



Negative self-schemas and devaluation of positivity in depressed individuals: A moderated network analysis

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Abstract

Depressed individuals hold negative schemas and experience less positivity in their lives. Network analyses suggest that this may be due to connectivity among negative concepts within depressed individuals' schemas. However, the extent to which positivity interacts with negativity in depressed persons' schemas has not been thoroughly assessed. Thus, we examined the interactive components of the Fear of Happiness Scale, a construct that examines negative emotions associated with happiness, in 966 individuals with depressive symptoms ranging from none to severe via a moderated network model. Patterns of connectivity differed by depressive symptom severity. Notably, as depressive symptoms increased, items representing avoidance and dampening of positivity with negative thoughts went from weakly, negatively connected at no depressive symptoms to strongly, *positively* connected at elevated depressive symptoms. In other words, individuals who experience higher levels of depressive symptoms devalue positivity in their semantic networks, demonstrating an opposite pattern to those without depressive symptoms. Future work should longitudinally examine other individual differences related to the devaluation of reward to ascertain how these individual differences directly contribute to and maintain depressive symptoms.

Keywords Fear of happiness · Depressive symptoms · Network models · Dampening · Reward devaluation theory

Beck's cognitive theory of depression posits that depressed individuals hold negative views about themselves, the future, and the world (Beck, 1967). Negative self-schemas in particular may be influential in the development and maintenance of depressive symptoms. Findings from a recent meta-analysis indicate that depressed individuals hold less positive and more negative self-schemas than nondepressed individuals (Collins & Winer, 2022). In other

words, depressed individuals are less likely to describe themselves in a positive manner (e.g., "I am accomplished") and more likely to describe themselves in a negative manner (e.g., "I am a failure") compared to nondepressed individuals. In addition, depressed individuals are also more likely to describe others in a positive manner than themselves, indicating a potential devaluation of self-referential positive information. Thus, not only do depressed individuals hold negative self-schemas, but they also hold *fewer* positive self-schemas.

Negative self-schemas contain feedback loops (e.g., "I am always sad" ↔ "I deserve to be sad") that facilitate negative interpretations when processing new information (Disner et al., 2011). Negative self-schemas may also hold powerful influence over new information that might otherwise be interpreted as positive. Indeed, meta-analytic findings have demonstrated that depressed individuals do not simply have a diminished attentional bias for positivity when assessed experimentally; rather, depressed individuals *avoid* positivity (Winer & Salem, 2016). Avoidance of the positive is not the same as merely not approaching it: avoidance indicates that there is something specific and meaningful that the

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perceiver is diverting attention *away* from. Reward devaluation theory (RDT), the theoretical framework Winer and Salem (2016) introduced to explain these findings, suggests that attentional avoidance of positivity likely functions this way in individuals for whom previous positive experiences were accompanied by negative results (e.g., hope leading to hopelessness or disappointment). So, RDT extends Beck's cognitive theory, positing that chronic, negative feedback loops not only facilitate negative interpretations when processing new information, they also incorporate and inhibit (i.e., devalue) *positive* interpretations when processing new information. Thus, many people who suffer from depression have not merely become apathetic or hopeless due to hope being paired with negative experiences; they have become hope-averse.

One type of positive emotion, happiness, may elicit a specific type of devaluative response (i.e., fear) when negative self-schemas contain feedback loops that extend to positive information (e.g., “good feelings never last” ↔ “I am frightened to let myself become happy”; Gilbert et al., 2012). Thus, the prospect of experiencing happiness itself may result in fear and avoidant tendencies. Indeed, some prior research indicates that, for some individuals, happiness is not valued or is seen as negative due to previous positive experiences being associated with negative outcomes (Baumeister et al., 2001; Gilbert et al., 2014; Gilbert et al., 2014; Joshanloo et al., 2014; Şar et al., 2019). Moreover, depressed individuals endorse greater fears of happiness than nondepressed individuals (Gilbert et al., 2014; Gilbert et al., 2014), and greater fear of happiness has been found to be positively related to depressive symptoms in non-clinical samples (Blasco-Belled et al., 2021; Gilbert et al., 2012; Jordan et al., 2021; Lyvers et al., 2022). However, to our knowledge, the extent to which appraisal processes related to happiness and positivity change at varying levels of depressive symptom severity (e.g., mild, moderate, and severe) has not yet been investigated.

Depressed individuals may experience greater emotional or affective temperamental dysregulation compared to non-depressed individuals, which can contribute to the maintenance of their symptoms (Serafini et al., 2012). Indeed, prior research suggests that some depressed individuals engage in different emotion regulation strategies in the face of positive emotions than nondepressed individuals (Feldman et al., 2008). Whereas non-depressed individuals may engage in positive rumination to increase positive affect, depressed individuals are more likely to engage in dampening (i.e., reducing the frequency and intensity of positive feelings) if they are unable to avoid positivity (Abasi et al., 2021; Feldman et al., 2008; Werner-Seidler et al., 2013). Moreover, this may be due to negative interpretations when processing new information (Everaert et al., 2018, 2020; Everaert,

Grahek, et al., 2017; Everaert et al., 2017). Thus, depressed individuals who engage in devaluative and dampening strategies in response to positive information likely hold positive self-schemas that have negativity flowing through them.

Findings from a previous network analysis have demonstrated that negative self-views are closely connected to devaluation of positivity, providing evidence that depressed individuals may interpret future positive information in a negative fashion and likely hold both more densely-connected negative self-schemas and devaluative positive self-schemas (Collins et al., 2021). Whether these interpretations are guided by the structure of self-schemas associated with depression has not been empirically assessed, however. RDT provides a theoretical framework by which one may examine the inter-relations among facets of fearing happiness at different levels of depression, and network analysis provides the statistical framework to carry out this investigation.

Network analysis

Network analysis is a statistical method that can be used to examine the interactive relationships among variables (Borsboom & Cramer, 2013). This allows for further investigation into the interplay among variables to determine which variables may have the largest influence on other variables in the network. Moderated network models (MNM) have been established to investigate moderation effects of one variable on other relationships in the network, resulting in 2-way interactions (pairwise interactions) and 3-way interactions (moderation interactions; Haslbeck et al., 2021). Traditional networks that only examine pairwise interactions may overlook key factors that contribute to the relationship between two nodes. Thus, incorporating a moderator into the network may help to better explain the relationship between two nodes and is a particularly robust method for analyzing our research question.

The Fear of Happiness Scale (FHS; Gilbert et al., 2012) is a self-report measure that may capture the devaluative processes of depressed individuals as it includes statements that reflect one's negative biases toward happiness due to previous, negative experiences or negative self-schemas (Gallagher et al., 2022). To our knowledge, there are no existing studies that have examined the items from the FHS independently in a network; thus, this aspect of the current study was exploratory in nature. In addition, how specific relationships between these items change as a result of depressive severity has not yet been investigated.

Thus, we examined the interactive relationships between the FHS variables via network analysis at varying levels of depressive symptom severity. Given that existing literature

has shown (a) a high correlation of FHS to depressive symptoms (Blasco-Belled et al., 2021; Gilbert et al., 2012; Jordan et al., 2021; Lyvers et al., 2022), (b) depressed individuals have negative biases toward positivity and happiness (Winer & Salem, 2016), and (c) the negativity networks of depressed individuals are more densely connected than non-depressed individuals (Hayes et al., 2015), we expected differences in the network structures of FHS variables at different levels of depression, in line with the predictions for self-relevant processing of positivity and negativity by RDT. We investigated this using a MNM with the sum score of the Quick Inventory of Depressive Symptomatology Self-Report (QIDS-SR; Rush et al., 2003) as the moderator to examine how positivity interacts with negativity networks representing increasingly depressed individuals.

Materials and methods

Participants

Nine-hundred and sixty-six participants ($N=966$, 719 females, $M_{\text{age}} = 18.74$) were recruited from a large southern university in the United States and included undergraduate students who were enrolled in a psychology course. Participants were recruited online via the university's psychology research program and completed the study as part of their course credit. Prior to signing up for the study, undergraduate students were informed that the purpose of the study was to examine thoughts about the self and reactions to stress. The study was approved by the university's Institutional Review Board (IRB #19–390). Participants received an informed consent online prior to completing the self-report measures and then completed the Fear of Happiness Scale (FHS) and the Quick Inventory of Depressive Symptomatology Self-Report (QIDS-SR), among other self-report measures that are not relevant to the current study, online via Qualtrics.

Measures

Fear of Happiness Scale (FHS; Gilbert et al., 2012)

The FHS is a 9-item self-report measure that assesses feelings about happiness and positive feelings (Gilbert et al., 2012). Items on the FHS range from 0 (not at all like me) to 4 (extremely like me) and are summed for a total score. Higher scores indicate greater levels of fear of happiness. The mean and standard deviation of the FHS in the current study ($M=9.84$, $SD=8.11$) is comparable to prior work utilizing student samples ($M=11.63$, $SD=8.31$; Gilbert et al.,

2012). The FHS in this study demonstrated good internal consistency with a Cronbach's alpha of 0.90.

Quick Inventory of Depressive Symptomatology Self-Report (QIDS-SR; Rush et al., 2003)

The QIDS-SR is a 16-item self-report measure of depressive symptoms (Rush et al., 2003). Items on the QIDS-SR are scored on a four-point Likert scale ranging (0–3). In the present study, item 12 (suicidal ideation) was not included in the self-report due to the researchers not being able to readily respond if a participant endorsed suicidal ideation; thus, participants completed a modified 15-item QIDS-SR. This modified QIDS-SR has been used in prior research (Collins et al., 2021). Higher scores indicate greater levels of depressive symptoms. A total sum score for the QIDS-SR was calculated by summing the maximum value of items 1–4 (sleep difficulties), item 5 (sad or depressed mood), the maximum values of items 6–9 (appetite or weight change), item 10 (concentration difficulties), item 11 (negative views of the self), item 13 (anhedonia), item 14 (low energy/fatigue), and the maximum value of items 15 and 16 (psychomotor difficulties). In the current study, the sum was adjusted to account for the exclusion of item 12, resulting in a total sum score for each participant.

Ranges of depressive symptoms for varying cut-off scores have been established and include none (0–5), mild (6–10), moderate (11–15), severe (16–20), and very severe (≥ 21 ; www.ids-qids.org). The mean of QIDS-SR scores in this sample fell within the mild range, -1SD fell within the none range, +1SD fell within the moderate range, and +2SD fell within the severe range ($M=8.74$, $SD=4.73$). The QIDS-SR in this study demonstrated adequate internal consistency with a Cronbach's alpha of 0.78.

Statistical analyses

The statistical analyses were pre-registered online via AsPredicted.org before analyses were conducted (ID #31284). Analyses were carried out using R (Version 4.0.2). Less than 1% of data were missing and were handled via multiple imputation with the *mice* function. All data were assessed for normality and were within normal limits with skewness and kurtosis values < 2 (Tabachnick & Fidell, 2013).

We conducted a moderated network model with items of the FHS as individual nodes and QIDS-SR as the moderator. We first assessed for redundancy within the FHS nodes via the *goldbricker* function in the R package *networktools* (Jones, 2018), which revealed no redundant nodes. We used the *mgm* package to estimate pairwise and 3-way interactions between each node (Haslbeck & Waldorp, *in press*).

Table 1 List of node names

Node	Item
Depression	Computed total of the QIDS-SR
Guard	If you feel good you let your guard down
Excited	I don't let myself get too excited about positive things or achievements
Never_Last	Good feelings never last
Blue	When you are happy you can never be sure that something is not going to hit you out of the blue
Worry	I worry that if I feel good something bad could happen
Trust	I find it difficult to trust positive feelings
Uncomfortable	Feeling good makes me uncomfortable
Frightened	I am frightened to let myself become happy
Deserve	I feel I don't deserve to be happy

We stipulated the cross-validation (CV) procedure and the OR-rule for a less-conservative estimate to allow us to observe more estimates that may provide useful information for interpretation and is consistent with the exploratory nature of the study.

After all pairwise and 3-way interactions were estimated, we conditioned on the fixed values of the QIDS-SR using the function *condition* to examine the pairwise network models of FHS items at (1) -1SD, (2) the mean, 3) +1SD, and 4) +2SD.¹ We next assessed node centrality by examining both node strength and expected influence in the pairwise network and each of the four conditioned networks.² We assessed the stability of the estimates and parameters in the pairwise network model by bootstrapping the sampling distributions of the parameters via the *resample()* function with 2500 bootstrap samples.

Results

Table 1 presents a list of the language of each item corresponding to each node name. Thirty-three pairwise interactions were estimated in the pairwise network out of a possible total of 45 edges (73.33%), thus this network represents a dense model overall. The three most influential nodes were *Frightened*, *Trust*, and *Blue*, as evidenced by these three nodes exhibiting both high strength and expected influence.³

¹ The conditioned model at +2SD was not included in the initial pre-registration. However, we included this to examine a full range from mild to severe symptomatology and to confirm that the pattern that was emerging at +1SD continued at higher levels of depression.

² Strength and expected influence were not included in the planned analyses for our pre-registration; however, they provide crucial information on nodes that are of large importance to the networks.

³ Additional, relevant information, including tables, and figures, and the R code, are located in the supplemental materials.

Figure 1 depicts the four network models conditioned on the four levels of the moderator, ranging from no/minimal depressive symptoms to severe depressive symptoms. In three of the four conditioned models, the three most influential nodes were *Frightened*, *Trust*, and *Blue* due to them exhibiting the greatest strengths and expected influences; however, at one standard deviation below the mean, the most influential nodes were *Frightened*, *Never_Last*, and *Blue*.

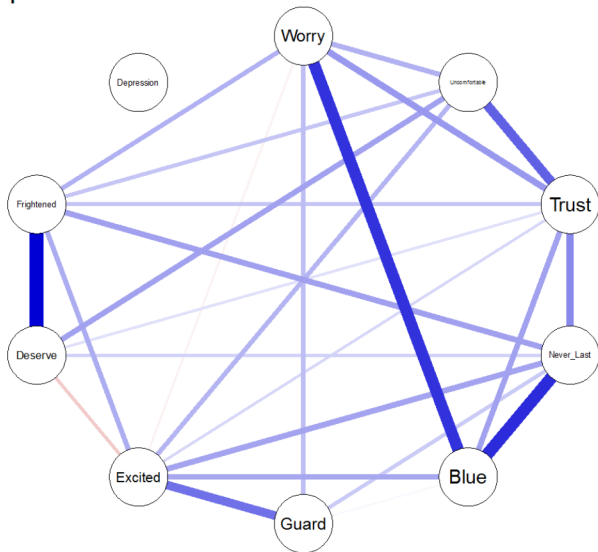
Six 3-way interactions emerged out of a possible 36 interactions. The 3-way interactions ranged from -0.085 to 0.058 . Four 3-way interactions were in the negative direction, indicating that as depression symptoms increased, the relations between the items became more negative. Depression displayed the strongest moderating effect for *Guard-Excited* (-0.085), suggesting that as depression increased, the relationship between *Guard-Excited* progressively decreased from positive to negative. The moderating effect for *Never_last-Excited* (-0.032) exhibited a progressive relationship as depressive symptoms increased. Specifically, as depressive symptoms increased, the positive relationship became weaker until it was no longer present at two standard deviations above the mean. *Worry-Excited* (-0.024) exhibited the only negative relationship at the mean of QIDS-SR; the strength of the relationship increased as QIDS-SR increased with the strongest relationship depicted at two standard deviations above the mean. *Worry-Guard* (-0.014) demonstrated the smallest, negative moderating effect. The strongest relationship was present at one standard deviation below the mean, decreased as QIDS-SR increased, and was not present at two standard deviations above the mean.

Two 3-way interactions were in the positive direction, indicating that as depression symptoms increased, the relations between the items became more positive. The relationship between *Excited-Deserve* (0.058) exhibited a positive moderating effect as evidenced by a progressive change of this relationship from negative to positive as depressive symptoms increased. In other words, there was a negative relationship between *Excited-Deserve* at one standard deviation below the mean of QIDS-SR, no relationship at the mean, a positive relationship at one standard deviation above the mean, and a stronger, positive relationship at two standard deviations above the mean. *Excited-Frightened* (0.028) exhibited a positive relationship at all four conditions, which increased as QIDS-SR increased.

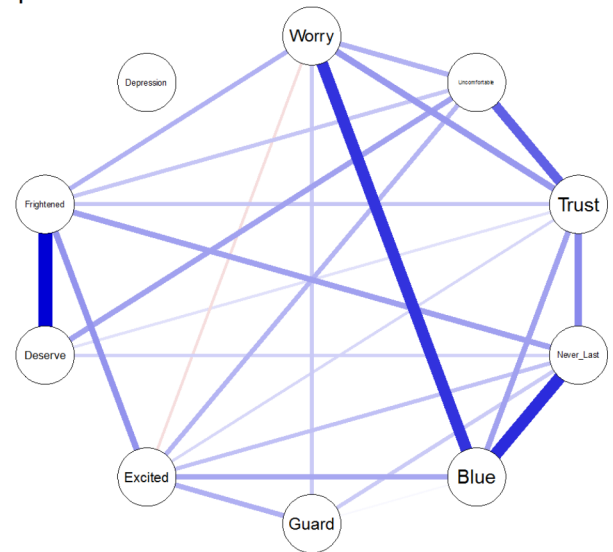
Discussion

Our constellation of findings supports prior research that has found positive relationships between fear of happiness and depressive symptoms (Blasco-Belled et al., 2021; Gilbert et

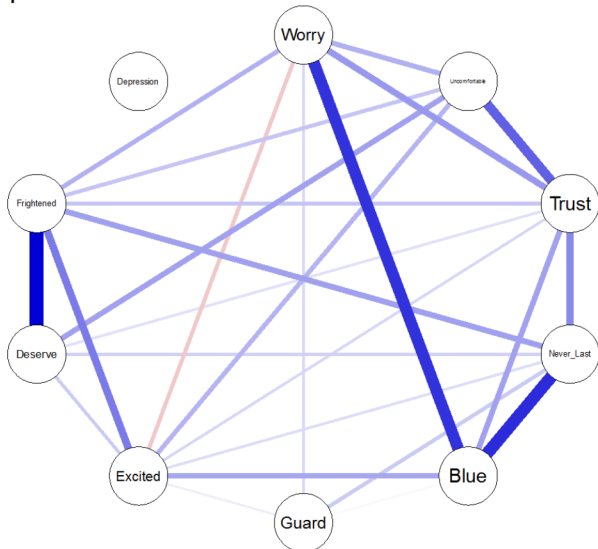
Depression = -1



Depression = 0



Depression = 1



Depression = 2

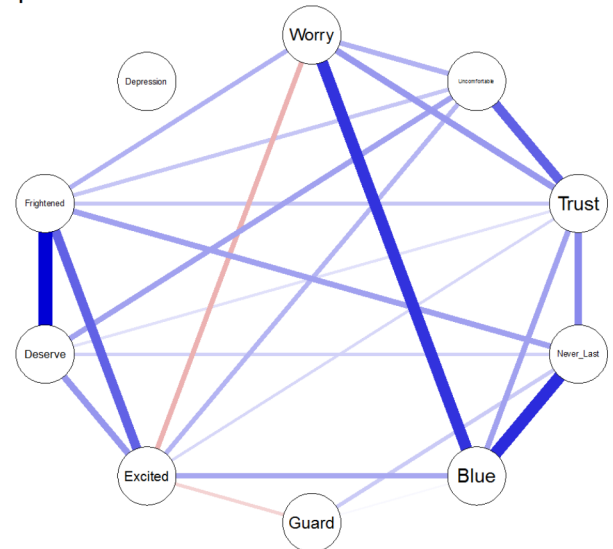


Fig. 1 Network of Fear of Happiness (FHS) items conditioned on four levels of the Quick-Inventory of Depressive Symptomatology Self-Report (QIDS-SR). (Note. Network is depicted at -1SD (top left), mean (top right), +1SD (bottom left), and +2SD (bottom right) of QIDS-SR sum score.)

al., 2014; Gilbert et al., 2014; Gilbert et al., 2012; Jordan et al., 2021; Joshanloo et al., 2014; Lyvers et al., 2022; Şar et al., 2019) and provides evidence that the processing of positivity changes at different levels of depressive symptom severity when examined with a moderated network analysis. Notable moderating effects were present suggesting dampening and/or *complete reversal* (i.e., devaluation) of connections among positivity statements as depressive symptoms increased, providing evidence for a change in schemas and processing of positivity associated with change in depression symptom severity. The absence of normative positivity connections is consistent with the dampening literature,

which suggests that some depressed individuals dampen positive emotions because they feel that they do not deserve it and may be trying to devalue or avoid positive feelings (Feldman et al., 2008; Raes et al., 2012; Werner-Seidler et al., 2013).

Further, our findings suggest that one's negative schema not only influences how negative information is influenced but it also influences the interpretation of *positive* information, which resulted in a devaluation of positivity in our networks as depressive symptoms increased. Moreover, and most important to our research question, the pattern of avoidance of happiness that emerges at higher levels of

depressive symptoms (i.e., the reversal of normative positivity connections) matches and extends previous research examining avoidance of positivity (Bartoszek & Winer, 2015; Jordan et al., 2017) and meta-analyses of experimental evidence (Collins & Winer, 2022; Winer & Salem, 2016) in depressed individuals. In other words, depressed individuals seem to devalue reward, such that they evidence a reversal of the pattern seen in non-depressed individuals (Winer & Salem, 2016; Winer et al., 2019). These specific moderating effects are discussed in detail below.

Additionally, the nodes *'I am frightened to let myself become happy'*, *'When you are happy you can never be sure that something is not going to hit you out of the blue'*, and *'I find it difficult to trust positive feelings'*, were consistently influential in the pairwise network and each conditioned network, as evidenced by these nodes exhibiting high strength and expected influence at each level of the moderator. These three nodes exhibiting high strength and expected influence at each level of the moderator and represent a negative interpretation of *prospective*, positive information (e.g., happiness and positive feelings) that may be guided by one's negative schema. Thus, these nodes emerging as the most central in the network may provide insight into how one's negative schemas may influence the processing of prospective information.

Item pairs

Deserve and Excited

The relationship between the items *'I feel I don't deserve to be happy'* and *'I don't let myself get too excited about positive things or achievements,'* evidenced a progressive change such that at low levels of depression, this relationship was negative, and at high levels of depression, it was positive. So, those with minimal (or no) depressive symptoms who endorsed not allowing themselves to get too excited about positive things still felt that they deserved happiness. Individuals with high levels of depressive symptoms evidenced a robust positive association between these items, suggesting that they viewed allowing themselves to get too excited about positive things and deserving happiness as semantically similar.

Excited and Guard

The relationship between *'I don't let myself get too excited about positive things or achievements'* and *'If you feel good you let your guard down'* showed a moderation effect. At low levels of depressive symptoms, there was a positive relationship, which became progressively weaker as

depressive symptoms increased, and reversed into a negative relationship at the severe range of depressive symptoms. This suggests that the negative self-schemas of individuals experiencing severe depressive symptoms may contain a feedback loop that extends to prospective positivity. Thus, they may be more likely to dampen positivity due to them having a negative association between letting themselves be hopeful and excited about positivity and with letting their guard down. This negative interpretation of positivity may be absent for individuals experiencing no or minimal depressive symptoms, who can allow themselves to be excited about positivity without fear of repercussions.

Worry and Excited

The negative relationship between *'I worry that if I feel good something bad could happen'* and *'I don't let myself get too excited about positive things or achievements'* became stronger as depressive symptoms increased. At low levels of depressive symptoms, the relationship between these two items is weak, and at the severe range of depressive symptoms, the relationship is stronger, both in the negative direction. This suggests that as depressive symptoms increase, so does the strength of the connection between worrying about something bad happening when feeling good and allowing oneself to get too excited about positive things. However, the framing of the latter item (see Table 1) makes interpretation of this relationship more difficult.

Never_Last and Excited

Lastly, the negative relationship between *'Good feelings never last'* and *'I don't let myself get too excited about positive things or achievements'* is also notable, as this relationship becomes weaker as depressive symptoms increase. At low levels of depressive symptoms, there was a strong, positive relationship present; however, this relationship progressively decreased as depressive symptoms increased and was absent at the severe range of depressive symptoms. This suggests that, for individuals who experience fewer depressive symptoms, the idea that good feelings never last is also associated with concerns about getting 'too' excited about positive things; however, at higher levels of depressive symptoms, these nodes do not share a meaningful relationship, indicating that this connection is less salient for those experiencing higher depressive symptoms and may not be present in their negative schemas.

Influential role of fearing happiness

Interestingly, *'I am frightened to let myself become happy'* emerged as having high strength and expected influence in the pairwise and all four conditioned networks. This item may be crucial in understanding the avoidant tendencies associated with fearing happiness. For example, in line with the RDT framework, individuals who hold negative schemas may process positivity and happiness in a negative fashion, resulting in fear and avoidant tendencies (Winer & Salem, 2016). Thus, they may be frightened to let themselves become happy due to it being associated with negative or disappointing outcomes in the past. This may result in the activation of a feedback loop for positive information and subsequent dampening or suppressing of positive emotions to prevent future pain. Thus, being fearful of becoming happy may negatively influence how individuals interact with any kind of positive information, resulting in a bias away from positivity. The fact that this was influential in each of the conditioned networks also suggests that it is not entirely based on related depressive severity.

Clinical implications

Major depressive disorder is the leading cause of global disease burden (Substance Abuse and Mental Health Services Administration, 2021), and depressed individuals often demonstrate maladaptive health behaviors, including exercising less, living a sedentary lifestyle, obesity, and increased substance use (Belvederi Murri et al., 2018; Strine et al., 2008). Existing treatments for depressed individuals include pharmacotherapy (e.g., antidepressants) and psychotherapy (e.g., cognitive-behavioral therapy; DeRubeis et al., 2008). Moreover, exercise may also be a beneficial “from the neck up” treatment for core symptoms of depression, including depressed mood and anhedonia (Belvederi Murri et al., 2018). Thus, incorporating strategies from these three types of treatments can help alleviate depressive symptoms; however, it is important to note that some depressed individuals may not benefit from traditional cognitive-behavioral therapy (Johnsen & Friberg, 2015).

As such, the current findings provide further evidence into the devaluative appraisal processes of depressed individuals, indicating that those with elevated depressive symptoms may benefit *more* from treatments targeting positive affect. Because reward devaluation indicates difficulty with positive affect, individuals who devalue reward may not benefit from traditional treatments that focus strictly on reducing negative affect. Additionally, some of the traditional existing treatments that do incorporate strategies to increase positive affect (e.g., traditional cognitive behavioral therapy

or behavioral activation) may still not be effective, as they do not address the fact that some individuals may not only have deficits in their ability to derive pleasure from positive activities, but may actually experience *negative* emotions (e.g., fear, anxiety, uncertainty) when presented with prospective positivity. The ‘positivity paradox’ described by Lass and Winer (2020) asserts that individuals who devalue reward often experience symptoms of depression due to prolonged avoidance of positivity; however, simply asking these individuals to engage in positive activities (which would seem to be the obvious solution without accounting for the fact that positivity may be distressing) may actually exacerbate feelings of distress, leading to ambivalence toward treatment.

Positive affect treatments (PATs) have been developed and validated, however, that integrate theories regarding positive affect difficulties. These novel treatments have demonstrated success in the increase of positive emotions, as well as the decrease of depressive symptoms in clinical samples (Chaves et al., 2016; Craske et al., 2019; Geschwind et al., 2020; Vazquez et al., 2018; Winer et al., 2019). An example is Augmented Depression Therapy (ADepT), which simultaneously targets reducing depressive symptoms and increasing positive emotions (Dunn et al., 2019). ADepT is a fifteen-session protocol that components of existing treatments, including behavioral activation, to develop strategies to enhance well-being by participating in positive activities that are of value to a given individual. However, ADepT places more of an emphasis on thriving with positivity and targets existing thoughts and behaviors that may inhibit individuals from fully engaging with positivity, differing from existing treatments. Initial findings have been promising as there were notable improvements in depressive symptoms and well-being.

Taylor et al. (2017) have developed Amplification of Positivity (AMP) that aims to target positive affect and well-being. AMP is a ten-session protocol that has individuals engage in positive thinking and activities to upregulate positive emotions. Whereas individuals engage in behavioral strategies that are similar to those in behavioral activation, a key, discriminant component of AMP is the inclusion of psychoeducation of the function of emotions at the beginning of treatment, with an emphasis in the importance of positive emotions in relation to depression. These initial findings have also been promising at individuals who received AMP experienced increases in positive affect and decreases in negative affect compared to the waitlist group, and these changes were maintained at the 6-month follow-up.

PATs may thus be an effective treatment for depressed individuals who demonstrate a devaluation or fear of happiness given their emphasis on increasing positive affect. Network analysis can be beneficial in identifying the most

influential nodes in a depressed person, which may include a negative interpretation of *prospective*, positive information, and may help to increase treatment match and outcomes. For example, individuals who believe that negative outcomes will follow prospective positive experiences may benefit from enhanced psychoeducation about the function of positive and negative emotions.

However, despite the promising outcomes of PATs for depressive symptoms, recent research has found that individuals with greater fear of happiness may be more likely to avoid PATs and believe that they are not a good fit or that they be ineffective for them (Bryant et al., *in press*). Thus, it is likely highly important for clinicians to investigate whether a depressed individual demonstrates devaluative appraisal processes so that they may provide more extensive psychoeducation on PATs to increase patient buy-in and treatment success.

Strengths and limitations

An overall strength of this study is the novel use of a moderated network model, which allows the examination of differences among fear of happiness items at different levels of depressive symptoms within the same sample, as well as the identification of important items and relationships that may inform future work related to RDT (Winer & Salem, 2016). Most extant methods, including the network comparison test and fused graphical lasso, involve either (a) splitting a single dataset into ‘high’ and ‘low’ groups or (b) merging two data sets to have enough power to detect differences, which are either less robust or include less specific options (i.e., the ability to examine networks at specific values; Haslbeck et al., 2021).

Our sample evidenced a limited age range and may thus be difficult to generalize across all adults given we used an undergraduate sample from the United States. Additionally, prior work has indicated that individuals from Eastern cultures hold different views about happiness and may not value it to the same extent as individuals from Western cultures (Joshanloo & Weijers, 2014). Thus, it is unclear whether these findings would replicate in a more diverse sample. However, we were able to examine a full range of depressive symptoms, which is to be considered a notable strength. We did not specifically recruit for depressed individuals or examine the network for depressive symptoms falling within the very severe ranges that might indicate inpatient status, however. Thus, future studies should aim to include individuals in the extreme range, so that fear of happiness can be examined at all ranges for those who are clinically depressed.

Lastly, although the current findings provide important clinical implications, we utilized a cross-sectional design, limiting our ability to infer causality (Winer et al., 2016). It is unclear whether certain devaluative statements precede the development or endorsement of other statements measured by the FHS and how these relationships may unfold and change over time. Thus, future research is warranted to examine how depressed individuals’ semantic networks change over time, or even fluctuate throughout the day in response to external stressors, by utilizing intensive longitudinal methods (i.e., ecological momentary assessment).

Conclusion

The current study is the first to examine how relationships between fear of happiness items change at different levels of depressive symptom severity using a moderated network analysis, providing important theoretical and clinical implications, as noted above. Our findings suggest that there are important differences in how individuals process positivity in their semantic networks, and that these differences often follow the pattern posited by reward devaluation theory and other frameworks emphasizing the dampening of positivity (Collins et al., 2021; Collins & Winer, 2022; Gilbert et al., 2014; Winer & Salem, 2016). As overall depressive symptoms increase, the strength and importance of connections between nodes that indicate fear and potential avoidance of happiness also increase, providing evidence of a prospective feedback loop for processing prospective positivity in a negative fashion. Moreover, buffering connections among positivity-related nodes that are present when depressive symptoms are low were often absent or reversed when depressive symptoms were high. This may represent changes in individuals’ schemas as depressive symptoms increase (e.g., positive schemas for nondepressed individuals and negative schemas for depressed individuals). Suggestive evidence for such a reversal has previously been found (e.g., Winer & Salem, 2016), but this is the first study to demonstrate a reversal of positivity connections as part of a complex network.

Future work should longitudinally examine other individual differences related to the devaluation of reward to ascertain how these individual differences directly contribute to and maintain depressive symptoms. As such, we can further detail how the avoidance of positivity is connected to depression as part of a complex causal system, and better conceptualize and treat those who fear prospective positivity.

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Code availability The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Competing interests The authors of this manuscript have no competing interests to report.

Ethics approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The study was approved by the university's Institutional Review Board (IRB #19–390).

Consent to participate Informed consent was obtained from all individual participants included in the study.

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