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Research paper

The mood brightening effect of leisure activities and social company in young people with depression and anhedonia symptoms: An ecological momentary assessment study

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ABSTRACT

Background: Depressed individuals are less reactive than controls to positive stimuli in the laboratory, yet mood brightening (MB) is when positive stimuli increase positive affect (PA) and/or decreases negative affect (NA) more in those with depression compared to controls, in real life. Leisure activities and social company may drive mood brightening in depression, but their impact on anhedonia remains unclear, clarifying this could inform intervention development.

Methods: Participants ($N = 71$, mean 20 yrs) with a range of depression and anhedonia symptoms provided 6 days Ecological Momentary Assessments about leisure activities, social company, NA and PA. From the 2177 assessments, we measured affective reactivity as the difference between PA and NA at the time of the activity/social company compared to two baselines: the within-subject mean and the previous assessment (t-1; lag-1 fluctuation). Longitudinal multilevel linear regression models examined the interaction between symptoms and affect reactivity to leisure and to social company.

Results: Those with higher depression ($p < .05$) and anhedonia symptoms ($p < .025$) had greater reductions in NA during leisure activity and that those with higher depression symptoms ($p < .05$) had greater reductions in NA during social company. These findings indicate MB effects of leisure activity and social company.

Conclusions: Although MB has been documented in depression this is the first study to examine a MB effect in anhedonia symptoms. We provide real-time mechanistic evidence that encouraging individuals with depression and anhedonia symptoms to engage in leisure activities and seek out enjoyable social company could elevate their mood via a reduction in NA.

1. Introduction

Leisure activities, those that are enjoyable, relaxing, and recreational, are linked to lower depression rates in the general population (Bone et al., 2022; Chen et al., 2012; Harvey et al., 2010; Lin et al., 2008; Mikkelsen et al., 2010) and in patients (Cuijpers et al., 2007; Pickett et al., 2012), compared to functional activities like work or chores. Frequently socialising with close friends or family appears to alleviate depression symptoms more effectively than being non-social (alone) or in larger groups (Campbell et al., 2022; Panaite et al., 2021; Solomonov et al., 2019). Lab-based studies have shown that simulations of recreational and social activities can increase positive affect (PA) and decrease negative affect (NA) (McMahan and Estes, 2015; Ryan et al., 2010; Silk et al., 2011; Stavrakakis et al., 2015), suggesting that elevated mood underlies the positive effects of activity on depression symptoms.

Utilising Ecological Momentary Assessment (EMA), studies find that the real-life experiences of depression are characterised by higher levels and more variability in NA, greater inertia (moment-to-moment predictability) and lower levels of PA (Abitante et al., 2024; Houben et al., 2015; Koval et al., 2015). EMA studies have shown a "mood brightening" (MB) effect whereby events that are subjectively rated as being positive, lead to greater reductions in NA (Bylsma et al., 2011; Khazanov et al., 2019; Lamers et al., 2018; Nelson et al., 2020; Panaite et al., 2019; Schricker et al., 2023; Thompson et al., 2012) and greater increases in PA (Peeters et al., 2003; Schricker et al., 2023; von Klipstein et al., 2023) in depressed individuals compared to healthy controls. In contrast, other

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Table 1
Demographics.

Characteristics	Whole Sample (N = 71)
Age	20.14 (2.15)
Gender (% male)	28.2 %
Gender split (F/M)	51/20
Compliance (%)	73 (12.3)
Assessment delay (mins.)	118 (41.03)
Ethnicity (n)	White = 56 Black = 3 Asian = 9 Mixed = 2 Other = 1
MFQ	26.22 (13.21)
Depression Severity (LD/MD/HD)	19/13/39
ASA	18.46 (8.52)
Subscale 1 (Enjoyment, Excitement, and Emotional Flattening)	7.51 (4.57)
Subscale 2 (Enthusiasm, Connection, and Purpose)	5.18 (1.96)
Subscale 3 (Effort, Motivation, and Drive)	5.77 (2.72)

Table 1: Mean (SD) unless stated otherwise. Whole Sample. Compliance threshold: >50%.
MFQ, Mood and Feelings Questionnaire; Depression Severity, based on MFQ scores: LD = Low Depression (MFQ ≤ 16), MD = Moderate Depression (16 < MFQ < 27), HD = High Depression (MFQ ≥ 27); ASA, Anhedonia Scale for Adolescents.

EMA studies have found no MB effect of positive events in depression (Nelson et al., 2020; Thompson et al., 2012). It is argued that this is due to participants subjectively rating events, as this could be confounded by negative biases in depression where patients tend to put greater weight on negative experiences compared to positive experiences (Khazanov et al., 2019). Therefore, EMA studies that measure engagement in real-life activities could be more advantageous as they are more objective.

We know of only two studies examining NA and PA reactivity to actual activities using EMA. Heininga et al. (2019) examined PA reactivity to enjoyable activities grouped together (i.e. sport, hobbies, friends, partner), while van Loo et al. (2023) examined both NA and PA reactivity to physical (exercising, being outdoors) and social contexts (in company or alone) separately. Heininga et al. found no differences in PA reactivity to enjoyable activities in those with major depressive disorder (MDD) and anhedonia, compared to controls. In contrast, van Loo et al. found a MB effect of physical activities which was driven by a greater decrease in NA, and a MB effect of social activities driven by a greater increase in PA and a greater decrease in NA, in depression compared to controls.

Inconsistencies in results to date might reflect differences in the measurement of NA and PA reactivity. While van Loo et al. (2023) and Heininga et al. (2019) measured reactivity as in-the-moment affect, others have measured it as the difference between momentary affect and an individual's mean affect (Bylsma et al., 2011). Further, some studies measured reactivity as the difference in affect between consecutive assessments (Khazanov et al., 2019; Thompson et al., 2012). Studies have also used the mean square successive difference (MSSD; Jahng et al., 2008) to measure temporal instability of affect i.e. an individual's mean magnitude difference in affect between consecutive assessments. Studies have shown that poorer well-being is associated with NA and PA temporal instability (Houben et al., 2015), and that greater NA instability predicts higher depression symptoms (Bowen et al., 2013; Sultson et al., 2024; Thompson et al., 2012) and greater suicidal ideation (Jeong et al., 2021). However, as the MSSD collapses affective instability across all activities into a subject-level mean, we argue that the within-subject examination of how specific activities impact temporal instability is not known (Dejonckheere et al., 2019).

Therefore, the first aim of this study was to examine how depression symptoms moderate the within-subject relationship between activities (specifically leisure and social company) affective reactivity, by measuring reactivity as the change in NA and PA between consecutive assessments. This method allows us to measure both the *magnitude* and *direction* of change between consecutive assessments, which we will call lag-1 fluctuations. So, a smaller magnitude of change, regardless of direction, would indicate a smaller fluctuation. In contrast, increases and decreases in PA, for example, would both indicate large fluctuations, but suggest elevated and lower mood, respectively. How NA and PA react to activities compared to a person's "general" experience is also unclear. Therefore, the second aim was to examine the within-subject relationship between activities (leisure and social company) and affective reactivity measured as the change in momentary NA and PA relative to the individual's mean affect. We examined if this was moderated by depression symptoms for leisure activities and social company separately.

To the best of our knowledge, no studies have examined the relationship between anhedonia symptoms and affective reactivity. Although Heininga and colleagues did include a group with both MDD and anhedonia, they reported mixed findings in PA reactivity when compared to controls (Heininga et al., 2019; Heininga et al., 2017) and did not examine the dimensional relationship between affect and anhedonia symptoms.

Taken together and in line with previous studies, we hypothesised:

Table 2
Lag-1 fluctuations in NA predicted by symptoms, and physical activities and company.

Table 2a: Physical Activities	Symptom			Symptom × Leisure		
Symptoms	β	SE	p	β	SE	p
MFQ	0.036	0.005	<0.001	−0.01	0.003	0.005
ASA Total	0.007	0.014	0.587	−0.011	0.005	0.025
Subscale 1 (Enjoyment, Excitement, and Emotional Flattening)	0.022	0.027	0.433	−0.024	0.009	0.01
Subscale 2 (Enthusiasm, Connection, and Purpose)	0.02	0.041	0.631	−0.035	0.022	0.114
Subscale 3 (Effort, Motivation, and Drive)	0.007	0.037	0.857	−0.026	0.016	0.105

Table 2b: Company	Symptom			Symptom × Social		
Symptoms	β	SE	p	β	SE	p
MFQ	0.032	0.005	<0.001	−0.004	0.004	0.215
ASA Total	0.006	0.014	0.687	−0.005	0.005	0.299
Subscale 1 (Enjoyment, Excitement, and Emotional Flattening)	0.021	0.028	0.462	−0.012	0.009	0.202
Subscale 2 (Enthusiasm, Connection, and Purpose)	0	0.041	0.995	0.002	0.023	0.914
Subscale 3 (Effort, Motivation, and Drive)	0.004	0.037	0.911	−0.019	0.016	0.229

Table 2: Outcome was lag-1 fluctuations in NA: was the difference between momentary NA and baseline of NA(t-1). Predictors were symptoms, and a) Physical activities (0 = Functional, 1 = Leisure), and b) Company (0 = Non-Social, 1 = Social).
Each symptom signifies a separate multilevel linear model, in which an interaction between Activities or Company, and Symptoms predicted the outcome. In each model, baseline and age were controlled. For ASA scale, depression symptoms (MFQ) were additionally controlled for.

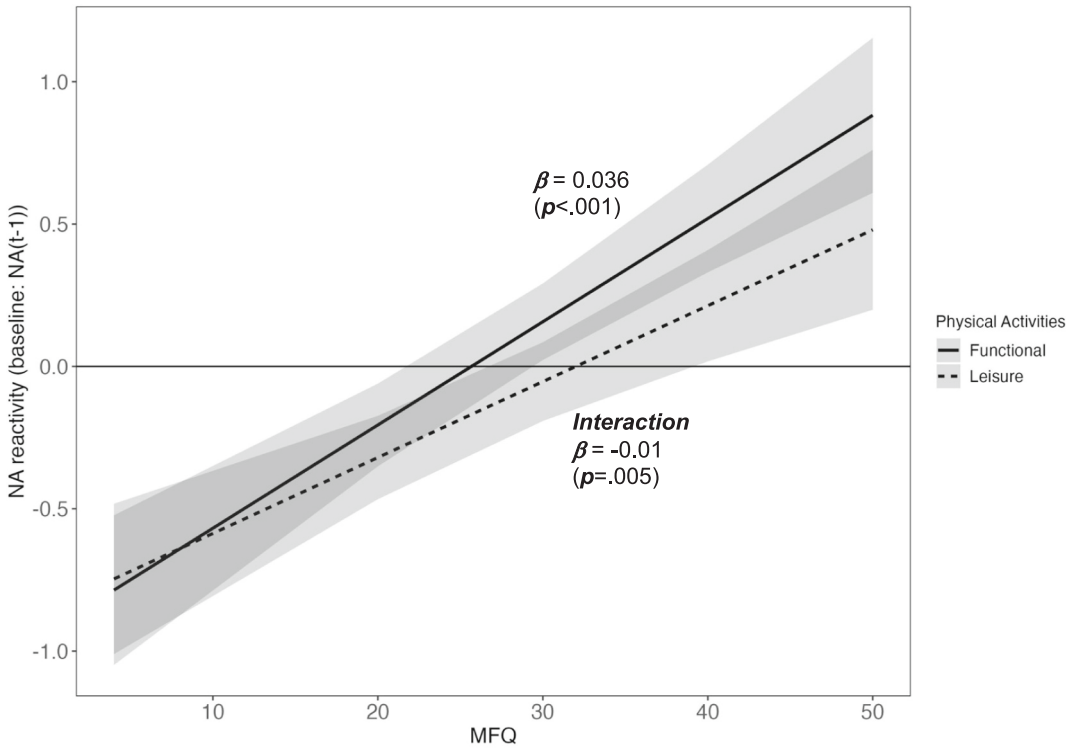

Fig. 1. Lag-1 Fluctuations in NA showing the interaction of Depression Symptoms and Physical Activities. Fig. 1**:** The slope of Leisure activities is shallower than Functional activities, showing smaller increases in NA between consecutive assessments when individuals with higher depression symptoms are engaged in Leisure activities. The shaded areas show standard error. The slopes (**β**) are reported from Table 2a, MFQ row; the slope for Leisure is the interaction effect (Symptom x Leisure, **β** = −0.01) and the slope for Functional is the main effect (Symptom, **β** = 0.036) (all p's < 0.01).

(H1) increased affective lag-1 fluctuations with increasing depression symptoms.

(H2) engaging in leisure activities and social company would lead to increases in PA and reductions in NA, relative to both baselines.

(H3) the increases in PA and reductions in NA when engaging in leisure activities and social company would be greater at higher depression symptoms, indicating an MB effect.

2. Methods

2.1. Sample

2426 questionnaires were collected from young people (N = 95), ages 16–25, with a range of depression symptoms, recruited from the local schools and universities. As compliance thresholds are recommended to be between 30 % and 60 % (Block et al., 2020; Das-Friebel et al., 2020; Edwards et al., 2018; Myin-Germeys et al., 2001), we set our threshold at 50 % (at least 21 out of 42 assessments completed), also in agreement with other reactivity studies (Heininga et al., 2019). This gave us a final sample size of 71 participants and a total dataset of 2177 EMA assessments.

The study adhered to ethical standards (Revised Helsinki declaration 2008) and was approved by the University of Reading Psychology Department Ethics Committee (REC no: 2021–120-CM). All participants provided written informed consent after reviewing the information sheets.

2.2. Patient & public involvement and piloting

Based on feedback from piloting sessions with young people, we revised the activity categories and allocated time for app troubleshooting in our study briefing sessions.

2.3. Baseline demographics

To assess depression symptoms, the Mood and Feelings Questionnaire (≥27 cut off for clinical depression) (MFQ; Costello and Angold, 1988) was used. The 33-item questionnaire has been shown to have excellent internal reliability in adolescents (Cronbach's α = 0.91 to 0.93) (Thabrew et al., 2018), where the scores range from 0 to 66 and higher scores indicating greater depression severity. It is a widely used and a validated questionnaire to examine depressive symptoms in young people.

To assess anhedonia symptoms, the Anhedonia Scale for Adolescents (ASA) was used, informed by qualitative interviews to specifically capture anhedonia in young people (Watson et al., 2021b). It contains 14 items rated on a four-point scale (0 = never, 1 = sometimes, 2 = often, 3 = always), and higher scores indicate more anhedonia symptoms. Scores range from 0 to 42. The total and subscales of ASA (1: Enjoyment, Excitement, and Emotional Flattening, 2: Enthusiasm, Connection, and Purpose, and 3: Effort, Motivation, and Drive) show good internal consistency (Cronbach's α = 0.79–0.94) and high test-retest reliabilities (ICC = 0.73–0.78) (Watson et al., 2021b). ASA subscale 2 was reverse-coded.

2.4. EMA procedure

The experimenter met with each participant to brief them on the app. Participants were then required to log on and fill in their age, gender, ethnicity and the Mood and Feelings Questionnaire (MFQ; Costello and Angold, 1988) and Anhedonia Scale for Adolescents (ASA; Watson et al., 2021) questionnaires. EMA assessments began the next day. Participants were asked to respond to each assessment as soon as possible, otherwise they would expire.

We used the Psymate2 app (https://www.psymate.eu/) where the EMA questionnaires were delivered as notifications to participants. We

Table 3
NA reactivity predicted by symptoms, and physical activities and company.

Table 3a: Physical Activities	Symptom			Symptom × Leisure		
Symptoms	β	SE	p	β	SE	p
MFQ	0.004	0.002	0.099	−0.007	0.003	0.014
ASA Total	0.004	0.004	0.404	−0.006	0.004	0.136
Subscale 1 (Enjoyment, Excitement, and Emotional Flattening)	0.004	0.008	0.659	−0.013	0.008	0.086
Subscale 2 (Enthusiasm, Connection, and Purpose)	0.017	0.014	0.244	−0.022	0.018	0.231
Subscale 3 (Effort, Motivation, and Drive)	0.009	0.012	0.421	−0.012	0.013	0.362

Table 3b: Company	Symptom			Symptom × Social		
Symptoms	β	SE	p	β	SE	p
MFQ	0.002	0.002	0.32	−0.005	0.003	0.043
ASA Total	0.002	0.004	0.582	−0.005	0.004	0.191
Subscale 1 (Enjoyment, Excitement, and Emotional Flattening)	0.003	0.008	0.717	−0.01	0.008	0.171
Subscale 2 (Enthusiasm, Connection, and Purpose)	0.008	0.014	0.558	−0.01	0.018	0.595
Subscale 3 (Effort, Motivation, and Drive)	0.008	0.012	0.513	−0.018	0.013	0.158

Table 3: Outcome was NA reactivity: the difference between momentary NA and baseline of mean NA. Predictors were symptoms, and a) Physical activities (0 = Functional, 1 = Leisure), and b) Company (0 = Non-Social, 1 = Social).
Each symptom signifies a separate multilevel linear model, in which an interaction between Activities and Symptoms predicted the outcome. In each model, baseline and age were controlled. For ASA scale, depression symptoms (MFQ) were additionally controlled for.

collected data 7 times a day, between 8:30 am and 10 pm, for 6 days, during the period July 2022 to Oct 2023. There was at least 45 min delay between each semi-random assessment which took ~1 min to complete and expired after 20 min. This sampling frequency and questionnaire design has been shown to encourage compliance and reduce burden in young people and those with mood disorders (Eisele et al., 2022; Myin-Germeys et al., 2018; van Roekel et al., 2019; Wrzus and Neubauer, 2023). We contacted participants on days 2 and 5 to check that they were receiving notifications and to troubleshoot any problems.

At the end of the study, we collected app user experiences and participants were debriefed and advised that if concerned about their mood to contact their GP or the mental health charity the Samaritans.

2.5. EMA assessments

We adapted the EMA protocol developed by Edwards et al. (2018) (Supplementary Methods for more details). In seven assessments per day for six days, participants reported their mood by rating "Right now, I feel […]" statements using a Likert scale, ranging from 1 (not at all) to 7 (very much). We operationalised PA and NA by covering both high and low arousal states of emotions on the affective circumplex (Russell, 1980), consistent with previous studies (Heininga et al., 2019; Heininga et al., 2017; Thompson et al., 2012; Wong et al., 2024). The selected items were: PA (high arousal: *cheerful, enthusiastic;* low arousal: *relaxed, satisfied*) and NA (high arousal: *annoyed, anxious;* low arousal: *ashamed, down*). The mean of these ratings per assessment represented the measure of momentary PA and NA. Participants also reported their current activities, selecting from multiple options for physical (Relaxing, Other Leisure Activities, Exercising, Work/School, Studying, Chores, Shopping, Hygiene, Eating/Drinking, Travelling) and social (Partner, Friends, Family, Alone) contexts. We categorised Relaxing, Other Leisure Activities and Exercising as "Leisure" and the rest as "Functional" physical activities, and we categorised Alone as "Non-Social", and the rest in the "Social" category.

2.6. Analysis

We prepared EMA data for analysis using *esmpack* in R (https://wviechtb.github.io/esmpack/). From this, we presented the percentage of assessments engaged in each physical and social activity in pie charts, representing the split between Functional and Leisure activities, and Social and Non-social company.

To examine how affective reactivity is predicted by symptoms and activities, we measured reactivity as the change in momentary PA and NA, and ran separate multilevel linear models with it as the outcome. The change was measured relative to two baselines as used in prior studies: affect at the previous assessment (or, t-1) (Vaessen et al., 2019) and within-subject mean affect (Kuranova et al., 2020). Both baselines provide the direction of change, affect (t-1) provides a measure of lag-1 fluctuation of affect and mean affect represents affective reactivity.

In the multilevel linear models, Level 2 predictors were depression and anhedonia symptoms, and Level 1 predictors were the categories of physical activities (0 = Functional, 1 = Leisure) and company (0 = Non-Social, 1 = Social), and incorporated subject-level random intercepts. Each model included the interaction between activities/company and symptoms, and was controlled for age and baseline affect as covariates. Additionally, we controlled for depression symptoms as a covariate in the models where ASA subscales were predictors, to isolate the relationship with anhedonia symptoms. 1.5 % of all EMA assessments were incomplete. The data of these questionnaires was removed when running the multilevel models using the *lmer* function. These analyses were used to assess hypotheses H1–H3.

Visual representation of how of the results are interpreted are described in Fig. S2. Graphs show the interaction between symptom and activity/company with the shaded area representing the 95 % confidence interval.

Lastly, to assess if the inertia of NA and PA drive their reactivity to Leisure activities and Social company, we ran the same multilevel models as above but also controlling for inertia. Inertia captures the *trend* of affective change between assessments. To examine if inertia of affect from the previous timepoint is responsible for affective reactivity at the current timepoint, instead of the activity being engaged in, we chose to control for inertia as a covariate. For details, see Supplementary Methods.

3. Results

3.1. Participants

In a final sample size of 71 participants (mean age 20 yrs), we observed a mean compliance of 73 % (Table 1). Participants had low (N = 19, MFQ ≤ 16), moderate (N = 13, 16 < MFQ < 27) and high depression symptoms (N = 39, MFQ ≥ 27).

3.2. Leisure activities and social company in young people

Leisure (relaxing, exercising and other leisure activities) and social (partner, friends and family) were ~ 50 % of all activities that young people engaged in during the study period (Fig. S1).

H1. Greater affective Lag-1 fluctuations at higher depression symptoms.

Our hypothesis was confirmed as MFQ predicted greater increases in NA (Table 2; β = 0.032 and 0.036, p's < 0.001) and greater decreases in PA (Table S1), relative to the baseline of affect (t-1) across all activities

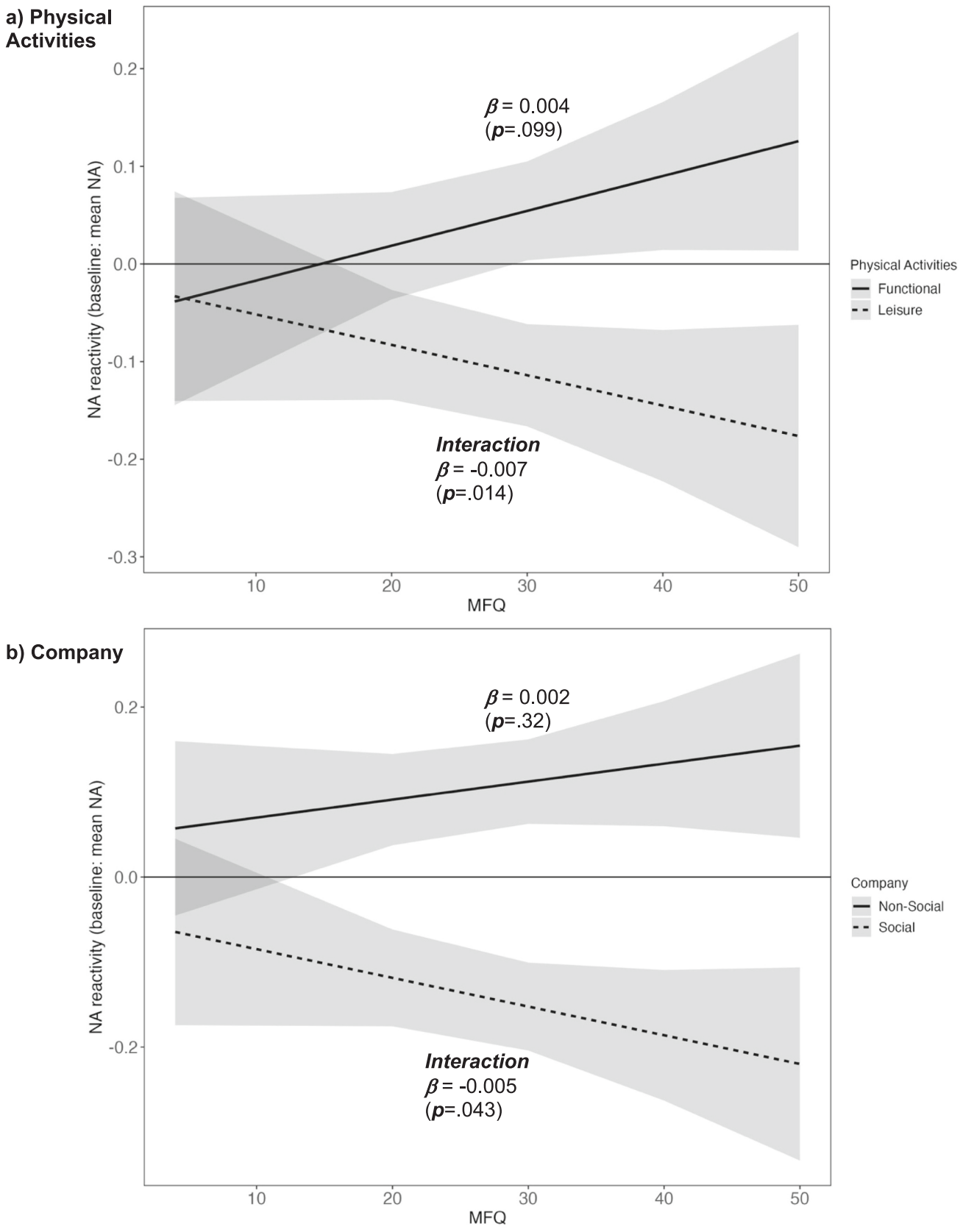

Fig. 2. NA reactivity showing an interaction of Depression Symptoms and Physical Activities and Company. Fig. 2**:** When engaged in Physical activities (a) and Company (b), the significant interaction shows greater decreases below baseline in NA at higher depression symptoms. The shaded areas show standard error. The slopes (**β**) are reported from MFQ row, Table 3a for Physical activities and **3b** for Company. Main effects were non-significant (Functional & Non-Social, $p > .05$), but interaction effects were significant (Leisure & Social, $p < .05$).

and social company. Further, ASA total and subscales predicted decreasing PA.

H2. Leisure activities and Social company predict a decrease in NA and an increase in PA.

This hypothesis was confirmed relative to the both baselines, affect (t-1) (Table S2a) and mean affect (Table S2b). All results indicate elevated mood.

H3. The MB effect of Leisure activities and Social company would be driven by both PA and NA reactivity.

Our findings partially confirm this hypothesis as they demonstrate that the MB effect was driven by NA reactivity. No interactions were observed for PA reactivity for either baseline affect (t-1) (Table S1) or mean affect (Table S3).

We found a negative interaction between leisure activities and MFQ (Table 2a; $\beta = -0.01$, $p = .005$) with the baseline NA(t-1). Together with the main effect of MFQ ($\beta = 0.036$, $p < .001$), this indicates a shallower slope when engaged in leisure activities, compared to functional activities (Fig. 1). This suggests smaller increases in NA, and therefore smaller lag-1 fluctuations, at higher depression symptoms when engaged in leisure activities, compared to functional activities.

Further, we found a negative interaction between leisure activities and anhedonia symptoms, specifically we found (ASA Subscale 1, Table 2a; $\beta = -0.024$, $p = .01$), larger reductions in NA between consecutive assessments at higher anhedonia symptoms.

For the baseline of mean NA, negative interactions of MFQ with both Leisure activities (Table 3a; $\beta = -0.007$, $p = .014$) and Social company (Table 3b; $\beta = -0.005$, $p = .043$) were observed. This suggests that engaging in Leisure activities (Fig. 2a) and Social company (Fig. 2b) is associated with greater reductions in NA, below mean NA, at higher depression symptoms.

3.3. Inertia

When controlling for inertia, all results for reactivity and lag-1 fluctuations were similar to previous models without inertia (Tables S4–7). This indicates that changes in affect in response to activities is not due to the inertia of NA and PA.

4. Discussion

This study is the first to examine real life affective reactivity to leisure activities and social company in young people with depression and anhedonia symptoms.

In line with our hypothesis (H1), we found larger affective lag-1 fluctuations with increasing depression symptoms. This is consistent with studies showing greater NA instability associated with higher depression symptoms when measuring the mean *magnitude* of change between consecutive assessments using MSSD (Bowen et al., 2013; Jahng et al., 2008; Sultson et al., 2024; Thompson et al., 2012). We extend this by showing the temporal *direction* of change, i.e., greater increases in NA and greater decreases in PA between consecutive timepoints in those with higher depression symptoms. Further, we show for the first time that higher anhedonia symptoms predict greater decreases in PA between consecutive timepoints, in line with the role of positive processing as a mechanism that underpins anhedonia (Ma et al., 2025).

Regards hypothesis (H2), we found leisure activities and social company predict increases in PA and decreases in NA, compared to both the affect at the previous timepoint and mean affect. Thus, we show that doing enjoyable activities or being social can boost mood within a short timeframe (i.e. change from t-1), and above general mood experiences. This may underpin the well-established protective effects of leisure (Bone et al., 2022; Chen et al., 2012; Harvey et al., 2010; Lin et al., 2008; Mikkelsen et al., 2010) and social company (Campbell et al., 2022; Panaite et al., 2021; Pemberton and Tyszkiewicz, 2016) against depression symptoms.

The hypothesis for H3 was partially confirmed, in that the MB effect of leisure and social company was driven by NA reactivity. We found that leisure activities reduce the increase in NA between consecutive assessments at higher depression symptoms, indicating smaller lag-1 fluctuations. As higher NA instability, as measured by MSSD, is shown to predict higher depression symptoms (Bowen et al., 2013; Sultson et al., 2024; Thompson et al., 2012), our study is the first to demonstrate that leisure activities could reduce depression symptoms by reducing NA fluctuations. Further, we show that leisure and social company reduce NA, below mean NA, at higher depression symptoms.

Unlike van Loo et al. (2023), we did not find that PA reactivity underpins the MB effect of social company. However, van Loo et al. recruited a sample of over 400 adults and had double the number of people with depression and anxiety symptoms as we had in our study. This suggests that future studies with larger samples with depression symptoms are needed before firm conclusions can be drawn on the role of PA in the MB effect of social company in depression.

Depressed individuals show greater increases in NA to events appraised as being 'stressful' (van der Stouwe et al., 2019; van Winkel et al., 2015; Wong et al., 2024) and to negative interpersonal social events (Parris et al., 2011; Sheets and Armey, 2020). As negative biases are considered a major player in maintaining depression (Beck, 1967; Beck, 2008), our findings are consistent, showing that NA is the more reactive component of mood in depression. Further, our results are promising, as they show that the moderation of NA by leisure and social company could be a mechanism by which these activities improve mood.

An interesting finding was that higher anhedonia (*lower Enjoyment, Excitement, and higher Emotional Flattening*) predicted larger decreases in NA between consecutive assessments when engaged in leisure activities. This supports findings from brief BA treatments, where young people reported that engaging in activities despite low motivation was helpful, as it led to enjoyment and shifted their associations from negative to positive emotions (Watson et al., 2021a).

A limitation of our study is that most participants were female, future studies should include more males. Further, leisure and social company in this study was from predetermined categories, future studies could employ open ended answers to ascertain more precisely activities being engaged in. Although some participants met the criteria for clinical depression, we examined how MB effects change over a range of symptoms. Therefore, future studies could also examine MB effects in patients with chronic depression. Now that we have taken the first step to identify interactions between context and symptoms as predictors of affective reactivity, future studies could also examine if symptoms differentially predict affective reactivity.

Taken together, our results support encouraging young people with depression and anhedonia symptoms to engage in leisure activities and to seek out enjoyable social company as this could improve their mood.

CRediT authorship contribution statement

Angad Sahni: Conceptualization, Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. **Ciara McCabe:** Supervision, Project administration, Conceptualization, Funding acquisition, Methodology, Writing – review & editing, Writing – original draft.

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Declaration of competing interest

The authors report no conflicts of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jad.2025.121020.

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