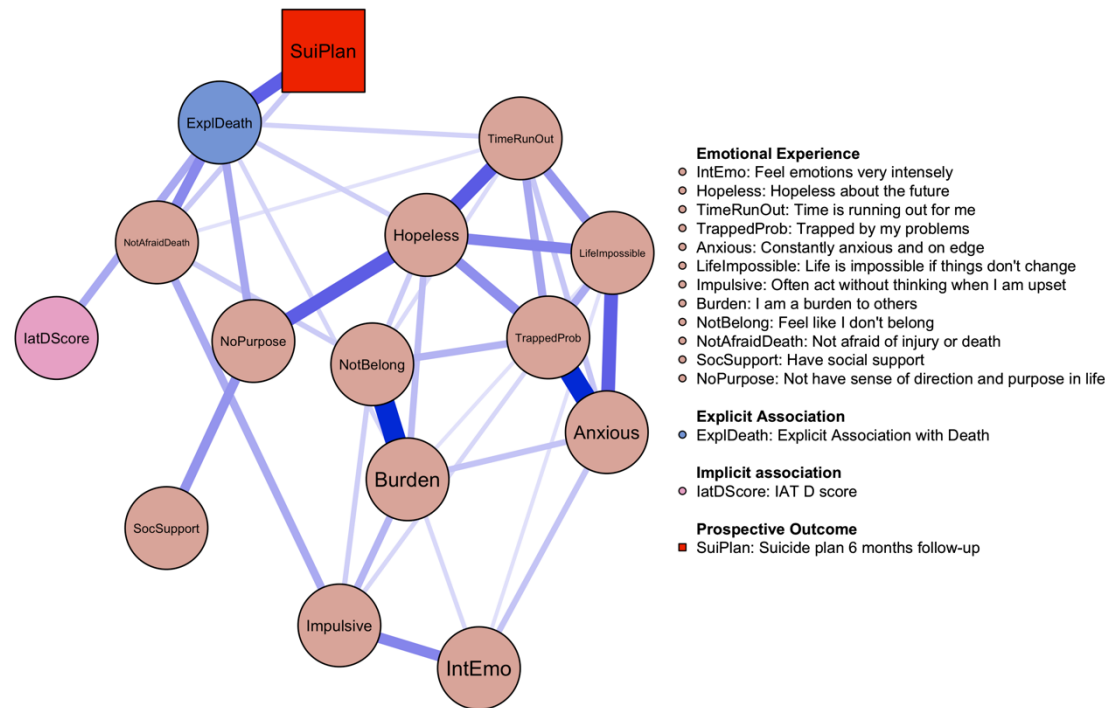
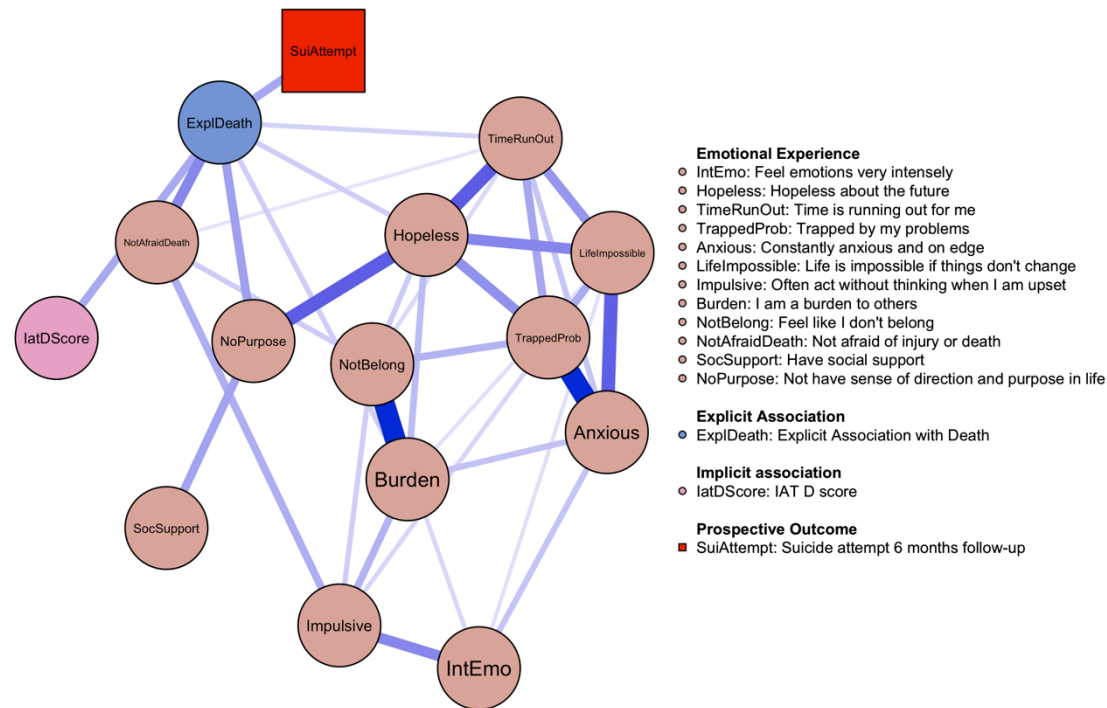


Figure S6

Symptom Network with Suicide Attempt at Six-Month Follow-Up (hyperparameter = 0.5)



Supplementary Materials Section 4: Edge Weights for Six-Month Follow-Up Networks with hyperparameter = 0.25

Table S7

Edge Weights for Network with Suicidal Ideation at Six-Month Follow-Up (hyperparameter = 0.25)

	IntEm o	Hopeles s	TimeRunO ut	TrappedPro b	Anxiou s	LifImpossib le	Impulsiv e	Burde n	NotBelon g	NotAfraidDea th	SocSuppo rt	NoPurpos e	ExplDeat h	IatDScor e
IntEmo														
Hopeless	0													
TimeRunOut	0	0.24												
TrappedProb	0	0.18	0.16											
Anxious	0.1	0	0.08	0.33										
LifeImpossible	0	0.16	0.17	0.15	0.21									
Impulsive	0.16	0	0	0	0.06	0.04								
Burden	0	0.11	0	0	0.03	0.06	0.12							
NotBelong	0.05	0.09	0.06	0.11	0	0	0.08	0.35						
NotAfraidDeath	0	0	0	0	0	0	0.08	0	0.09					
SocSupport	0	0	0	0	0	0	0	0	0	0				
NoPurpose	0	0.23	0	0	0	0	0	0	0	0	0.2			
ExplDeath	0	0.06	0.06	0	0	0	0	0	0.04	0.19	0	0.14		
IatDScore	0	0	0	0	0	0	0	0	0	0	0	0	0.11	
ActIdea	0	0	0	0	0	0	0	0	0.14	0	0	0	0.23	0

Table S8

Edge Weights for Network with Suicide Plan at Six-Month Follow-Up (hyperparameter = 0.25)

	IntE mo	Hopele ss	TimeRun Out	TrappedP rob	Anxio us	LifeImpossi ble	Impulsi ve	Burd en	NotBelo ng	NotAfraidDe ath	SocSupp ort	NoPurp ose	ExplDea th	IatDSco re
IntEmo	0													
Hopeless	0													
TimeRunOut	0	0.24												
TrappedProb	0	0.16	0.13											
Anxious	0.09	0	0.08	0.37										
LifeImpossible	0.04	0.18	0.15	0.12	0.23									
Impulsive	0.18	0	0	0	0	0.06								
Burden	0	0.1	0	0	0.09	0.04	0.11							
NotBelong	0.06	0.07	0.05	0.11	0	0	0.07	0.37						
NotAfraidDeath	0	0	0.04	0	0	0	0.12	0	0.08					
SocSupport	0	0	0	0	0	0	0	0	0	0				
NoPurpose	0	0.23	0	0	0	0	0	0	0	0	0.16			
ExplDeath	0	0.07	0.07	0	0	0	0	0.06	0	0.17	0	0.13		
IatDScore	0	0	0	0	0	0	0	0	0	0	0	0	0.12	
SuiPlan	0	0	0	0	0	0	0	0	0	0.08	0	0	0.23	0

Table S9

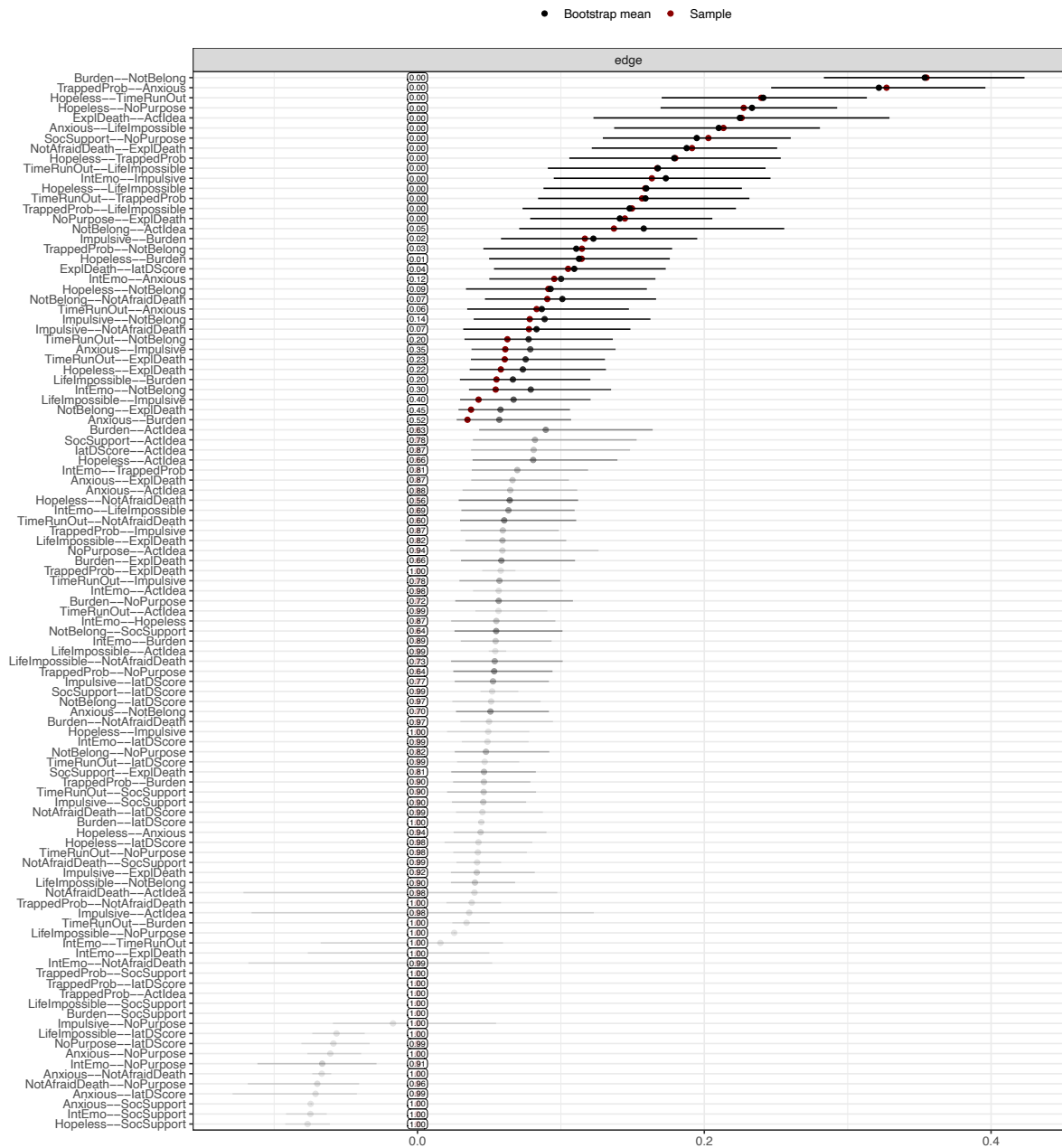
Edge Weights for Network with Suicide Attempt at Six-Month Follow-Up (hyperparameter = 0.25)

[illegible]

Supplementary Materials Section 5: Network Stability Analysis

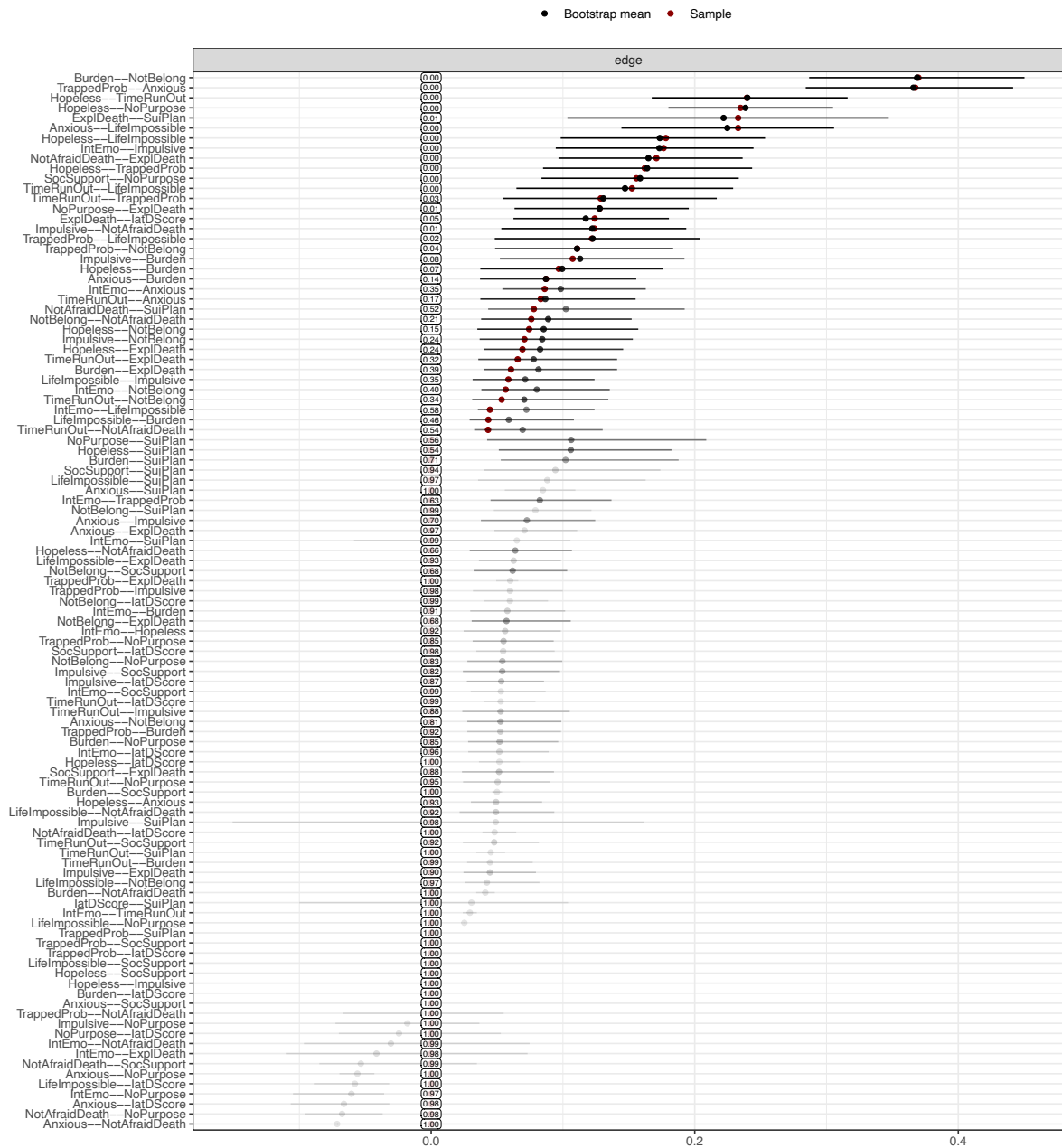
The following bootstrapping results refer to the networks (with *hyperparameter* = 0.25) reported in the manuscript. This non-parametric bootstrapping approach re-estimates the model 1000 times after sampling the data (with replacement). The figures below show the bootstrapped confidence intervals around the edge weight. More information on network stability and non-parametric bootstrapping procedures can be found elsewhere (7).

Figure S7

Non-Parametric Bootstrapping Results for Ideation Network at Six-Month Follow-Up

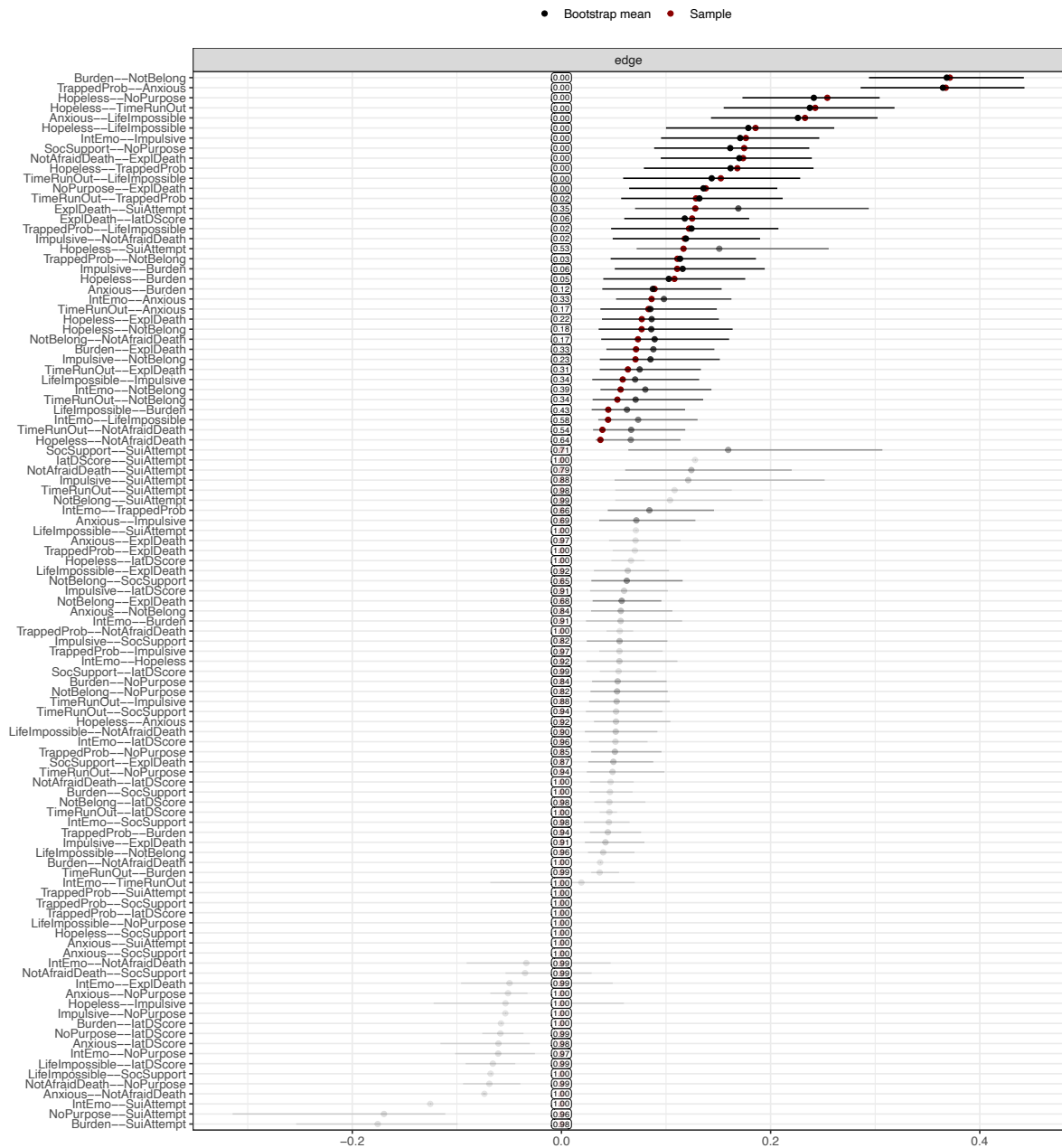
Note. The edges are ordered according to their weight from high (top) to low (bottom). The proportion of estimates being zero is shown in the middle. The vertical bars indicate the 95% confidence interval of the estimated edge weights. The sample values are shown in red.

Figure S8

Non-Parametric Bootstrapping Results for Suicide Plan Network at Six-Month Follow-Up

Note. The edges are ordered according to their weight from high (top) to low (bottom). The proportion of estimates being zero is shown in the middle. The vertical bars indicate the 95% confidence interval of the estimated edge weights. The sample values are shown in red.

Figure S9

Non-Parametric Bootstrapping Results for Suicide Attempt Network at Six-Month Follow-Up

Note. The edges are ordered according to their weight from high (top) to low (bottom). The proportion of estimates being zero is shown in the middle. The vertical bars indicate the 95% confidence interval of the estimated edge weights. The sample values are shown in red.

Supplementary Materials Section 6: Networks with Demographic Covariates

Figure S10

Symptom Network with Suicidal Ideation at Six-Month Follow-Up (hyperparameter = 0.5) with Covariates

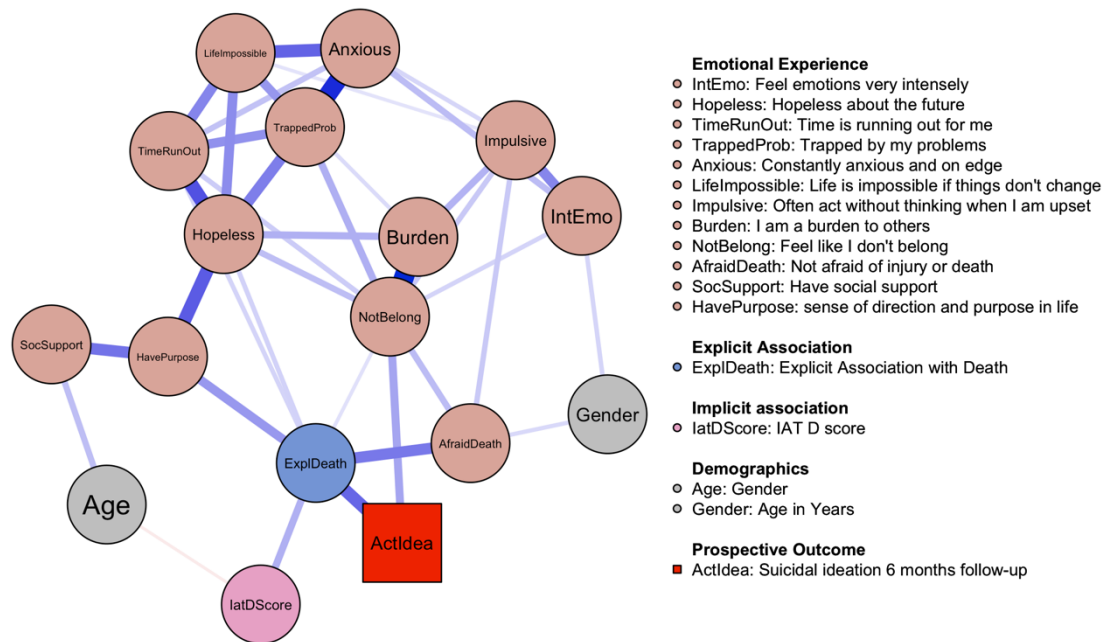


Figure S11

Symptom Network with Suicide Plan at Six-Month Follow-Up (hyperparameter = 0.25)

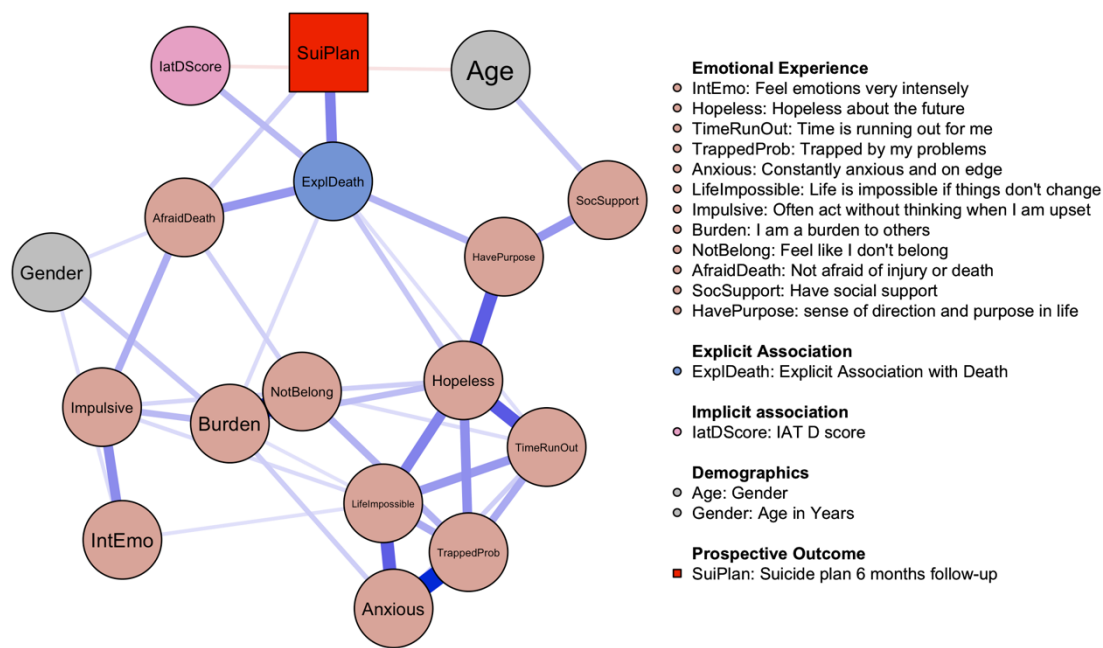
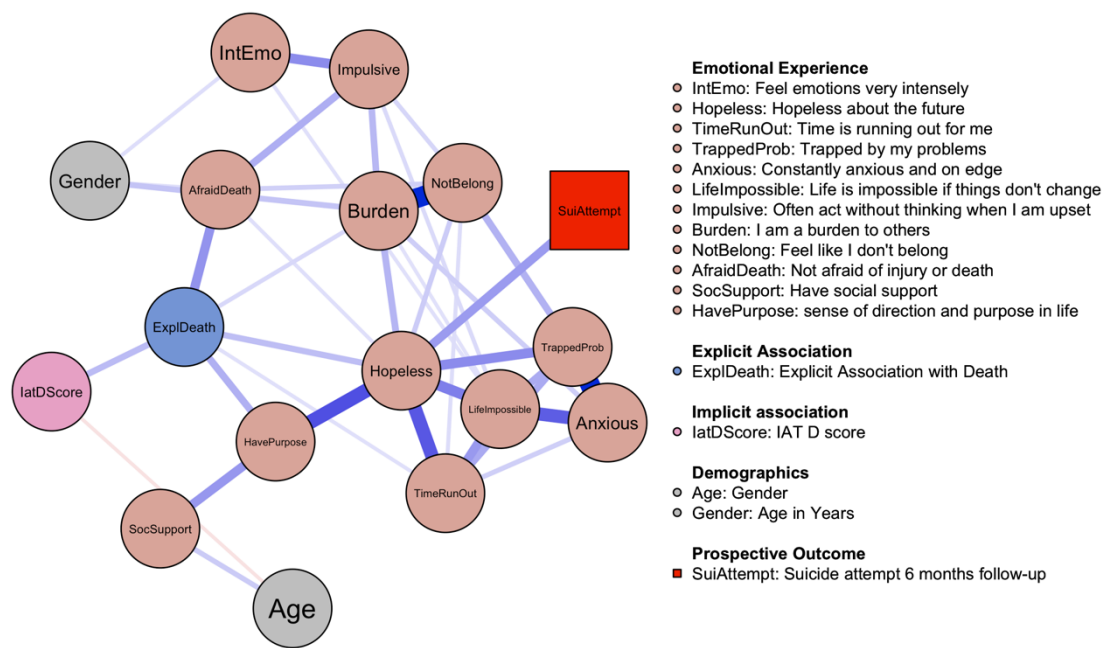


Figure S12

Symptom Network with Suicide Attempt at Six-Month Follow-Up (hyperparameter = 0.25)



References

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