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4   **Social Negative Affect and Social Disengagement: Unique and Interacting Effects on Social Dysfunction**

5   **Transdiagnostically**

6   Kathryn C. Kemp*[a], Carly A. Lasagna[b], Scott D. Blain[a], Cynthia Z. Burton[b], Costanza Colombi[c], Aubrey M.

7   Moe[a], Ivy F. Tso[a,b]

8   [a]The Ohio State University Wexner Medical Center, Department of Psychiatry and Behavioral Health,

9   1960 Kenny Road, Columbus, OH 43210, United States

10   [b]University of Michigan, Department of Psychiatry, 1500 E Medical Center Drive, Ann Arbor, MI 48109,

11   United States

12   [c]IRCCS Fondazione Stella Maris, Viale del Tirreno 331 56128 Calambrone, Pisa, Italy

13
14   *Correspondence should be addressed to: Kathryn Kemp, Department of Psychiatry and Behavioral
15   Health, The Ohio State University Wexner Medical Center, 1960 Kenny Road, Columbus, OH 43210, e-
16   mail: Kathryn.Kemp@osumc.edu
17
18

1   **Abstract**

2   Prior research indicates that social functioning is impacted by both social engagement and

3   affective experience regarding social interactions. The goal of this study was to examine the extent to

4   which each component, as well as their interaction, contributes to social dysfunction in a combined

5   nonclinical and transdiagnostic psychiatric sample. A sample of young adults (n=144) spanning the social

6   dysfunction spectrum completed measures that capture different forms of psychopathology relevant to

7   social dysfunction, from which two dimensions – namely Social Negative Affect (SNA) and Social

8   Disengagement (SD) – were extracted using Principal Components Analysis. Participants additionally

9   completed a variety of clinician-rated and self-reported social functioning measures that were

10   aggregated into one overall social functioning score. Hierarchical regression was used to examine the

11   unique contribution of SNA and SD and their interaction on overall social functioning. SNA and SD

12   explained unique variance (Δr^2=46.3%), indicating that elevated SNA and SD levels predicted worse

13   social functioning. The SNA-by-SD interaction was positive and explained significant additional amounts

14   of variance (Δr^2=2.9%), indicating a less-than-additive effect on social dysfunction. These effects

15   remained significant after controlling for intellectual functioning. The findings suggest that examining

16   social behaviors and affect simultaneously is important for understanding social functional outcomes in

17   clinical populations.

18   Keywords: social affect; social engagement; social functioning; RDoC

1. Introduction

1.1. Social Dysfunction in Clinical Populations

Social dysfunction is a major source of impairment and diminished quality of life in several mental illnesses, including schizophrenia-spectrum disorders, autism, and social anxiety (Blanchard et al., 1998; Bottema-Beutel et al., 2019; Davila & Beck, 2002). Social dysfunction is characterized by diminished engagement in satisfying interpersonal relationships and activities and with elevated challenges navigating interpersonal conflicts. It is, therefore, a key transdiagnostic feature of psychopathology and an important intervention target. Yet, current treatments fail to substantially improve social dysfunction in psychiatric populations, calling for a deeper understanding of the mechanisms leading to social dysfunction.

1.2. Behavioral and Affective Indicators of Social Dysfunction

Numerous factors contribute to social dysfunction, obscuring clear treatment targets. The literature emphasizes how altered social engagement contributes to social dysfunction. Consequently, social dysfunction is often quantified based on the frequency and quality of social interactions. For example, the schizophrenia literature emphasizes objective reductions in social contacts/activities as key features of social disability (Green et al., 2018). In addition, social functioning measures emphasize level of engagement with friends, family, and new social contacts (e.g., Cornblatt et al., 2007). Measuring direct behavioral engagement in social interactions is thus integral to understanding social functioning, particularly given its role in the size and quality of one's social world. However, it is well known that affective experiences regarding social interactions – which appear to be partly (albeit less explicitly) reflected in social functioning assessments – also play a major role in social functioning (Tso et al., 2010; Tso et al., 2012; Barkus, 2021; Kemp et al., 2025). For instance, anxiety about possibility of rejection can result in fewer meaningful relationships or ineffective strategies for managing interpersonal conflict. Furthermore, several disorders known for social dysfunction – such as social anxiety, autism, and

1   schizophrenia – involve elevated negative affect and/or diminished positive affect toward social

2   activities (Barkus, 2021; Hintzen et al., 2010). Therefore, social functioning involves both behavioral and

3   affective factors. Delineating the impact of each is crucial for a comprehensive understanding of social

4   dysfunction in psychopathology.

5   In addition to their individual effects, social behaviors and affect interact (Moore & Isen, 1990),

6   manifesting broader social dysfunction. For example, social withdrawal or avoidance inherently removes

7   reinforcing aspects of social engagement (e.g., social support, positive affect) and can increase negative

8   expectations or emotions regarding future social interactions (e.g., social anxiety). Decreased enjoyment

9   and increased anxiety about social situations then result in further social withdrawal or avoidance. Over

10   time, these interacting patterns are reciprocally reinforced. Alternatively, each factor may already be

11   detrimental to social functioning. For example, if someone with significant social anxiety tries to engage

12   socially without adequately addressing anxiety (e.g., utilizing "safety" behaviors, such as speaking

13   rarely), they will not experience meaningful interactions that improve social functioning. Clarifying

14   unique and interacting mechanisms of social functioning is therefore necessary for improving

15   understanding of social dysfunction and identifying targets in treatment. Here, we took a crucial first

16   step to examine these relationships at a single point in time. Confirming their cross-sectional

17   relationships will lay the foundation for future research to further characterize and delineate their

18   dynamics temporally.

19   **1.3. Goals and Hypotheses**

20   This study examined the extent to which affect and behavior regarding social activities, and their

21   interaction, contribute to social functioning in a cross-sectional, transdiagnostic sample with varying

22   levels of social dysfunction. We hypothesized each identified component would explain unique variance

23   in social functioning. We expected their interaction would explain additional variance, suggesting a

24   combination of these factors explains social functioning over-and-above either factor alone.

1   **2. Method**

2   **2.1. Participants**

3   Participants (*n*=174) ages 18-30 completed psychopathology measures in a study on

4   mechanisms of social dysfunction. However, 30 participants were dropped due to failing to complete at

5   least one measure constituting each of the three examined psychopathology domains, resulting in a final

6   sample of 144 participants. Demographics of the sample are as follows: *M* age=23.72, *SD*=3.75; 69.4%

7   female; 20.1% Asian, 4.2% Black/African American; 70.8% White; 4.9% Multiracial; 4.2% Hispanic.

8   Eligibility and selection criteria are provided in Supplementary Text 1. Participants were selected

9   across the full range of social dysfunction, from absent/minimal to severe levels of social dysfunction.

10   This sampling strategy was employed to capture a broad range of social functioning that cuts across

11   diagnostic statuses, thereby providing an examination not limited to any individual diagnostic category.

12   Although participants were not selected based on diagnostic status, this sample was enriched with

13   forms of psychopathology that are highly comorbid and are characterized by prominent social

14   dysfunction. This recruitment strategy ensured recruitment of different social-dysfunction

15   presentations, allowing discernment of shared transdiagnostic features. Specifically, this sample was

16   enriched in social anxiety disorder (n=35), autism spectrum disorder (n=10), psychotic spectrum disorder

17   (n=14), various comorbidities of these diagnoses (n=28), and subclinical levels of these diagnoses (n=19),

18   in addition to a non-clinical group (n=38) identified as having no social dysfunction.

19   **2.2. Measures and Procedures**

20   Institutional Review Boards approved this study at the University of Michigan (Reference

21   number: HUM00174935, Approval date: 02/25/2020) and The Ohio State University (Reference number:

22   2023H0055, Approval date: 04/03/2023). All procedures were performed in compliance with relevant

23   laws and institutional guidelines, and the privacy rights of human subjects have been observed.

24   Participants provided informed consent prior to completing the study.

1   **2.2.1. Psychopathology Measures**

2   This study examines measures capturing three relevant psychopathology dimensions (autism,

3   social anxiety, psychosis proneness). These psychopathology dimensions and measures were selected

4   due to their widely studied overlap with social functioning, and because they capture behavioral (e.g.,

5   clinician ratings of one's level of eye contact during social interactions) and affective (e.g., self-report

6   ratings of social anxiety levels) indicators of social responses. Supplementary Text 2 provides a brief

7   description of the training and reliability procedures for clinician-rated measures.

8   Autism measures included the Autism Diagnostic Observation Schedule (ADOS; Hus & Lord,

9   2014) and Autism Spectrum Quotient (AQ; Baron-Cohen et al., 2001). The ADOS is a clinician-

10   administered measure, whereas the AQ is a self-report measure. Social anxiety measures included the

11   Social Phobia Inventory (SPIN; Connor et al., 2000) and Social Anxiety Disorder Dimensional Scale (SADD;

12   LeBeau et al., 2012), which are both self-report format. Psychosis proneness measures included the

13   Peters Delusion Inventory (PDI; Peters et al., 1998), Cardiff Anomalous Perception Scale (CAPS; Bell et

14   al., 2006), and Scale for the Assessment of Negative Symptoms (SANS; Andreasen, 1984). The PDI and

15   CAPS are self-report measures, and the total number of endorsed items on each measure (not other

16   subscores) was used for analyses for consistency with the other psychopathology measures. The SANS is

17   a clinician-rated measure of negative symptoms of schizophrenia-spectrum disorders. Sum scores from

18   each measure were z-scored, and higher scores indicated greater levels of the respective

19   psychopathology characteristic.

20   **2.2.2. Social Functioning Measures**

21   Two self-report and two clinician-rated measures of social functioning were administered to

22   provide a comprehensive assessment. Clinician-rated measures of social functioning were the Mental

23   Illness Research, Education, and Clinical Center's Global Assessment of Functioning Social Functioning

1 scale (Niv et al., 2007) and the Global Functioning: Social subscale (Cornblatt et al., 2007). Higher scores

2 indicate higher social functioning.

3   Participants completed two self-report measures of role and social functioning: the Social

4 Adjustment Scale (SAS; Gameroff et al., 2012) and Work and Social Adjustment Scale (WSAS; Mundt et

5 al., 2002). Although each measure contains items examining role and social functioning, only social

6 items were evaluated to provide a "social functioning" score on each scale. Higher scores indicate lower

7 social functioning, but were re-coded to the opposite direction for consistency of interpretation with the

8 clinician-rated measures.

9   Scores on all social functioning measures were z-scored and then averaged to provide a

10 composite social functioning score.

11 **2.2.3**. **Intellectual Functioning**

12   Participants completed the Wechsler Abbreviated Scale of Intelligence (McCrimmon & Smith,

13 2013), which examines verbal comprehension and perceptual reasoning. We calculated the Full-Scale

14 IQ-2 (FSIQ2) to provide a score of intellectual functioning or neurocognitive ability. This allowed us to

15 examine whether results were robust to the impact of intellectual functioning, which can also impact

16 social functioning.

17 **2.5. Statistical Analyses**

18 **2.5.1. Principal Components Analysis**

19   Missing values were imputed using Bayesian PCA (pcaMethods package in R) for

20 psychopathology measures and clinician-rated social functioning, respectively. No imputation was

21 needed on self-reported social functioning measures, as all participants completed the SAS and WSAS.

22 We conducted a principal components analysis (PCA) on the seven psychopathology measures to extract

23 factors characterizing social difficulties. PCA provided a useful method of parsimoniously integrating

24 distinct but overlapping psychopathology constructs to distinguish unique variance from behavioral and

1   affective contributors to social dysfunction. Using the psych package in R, three components were

2   extracted following examination of scree plots from parallel analysis. These factors accounted for 83% of

3   the total variance in a PCA (Supplementary Table 1). Upon inspection of the factor structure, two

4   components appeared to capture elevated negative affect regarding social interactions and diminished

5   social engagement, which are the focus of the present study (the third factor reflected psychosis

6   proneness and was not examined further).

7   The first component had strongest loadings from the SPIN, SADD, and AQ. Conceptually, this

8   component is primarily characterized by the report of internal experiences regarding everyday,

9   particularly social, tasks. That is, the SPIN and SADD capture self-reported affective responses to social

10   situations. The AQ captures a broad range of autism features, yet emphasizes internal experiences such

11   as social preferences and reactions shared with social anxiety. Thus, this component represents self-

12   reported affective experiences in social situations and is labeled hereafter as Social Negative Affect

13   (SNA). Higher scores indicate greater levels of negative affect or negative internal experiences regarding

14   social situations.

15   The second component had the strongest loadings from the ADOS and SANS. The ADOS, which

16   was computed using the recommended revised algorithm (Hus & Lord, 2014), emphasizes social

17   communicative skills and behaviors that are exhibited to an interviewer in socially engaging laboratory

18   tasks. The SANS emphasizes diminished interest, motivation, and engagement in social interaction as

19   well as diminished outward affective expression as interpreted by an interviewer in a social research

20   setting. Thus, we conceptualized this second component as representing social behavioral difficulties we

21   now label as Social Disengagement (SD). Higher scores indicate greater levels of social communicative

22   difficulties, and by extension, lower levels of social engagement.

23   **2.5.2. Hierarchical Regression Analysis**

1   We used hierarchical regression analysis to examine SNA and SD's independent contributions

2   and interaction in predicting social functioning. SNA and SD were entered at Step 1 to evaluate their

3   respective contributions to social functioning, and their interaction term was entered at Step 2 to

4   evaluate its contribution above-and-beyond the main effects. To ensure that differences in social

5   functioning were not better explained by neurocognitive difficulties that co-occur with psychopathology,

6   we repeated these analyses while controlling for FSIQ2 scores.

7   **3. Results**

8   **3.1. Descriptive Statistics**

9   Descriptives for all measures are provided in Supplementary Table 2. As expected, participants

10   scored across a broad range of psychopathology severity and social functioning.

11   **3.2. Contributions of SNA and SD to Social Functioning**

12   Results of hierarchical regression analyses are presented in Table 1. When entered at Step 1,

13   SNA (β=-.57) and SD (β=-.37) each explained significant variance in social functioning, totaling 46.3% of

14   variance, all p's < .001. At Step 2, their interaction explained additional variance (β=.19, Δr^2=2.9%,

15   p=.006). Thus, elevated levels of SNA and SD each statistically predicted worse social functioning, and

16   their positive interaction indicated a less-than-additive effect on social functioning (Figure 1). All results

17   remained unchanged when we controlled for IQ at Step 1 (Supplementary Table 3).

18   **4. Discussion**

19   Behavioral engagement and affective responses to social situations are known to impact social

20   functioning, which is supported by this study. Examining both simultaneously offers a more

21   comprehensive understanding of social dysfunction in psychopathology; for example, our results show

22   that when there are elevated difficulties in both social-behavioral engagement and social-affective

23   experience, their combined impact on social functioning is smaller than expected from their individual

24   effects. This may reflect a suppression effect where the effect of each factor becomes less harmful when

1   both are present, indicating substantially overlapping (but not redundant) dysfunction between these

2   components.

3   Although definitions of social functioning more explicitly include behavioral engagement, it has

4   been long understood that negative affect also impacts quality of life and functioning (Tso et al., 2010;

5   Tso et al., 2012). Dominant cognitive-behavioral perspectives characterize social functioning as arising

6   from combinations of behaviors, thoughts, and emotions in response to a social interaction. For

7   example, experiencing social rejection may result in thoughts about not being likable and increase

8   anxiety in social situations, leading to social withdrawal. In turn, these reactions and outcomes are likely

9   to reinforce each other, such that continued social avoidance results in missed opportunities for

10 contradictory evidence, more persistent beliefs about being unlikeable, and ultimately worse social

11 anxiety. The cognitive modeling literature (e.g., Fulawka & Pachur, 2024) expands upon this, showing

12 that affective responses a person *expects* to have are a stronger motivator of behavior than monetary

13 outcomes. Moreover, this may be particularly evident for anticipated *negative* affect and diminished

14 anticipated *positive* affect, which are relevant to social isolation. These conceptualizations align with our

15 results in that these *distinct* behavioral and affective experiences may be so intertwined that, once

16 social functioning drops due to either factor, difficulties in the other factor have a smaller additional

17 impact. Therefore, our results provide some delineation of when behavioral engagement and affective

18 experience matter most for social functioning and provide information about specific, personalized

19 points of intervention. Failure to consider both behavioral and cognitive/affective features of social

20 difficulties contributes to inadequate treatment of social dysfunction in psychiatric populations. In cases

21 where social dysfunction is identified, providers must be wary to consider and address *both* social

22 negative affect and social disengagement.

23 **4.1. Limitations and Future Directions**

1   Many factors contribute to the heterogeneity of social dysfunction (Yanos & Moos, 2007). This

2   study examined behavioral and affective contributors, but not their interaction with other relevant

3   factors, such as social ability (i.e., social cognition). For example, diminished social cognition may

4   correspond with inaccurate interpretations of others' internal states (e.g., interpreting neutral

5   expressions as threatening) and/or receiving more negative responses from others (e.g., conflict), which

6   each can correspond with subsequent negative affective experiences and social disengagement.

7   Therefore, future studies should evaluate how unique, overlapping, and interacting factors across

8   multiple levels predict social dysfunction. Additionally, studies would benefit from recruiting larger

9   samples of different diagnostic groups, to examine whether the impact of behavioral and affective social

10   difficulties on social functioning differs based on diagnostic status.

11   Although this study delineates the impact of behavioral engagement, affect, and their

12   interaction on social functioning, we cannot determine causality given its cross-sectional design.

13   However, the reciprocal relationship among these factors is conceptualized to unfold over time. Thus,

14   future research should examine temporal relationships of these factors in clinical versus non-clinical

15   populations to better disentangle their effect on social functioning. For example, if an individual has high

16   levels of social negative affect, it is understandable that they may isolate more, leading to fewer social

17   contacts and diminished social engagement over time. Nonetheless, this cross-sectional study builds

18   upon prior work showing that negative affect in social situations uniquely impacts social functioning

19   (Kemp et al., 2025) and provides preliminary support for conducting more complex examinations.

CRediT Author Contributions:

- **Kathryn C. Kemp**: Conceptualization; Formal analysis; Investigation; Writing - original draft; Writing - review & editing

- **Carly A. Lasagna**: Methodology; Formal analysis; Writing – review & editing

- **Scott D. Blain:** Formal analysis; Writing – review & editing

- **Cynthia Z. Burton:** Supervision; Methodology; Writing - review & editing

- **Costanza Colombi:** Supervision; Methodology; Writing - review & editing

- **Aubrey M. Moe**: Conceptualization; Supervision; Writing - review & editing

- **Ivy F. Tso** – Conceptualization; Data curation; Funding acquisition; Investigation; Methodology; Project administration; Resources; Supervision; Writing – review & editing

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Table 1. Regressions of Social Negative Affect (SNA), Social Disengagement (SD), and their Interaction as Predictors of Social Functioning
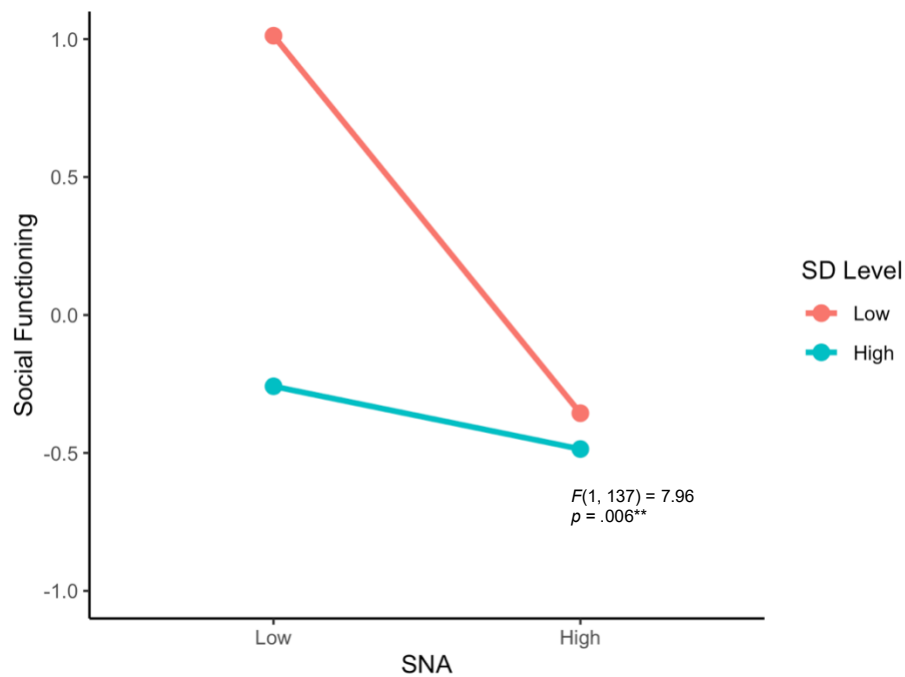
Outcome	n	Predictor	Variable Statistics			Model Statistics			
			β	t	P	r^2	Δr^2	ΔF	P
Overall Social Functioning	141	**Step 1**				.463	.463	59.55	<.001***
		SNA	-.57	-9.17	<.001***				
		SD	-.37	-5.92	<.001***				
		Step 2				.493	.029	7.96	.006**
		SNA	-.50	-7.64	<.001***				
		SD	-.38	-6.22	<.001***				
		SNAxSD	.19	2.82	.006**				

*p < .05   **p < .01   ***p < .001

Figure 1. Interaction of Social Negative Affect (SNA) and Social Disengagement (SD) on Social Functioning

Note. SNA and SD were standardized scores split into two percentile groups to represent visually the interaction effect. *F*-statistic values represent the *ΔF* from the entering the interaction effect at Step 2 (over and above SNA and SD) of the hierarchical regression analyses. This interaction effect indicates that SNA and SD amplify the effect of each other