Affective Science
https://doi.org/10.1007/s42761-023-00225-x

RESEARCH ARTICLE

Variety in Pleasant Activities is Associated with Improved Mental Health: Evidence from Two National Samples of U.S. Adults

Anthony D. Ong[1,2] · **Soomi Lee**[3]

Received: 29 June 2023 / Accepted: 29 October 2023

Abstract

Engaging in a wide range of pleasant activities may provide mental health benefits, particularly for those genetically predisposed to depression. This study examined associations between pleasant activity variety, mental health, and genetic vulnerability in two U.S. cohort studies ($N = 2{,}088$). Participants reported depressive symptoms, mental healthcare visits, and engagement in pleasant activities over the past month. Greater variety of pleasant activities was associated with fewer depressive symptoms in both study samples. Individuals engaging in more diverse pleasant activities also had fewer mental health visits. Individuals with a higher genetic risk for depression experienced a stronger negative association between variety of pleasant activities and depressive symptoms compared to those with a lower genetic risk. These results highlight the potential of diverse pleasant activities as a means to enhance well-being, particularly among individuals genetically susceptible to depression.

Keywords Pleasant activities · Depression · Variety · Mental health · Genetic risk

Depression is a widespread and debilitating mental condition affecting millions worldwide. A core facet of behavioral activation therapy (BA), proven effective for depression, involves scheduling and engaging in pleasurable activities (Lewinsohn & Graf, 1973; Manos et al., 2010). Meta-analyses consistently demonstrate that increasing pleasant activities enhances mood and reduces depressive symptoms (Cuijpers et al., 2007; Ekers et al., 2014; Mazzucchelli et al., 2009). Additionally, naturalistic studies reveal that depressed individuals report greater decreases in negative affect than controls when responding to daily positive events (Bylsma et al., 2011; Peeters et al., 2003; Thompson et al., 2012).

While previous research on pleasant activities and depression has primarily focused on the intensity or frequency of positive events, another potentially relevant aspect of mental health is the variety or diversity of positive experiences. Variety refers to an individual's participation in different types of pleasant activities across diverse contexts. Greater variety may benefit well-being by satisfying needs for novelty and stimulation, enhancing interest, curiosity, and learning (Bagheri & Milyavskaya, 2020; Sheldon et al., 2013). Exposure to varied situations requiring flexibility and creativity can also build resilience (Kashdan & Rottenberg, 2010; Lee et al., 2018, 2021). Variety may further counteract habituation and boredom, frequent barriers to pleasant activities (Kashdan & Silvia, 2009; Lyubomirsky & Layous, 2013).

Despite the theoretical importance of variety for mental health, its empirical significance for depression has been largely overlooked. The present study addresses this gap by examining the association between variety of pleasant activities, depressive symptoms, and mental healthcare utilization in two large, nationally representative samples of U.S. adults. We hypothesized that greater variety in pleasant activities would be associated with lower depressive symptoms and less mental health care use. We also examined whether these associations would be moderated by polygenic risk for depression (Wray et al., 2018). Polygenic risk represents the cumulative effect of multiple genetic variants associated with a trait or disorder (Wray et al., 2021). Previous research has demonstrated that polygenic risk for depression correlates with increased depressive symptoms

Handling Editor: Shigehiro Oishi

✉ Anthony D. Ong
anthony.ong@cornell.edu

[1] Department of Psychology, Cornell University, Ithaca, NY 14853-4401, USA

[2] Division of Geriatrics and Palliative Medicine, Weill Cornell Medical College, New York City, NY, USA

[3] Department of Human Development and Family Studies, The Pennsylvania State University, State College, PA, USA

Published online: 28 November 2023

and a heightened risk for major depressive disorder (MDD) (Halldorsdottir et al., 2019; Mitchell et al., 2021; Musliner et al., 2015). However, whether environmental or behavioral factors interact with polygenic risk on depression outcomes remains unclear. We hypothesized that the associations of greater variety in pleasant activities with lower depressive symptoms and less mental health care use would be stronger for those with higher genetic vulnerability to depression.

Method

Participants and Procedure

Data were drawn from two independent samples of the Midlife in the United States Survey (MIDUS): MIDUS II (2004–2009) and MIDUS Refresher (2012–2016). MIDUS is a longitudinal study of health and well-being among U.S. adults aged 25 to 74 (Ryff & Krueger, 2018). MIDUS II was a follow-up of the original MIDUS I sample collected between 1995 and 1996. MIDUS Refresher was a new sample recruited between 2012 and 2016 to refresh and expand the MIDUS study by including younger cohorts and more racial minorities (Kirsch & Ryff, 2016; Surachman et al., 2019). For this study, we used sub-samples of MIDUS II and Refresher (M2 and MR) who participated in both the main survey and the biomarker study.

During the M2 phase, 1,255 individuals who completed the main survey were invited to participate in the biomarker study. After excluding those who did not provide data on positive events ($n=6$) or the mental health outcomes used in this study ($n=16$), the final analytic sample for M2 included 1,233 individuals. During the MR phase, 863 individuals were invited to participate in the biomarker study. After excluding those who did not provide data on positive events ($n=3$) or mental health outcomes ($n=5$), the final analytical sample for the MR consisted of 855 individuals.

An a priori power analysis using G*Power (Faul et al., 2007) determined our samples had adequate power to detect small-medium effects in multiple regression models with up to 15 predictors (80% power, $\alpha=.05$). Specifically, assuming a small-medium effect size of 0.04 and 15 predictors, the required minimum sample size was 797. Our final samples of 1,233 (MIDUS II) and 855 (MIDUS Refresher) exceeded this threshold. The MIDUS Institutional Review Board approved the protocol.

Measures

Depressive Symptoms

Depressive symptoms were assessed using the Center for Epidemiologic Studies Depression Inventory (CESD; Radloff, 1977), a widely used self-report measure of depressive symptomatology. The CESD consists of 20 items summed together, four of which are reverse coded, asking about the frequency of symptoms on a scale of 0 (rarely or none of the time) to 3 (most or all of the time) during the past week ($\alpha=0.90$). Higher scores indicate more depressive symptoms.

Mental Healthcare Use

Mental healthcare use was assessed by asking participants how many times they saw each of the following professionals in the past 12 months about a problem with their emotional, mental health, or personal problems: (a) a psychiatrist, (b) a general practitioner or medical doctor, (c) a professional counselor or psychologist, and (d) a spiritual advisor (e.g., minister, priest, rabbi, or other). The total number of times seeing mental health professionals was calculated by summing the responses to the four items for cases with at least one valid response.

Variety in Pleasant Activities

Pleasant activities were assessed using the 49-item Positive Events Scale (Macphillamy & Lewinsohn, 1982), a widely used measure of pleasant activities that has been shown to be sensitive to changes in mood and behavior in clinical and nonclinical populations (Dimidjian et al., 2011; Manos et al., 2010). Items include activities typically considered positive (e.g., planning vacations, seeing old friends, and appreciating nature). Participants were asked to indicate how often during the past month they had each experience ("frequency" score, rated on a 3-point scale; never, 1–6 times, or greater than 7 times) and whether the experiences were pleasant, enjoyable, or rewarding ("impact" score, rated on a 3-point scale; neutral or unpleasant, somewhat, very pleasant). Several steps were taken to create a variety score for pleasant activities. In Step 1, we created binary indicators of engaged activities (frequency > never) for all 49 activities. In Step 2, we identified a list of activities that were rated by the participant as very pleasant. In Step 3, we summed the binary indicators of the engaged activities that were rated as very pleasant. This sum score represented the variety of pleasant activities, with higher scores indicating greater variety.

Covariates

Sociodemographic, frequency of pleasant activities, personality, and behavioral characteristics related to mental health (Urban-Wojcik et al., 2022) were included as covariates. These included age (in years), sex (0 = female, 1 = male), race (0 = non-White, 1 = White), education (1 = no school/some grade school to 12 = Ph.D. or other professional degree), Big 5 personality traits (openness,

conscientiousness, extraversion, agreeableness, and neuroticism), and use of antidepressants (0 = no, 1 = yes). The frequency score was calculated by summing the total number of activities endorsed by participants as occurring at least once over the past month. In addition, we adjusted models for the total number of chronic physical health conditions that participants had experienced in the past 12 months. From a checklist of 30 items (e.g., asthma, high blood pressure, and ulcer), we excluded three items not related to chronic physical conditions: (1) anxiety, depression or some other emotional disorder, (2) alcohol or drug problems, and (3) chronic sleeping problems (Keyes, 2005) The total number of chronic physical conditions was calculated by summing the conditions experienced in the past 12 months, with a higher score indicating a greater number of chronic physical health problems during that period. Lastly, we adjusted for the sample identifier (Milwaukee vs. non-Milwaukee) to account for potential differences between the two subsamples. Continuous covariates were centered on sample means.

Statistical Analysis

We used descriptive statistics to compare the characteristics of the two samples (M2 and MR) and test for sample differences in all variables used in this study. We used general linear regression models with PROC GLM in SAS 9.4 to test our hypotheses regarding the association of variety in pleasant activities with depressive symptoms, adjusting for covariates. For effect size comparison, we estimated standardized and unstandardized betas. For mental health care use outcome (i.e., the number of times seeing mental health professionals), we used zero-inflated Poisson models with PROC GENMOD in SAS to account for overdispersed data due to excess zero counts. This model estimates the likelihood of non-occurrence (zeros) and the count frequency among those with the risk of occurrence (non-zeros). We included standardized predictors to estimate the change in event rate ratios (RR) by one SD increase in each predictor. Analyses controlled for engaged activity frequency, allowing examination of variety's unique effects beyond general participation. Models were run separately per sample.

To test whether polygenic risk for depression moderated the association between variety in pleasant activities and depressive symptoms, we conducted analyses using a combined sample (M2 + MR) of participants with polygenic risk scores (PRS) for depression based on DNA samples. DNA was extracted from tissue samples (whole blood, saliva) from a subset of our M2 and MR Biomarker participants and then genotyped using the Illumina Omni Express array. PRS were only calculated for individuals of predominantly European descent due to ancestry confounding present in non-European data. In our sample, 1,179 participants had calculated PRS for depression. Information about MIDUS's genotype calling, DNA collection methods, and calculation of PRS is reported in detail elsewhere (Cuevas et al., 2021). We used general linear regression models with PROC GLM in SAS to test for the interaction between variety in pleasant activities and PRS for depression on depressive symptoms, adjusting for five ancestry component scores and other covariates.

While all participants provided data on variety in pleasant activities and mental health outcomes, some had incomplete covariate data. In M2, missing data resulted from omitted race ($n = 1$), education ($n = 2$), personality ($n = 30$), and antidepressant use ($n = 113$). In MR, there were cases with incomplete data due to missing race ($n = 5$), education ($n = 1$), personality ($n = 7$), and antidepressant use ($n = 93$). In both samples, most of the missingness was due to missingness in the antidepressant medications, which may not be desirable to impute. Thus, these missing cases were excluded from the analyses.

Results

Table 1 displays the descriptive statistics and sample differences. M2 participants ($n = 1{,}233$; 43% men) ranged in from 35–86 years ($M = 57$). MR participants ($n = 855$; 48% men) ranged 26–78 ($M = 52$). Compared to M2, the MR sample had more men, younger ages, greater education, more diversity, higher neuroticism, and lower agreeableness. Of the 49 potential positive events surveyed, 27 were endorsed as 'very pleasant' in the past month. No significant differences between the two samples emerged in variety of activities or mental health outcomes, but M2 showed slightly higher activity frequency. Supplemental Table 1 shows correlations among all study variables, separately in M2 (below diagonal) and MR (above diagonal). All the correlations were in the expected directions and moderate in strength. Variance inflation factor (VIF) for variety in pleasant activities was 1.79 in M2 and 1.83 in MR, and VIFs for covariates were ranged from 1.08 to 2.67, indicating acceptably low multicollinearity.

Variety of Pleasant Activities, Depressive Symptoms, and Mental Health Care Use

Table 2 presents results from general linear models that examine the association between variety in pleasant activities and depressive symptoms. In both samples, greater variety in pleasant activities was associated with lower levels of depressive symptoms after adjusting for all covariates (M2: $\beta = -0.24$, $p < .001$; MR: $\beta = -0.26$, $p < .001$). The effect size of variety was comparable to that of neuroticism, the strongest predictor of depressive symptoms in both samples.

Table 1 Descriptive Characteristics of M2 and MR Samples

	MIDUS II ($n=1,233$)		MIDUS Refresher ($n=855$)		Diff Test[2]	*p*-value
	M or %	(*SD*)	*M* or %	(*SD*)		
Demographic and Heath Covariates						
Age	57.32	(11.53)	52.68	(13.43)	8.22	<.001
Gender, Male	43%		48%		4.71	.030
Race, White	79%		71%		17.66	<.001
Education	7.49	(2.53)	8.14	(2.44)	-5.92	<.001
Openness	2.97	(0.53)	3.01	(0.52)	-2.03	.042
Conscientiousness	3.38	(0.46)	3.34	(0.50)	1.68	.094
Extraversion	3.14	(0.57)	0.09	(0.61)	1.71	.088
Agreeableness	3.43	(0.51)	3.34	(0.53)	3.86	<.001
Neuroticism	2.04	(0.64)	2.11	(0.66)	-2.18	.030
Using antidepressants (vs. no)	16%		17%		0.86	.355
Number of chronic physical conditions	2.11	(2.12)	1.98	(2.13)	1.33	.184
Milwaukee sub-sample (vs. not)	15%		13%		1.68	.195
Polygenic risk score (PRS) of depression[1]	-0.30	(0.99)	-0.31	(0.99)	0.15	.880
Main Variables						
Variety in pleasant activities	27.02	(10.82)	26.21	(10.86)	1.69	.091
Frequency of engaged activities	41.93	(5.69)	41.38	(5.89)	2.13	.033
Depressive symptoms	8.67	(8.14)	9.22	(7.87)	-1.55	.121
# of times mental health professionals	2.46	(10.38)	2.91	(9.71)	-1.01	.314

M2 MIDUS 2, *MR* MIDUS Refresher.[1] PRS data were available on sub samples ($n=618$ in M2, $n=561$ in MR). [2] T-tests were used for continuous variables; Chi-square tests were used for categorical variables

Table 2 Associations between variety in pleasant activities and depressive symptoms in M2 and MR samples

	MIDUS II ($n=1,233$)					MIDUS Refresher ($n=855$)				
	B	*SE*	*p*-value	95% CI	β	*B*	*SE*	*p*-value	95% CI	β
Intercept	8.93	0.79	<.001	[7.39, 10.47]	0.00	10.27	0.63	<.001	[9.03, 11.52]	0.00
Variety in pleasant activities	-0.18	0.02	<.001	[-0.23, -0.14]	-0.24	-0.20	0.03	<.001	[-0.25, -0.14]	-0.26
Frequency of engaged activities	-0.19	0.04	<.001	[-0.27, -0.11]	-0.13	-0.09	0.05	.053	[-0.19, 0]	-0.07
Age	-0.04	0.02	.019	[-0.08, -0.01]	-0.06	-0.07	0.02	<.001	[-0.11, -0.04]	-0.12
Gender: Male (vs. female)	-0.42	0.41	.302	[-1.23, 0.38]	-0.03	-0.85	0.50	.088	[-1.82, 0.13]	-0.05
Race: White (vs. non-White)	-0.69	0.79	.389	[-2.24, 0.87]	-0.03	-1.15	0.64	.076	[-2.41, 0.12]	-0.06
Education	-0.11	0.08	.160	[-0.27, 0.04]	-0.03	-0.29	0.10	.005	[-0.5, -0.09]	-0.09
Openness	0.60	0.45	.190	[-0.3, 1.49]	0.04	1.77	0.53	.001	[0.72, 2.81]	0.11
Conscientiousness	-2.05	0.46	<.001	[-2.95, -1.15]	-0.11	-1.06	0.52	.042	[-2.07, -0.04]	-0.06
Extraversion	-1.30	0.44	.003	[-2.18, -0.43]	-0.09	-1.87	0.47	<.001	[-2.8, -0.94]	-0.14
Agreeableness	0.47	0.48	.324	[-0.46, 1.4]	0.03	0.84	0.55	.129	[-0.24, 1.92]	0.06
Neuroticism	3.77	0.33	<.001	[3.11, 4.42]	0.29	3.52	0.39	<.001	[2.76, 4.27]	0.28
Using antidepressants (vs. no)	1.88	0.54	.001	[0.82, 2.94]	0.08	1.22	0.63	.052	[-0.01, 2.45]	0.06
Number of chronic physical conditions	0.56	0.10	<.001	[0.37, 0.75]	0.14	0.60	0.12	<.001	[0.37, 0.83]	0.16
Milwaukee sub-sample (vs. not)	1.56	0.93	.095	[-0.27, 3.39]	0.06	1.38	0.88	.118	[-0.35, 3.1]	0.06
Fit Statistics										
F test	57.36		<.001			37.34		<.001		

M2 MIDUS 2, *MR* MIDUS Refresher. $n=1,092$, 750 were used in the M2 and MR models, respectively, due to missing values in covariates. The primary variable of interest is grey highlighted

Table 3 presents results from zero-inflated Poisson models that examine the association between variety in pleasant activities and the number of times seeing mental health professionals. Among those who had any visits to mental health professionals (non-zeros), higher variety in pleasant activities was associated with 17% fewer visits in M2 ($RR = 0.83$, 95% CI = [0.79, 0.87], $p < .001$), but not in MR ($RR = 0.96$, 95% CI = [0.91, 1.01], $p = .131$).

Moderation by Genetic Risk for Depression

To examine whether the association between variety in pleasant activities and depressive symptoms was moderated by genetic risk for depression, we conducted analyses using a combined sample (M2 + MR) of participants who had calculated PRS for depression based on their DNA samples. The results showed a significant interaction between variety in pleasant activities and PRS for depression on depressive symptoms ($B = -0.04$, $SE = 0.02$, $p = 0.039$) after adjusting for five ancestry component scores and the frequency of engaged activities. Figure 1 depicts the results of simple slope tests. The negative association between variety in pleasant activities and depressive symptoms was stronger for those with higher PRS for depression (+1 *SD*; *slope estimate* = -0.28, $SE = 0.03$, $p < .001$) than those with lower PRS for depression (-1 *SD*; *slope estimate* = -0.20, $SE = 0.03$, $p < .001$). This moderation effect remained significant after controlling for all other covariates ($B = -0.04$, $SE = 0.02$, $p = .037$) (see Table 4). No moderation emerged for mental health visits ($B = -0.03$, $SE = 0.02$, $p = .109$).

Discussion

This study examined associations between variety in pleasant activities, depressive symptoms, and healthcare use across two nationally representative U.S. adult samples. Greater variety related to fewer depressive symptoms in both samples, even after adjusting for confounds. Variety in pleasant activities was also associated with less mental healthcare use in one sample. Furthermore, variety in pleasant activities had a stronger negative association with depressive symptoms for those with higher polygenic depression risk.

The findings align with previous evidence that positive events benefit mental health (Lyubomirsky & Layous, 2013; Peeters et al., 2003) and further suggest that variety of positive experiences play a crucial role in reducing depressive symptoms and care use. Engaging in a variety of pleasant activities may promote psychological well-being by satisfying the need for novelty and stimulation, fostering resilience and adaptive coping, and

Table 3 Associations between variety in pleasant activities and number of visits to mental health professionals in M2 and MR samples

	MIDUS II ($n = 1,233$)			MIDUS Refresher ($n = 855$)		
	RR	95% CI	*p*-value	RR	95% CI	*p*-value
Variety in pleasant activities	0.83	[0.79, 0.87]	< .001	0.96	[0.91, 1.01]	.131
Frequency of engaged activities	0.94	[0.91, 0.98]	.005	1.00	[0.95, 1.05]	.857
Age	0.90	[0.86, 0.94]	< .001	0.83	[0.79, 0.87]	< .001
Gender: Male (vs. female)	0.73	[0.66, 0.79]	< .001	0.85	[0.77, 0.94]	.002
Race: White (vs. non-White)	1.28	[1.09, 1.5]	.003	1.14	[1.02, 1.29]	.023
Education	1.22	[1.17, 1.27]	< .001	0.98	[0.93, 1.02]	.329
Openness	1.34	[1.28, 1.41]	< .001	1.19	[1.14, 1.26]	< .001
Conscientiousness	0.85	[0.82, 0.88]	< .001	0.82	[0.78, 0.86]	< .001
Extraversion	0.75	[0.71, 0.78]	< .001	0.90	[0.85, 0.94]	< .001
Agreeableness	1.14	[1.09, 1.2]	< .001	1.02	[0.96, 1.07]	.544
Neuroticism	1.13	[1.08, 1.18]	< .001	1.13	[1.08, 1.18]	< .001
Using antidepressants (vs. no)	1.12	[1.02, 1.22]	.012	2.20	[2.02, 2.4]	< .001
Number of chronic physical conditions	1.15	[1.11, 1.19]	< .001	1.00	[0.97, 1.03]	.972
Milwaukee sub-sample (vs. not)	1.65	[1.38, 1.97]	< .001	1.56	[1.35, 1.81]	< .001
Fit Statistics						
log *L*	2708.06			3102.53		
AIC	6303.99			4493.79		

M2 MIDUS 2, *MR* MIDUS Refresher. $n = 1,092$, 750 were used in the M2 and MR models, respectively, due to missing values in covariates. The primary variable of interest is grey highlighted. The *RR*s (event Rate Ratios) were estimated based on standardized betas and for participants who had any heart trouble (non-zeros) after taking into account the risk of excessive zeros

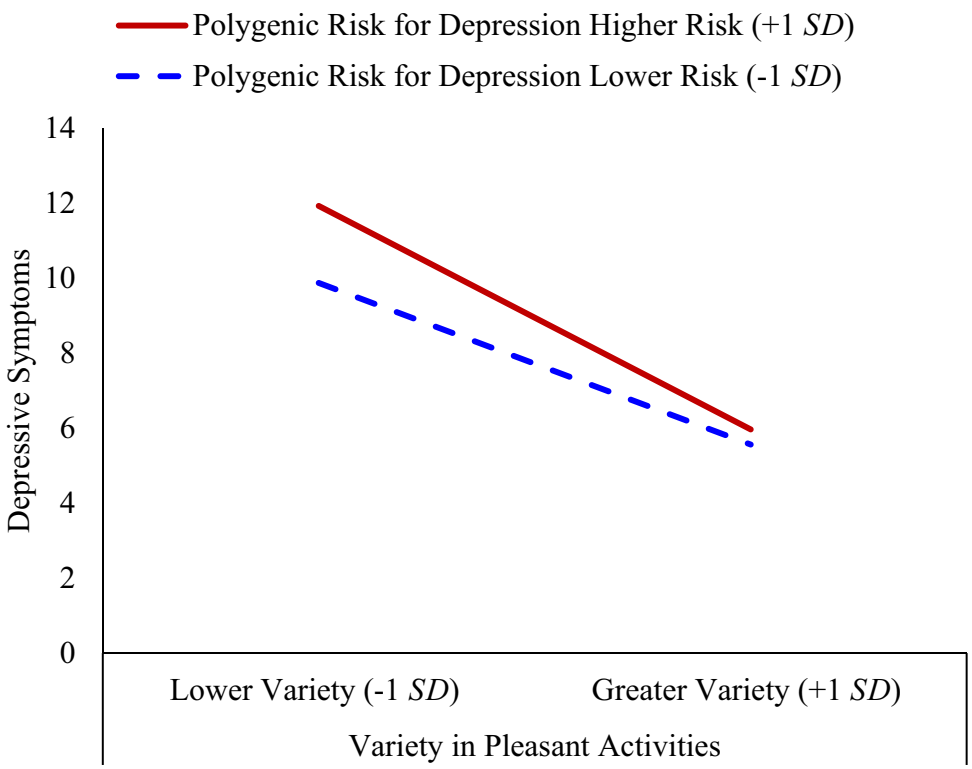

Fig. 1 The association between variety in pleasant activities and depressive symptoms moderated by polygenic risk scores for depression. Notes. There was a significant interaction between variety in pleasant activities and PRS for depression on depressive symptoms ($B = -0.04$, $SE = 0.02$, $p = .039$) after adjusting for five ancestry component scores and the frequency of engaged activities. While both slopes were significant, the negative association between variety in pleasant activities and depressive symptoms was stronger for those with higher PRS for depression (+1 *SD*; *slope estimate* = -0.28, $SE = 0.03$, $p < .001$) than those with lower PRS for depression (-1 *SD*; *slope estimate* = -0.20, $SE = 0.03$, $p < .001$)

counteracting boredom and habituation (Kashdan & Rottenberg, 2010; Lee et al., 2018; Sheldon et al., 2013). Increased participation in varied positive activities could thus improve mental health.

Additionally, variety in pleasant activities may protect against genetic depression vulnerability. The stronger negative association between variety in pleasant activities and depressive symptoms among individuals with higher polygenic risk for depression suggests that those with a genetic predisposition to depression may benefit more from engaging in diverse pleasant activities than those with lower genetic susceptibility. This accords with evidence that positive psychosocial factors like optimism and social support can buffer polygenic risk effects on mental illness (Cleary et al., 2023; Na et al., 2022). Increasing varied pleasant activities may be an intervention strategy to reduce depression risk among the genetically vulnerable.

We found that a greater variety of pleasant activities was associated with fewer instances of seeing mental health professionals in M2, but not in MR. This discrepancy may be due to differences in sample characteristics. For example, MR participants were younger, more educated, and more racially diverse than M2 participants. These sociodemographic factors may influence the access to and utilization of mental health services (Urban-Wojcik et al., 2022). Considering that the MR sample had more racial diversity, overlooked confounds related to racial disparities might have contributed to the null association in this sample. For example, prior research finds racial minorities have higher unmet mental health needs than non-Hispanic whites, partially due to geographic disparities in access (Kim et al., 2017). Such geographic factors could also constrain opportunities for varied activities through transportation barriers and lack of community resources. Future research should examine these potential explanations for the inconsistent findings across samples.

This study has several strengths, including two large U.S. samples, adjustment for confounds, and examination of genetic moderation. Nevertheless, limitations and directions for future research should be acknowledged. First, the cross-sectional nature of our data precludes causal inference and limits generalizability. Depression could plausibly influence activity perceptions and variety reporting rather than vice versa. Longitudinal research is needed to establish directionality and temporal precedence.

Additionally, the abbreviated Positive Events Scale lacks equal representation across activity domains. While the full measure encompasses diverse activity categories, the truncated version includes only a subset. For instance, physical and social activities have multiple indicators enabling within-domain variety analysis, while intellectual or creative activities have limited items. More comprehensive measures with greater cross-domain representation would be valuable. Reliance on self-reports

Table 4 Moderation of polygenic risk score of depression

	MIDUS II + MIDUS Refresher (n = 1,179)			
	B	*SE*	*p*-value	95% CI
Intercept	9.81	1.04	< .001	[7.77, 11.84]
Variety in pleasant activities	-0.19	0.02	< .001	[-0.24, -0.15]
Frequency of engaged activities	-0.13	0.04	.003	[-0.21, -0.04]
Polygenic risk score (PRS) of depression	0.39	0.19	.037	[0.02, 0.75]
Variety in pleasant activities × PRS of depression	-0.04	0.02	.031	[-0.07, -0.004]
Slope for higher PRS of depression (+ 1 *SD*)	-0.23	0.03	< .001	[-0.29, -0.17]
Slope for lower PRS of depression (-1 *SD*)	-0.17	0.03	< .001	[-0.23, -0.11]
Genetic ancestry PC1	88.60	472.82	.851	[-839.18, 1016.38]
Genetic ancestry PC2	-167.02	433.60	.700	[-1017.83, 683.79]
Genetic ancestry PC3	101.58	67.31	.132	[-30.5, 233.66]
Genetic ancestry PC4	-36.84	93.65	.694	[-220.6, 146.91]
Genetic ancestry PC5	-6.24	17.74	.725	[-41.04, 28.57]
Age	-0.05	0.02	.002	[-0.08, -0.02]
Gender: Male (vs. female)	-0.43	0.39	.273	[-1.2, 0.34]
Race: White (vs. non-White)	-1.34	1.03	.195	[-3.36, 0.69]
Education	-0.19	0.08	.017	[-0.35, -0.04]
Openness	0.49	0.43	.250	[-0.35, 1.34]
Conscientiousness	-2.04	0.42	< .001	[-2.86, -1.21]
Extraversion	-1.33	0.40	.001	[-2.11, -0.54]
Agreeableness	0.95	0.45	.034	[0.07, 1.82]
Neuroticism	3.16	0.32	< .001	[2.54, 3.79]
Using antidepressants (vs. no)	1.64	0.50	.001	[0.65, 2.63]
Number of chronic physical conditions	0.58	0.10	< .001	[0.38, 0.78]
Milwaukee sub-sample (vs. not)	7.49	3.62	.039	[0.39, 14.58]
Fit Statistics				
F test	33.44		< .001	

n = 1,081 were used in the model due to missing values in covariates. The main estimates of interest are grey highlighted

also presents biases. Future work should incorporate more objective, ecological assessments like experience sampling or wearables. Another direction is testing whether personality moderates the relationship between variety in pleasant activities and well-being outcomes. Certain personality traits like extraversion and openness to experience may amplify the benefits of variety in activities (Klaiber et al., 2022), given prior work linking these traits to engagement and reactivity. Examining these and other individual differences could shed light on for whom variety in pleasant activities is most impactful. Mental health visits provide an imperfect severity proxy since factors beyond symptoms influence utilization. Consideration of access and other use determinants is warranted when interpreting this proxy. Finally, our sole polygenic risk measure may miss variants or interactions. Studies should employ more refined, updated measures capitalizing on emerging genetic discoveries (Wray et al., 2018).

Conclusions

This study demonstrates that variety in pleasant activities is associated with fewer depressive symptoms and less mental healthcare use among U.S. adults. These associations held consistently across two independent samples and were stronger for those with higher genetic depression risk. These findings underscore the importance of positive and enjoyable experiences and suggest that efforts to increase engagement in diverse pleasant activities could benefit mental health outcomes. Further research should establish the causal mechanisms and moderators of these associations. Additionally, intervention research is needed to examine the efficacy of targeting variety in pleasant activities to prevent or treat depression. Overall, this work provides initial evidence that engaging in a range of pleasant activities may be a promising route to enhance well-being, particularly for individuals genetically vulnerable to depression.

Additional Information

Funding This research was supported, in part, by Grant P01-AG020166 from the National Institute on Aging to conduct a longitudinal follow-up of the MIDUS (Midlife in the United States) investigation. The original study was supported by John D. and Catherine T. MacArthur Foundation Research Network on Successful Midlife Development. Outside of the current work, Soomi Lee discloses that she received grants from NIH (R56AG065251 and R01HL163226).

Conflicts of interest None.

Availability of data and material MIDUS data is publicly available from the ICPSR at the University of Michigan (https://www.icpsr.umich.edu/web/pages/) or through the MIDUS Colectica portal (see http://midus.wisc.edu/data/index.php).

Code Availability Not applicable.

Ethics approval Procedures were approved by Institutional Review Boards at all study sites.

Consent to participate All participants provided informed consent.

Consent for publication Not applicable.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s42761-023-00225-x.

References

Bagheri, L., & Milyavskaya, M. (2020). Novelty–variety as a candidate basic psychological need: New evidence across three studies. *Motivation and Emotion, 44*, 32–53.

Bylsma, L. M., Taylor-Clift, A., & Rottenberg, J. (2011). Emotional reactivity to daily events in major and minor depression. *Journal of Abnormal Psychology, 120*(1), 155.

Cleary, J. L., Fang, Y., Zahodne, L. B., Bohnert, A. S., Burmeister, M., & Sen, S. (2023). Polygenic risk and social support in predicting depression under stress. *American Journal of Psychiatry, 180*, 139–145.

Cuevas, A. G., Mann, F. D., Williams, D. R., & Krueger, R. F. (2021). Discrimination and anxiety: Using multiple polygenic scores to control for genetic liability. *Proceedings of the National Academy of Sciences, 118*(1), e2017224118.

Cuijpers, P., van Straten, A., & Warmerdam, E. H. (2007). Behavioral treatment of depression: A meta-analysis of activity scheduling. *Clinical Psychology Review, 27*(3), 318–326.

Dimidjian, S., Barrera, M., Jr., Martell, C., Muñoz, R. F., & Lewinsohn, P. M. (2011). The origins and current status of behavioral activation treatments for depression. *Annual Review of Clinical Psychology, 7*, 1–38.

Ekers, D., Webster, L., Van Straten, A., Cuijpers, P., Richards, D., & Gilbody, S. (2014). Behavioural activation for depression; An update of meta-analysis of effectiveness and sub group analysis. *PLoS ONE, 9*(6), e100100.

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G* Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*(2), 175–191.

Halldorsdottir, T., Piechaczek, C., Soares de Matos, A. P., Czamara, D., Pehl, V., Wagenbuechler, P., Feldmann, L., Quickenstedt-Reinhardt, P., Allgaier, A.-K., & Freisleder, F. J. (2019). Polygenic risk: Predicting depression outcomes in clinical and epidemiological cohorts of youths. *American Journal of Psychiatry, 176*(8), 615–625.

Kashdan, T. B., & Rottenberg, J. (2010). Psychological flexibility as a fundamental aspect of health. *Clinical Psychology Review, 30*(7), 865–878. https://doi.org/10.1016/j.cpr.2010.03.001

Kashdan, T. B., & Silvia, P. J. (2009). Curiosity and interest: The benefits of thriving on novelty and challenge. *Oxford Handbook of Positive Psychology, 2*, 367–374.

Keyes, C. L. M. (2005). Chronic physical conditions and aging: Is mental health a potential protective factor? *Ageing International, 30*(1), 88–104. https://doi.org/10.1007/BF02681008

Kim, G., Dautovich, N., Ford, K.-L., Jimenez, D. E., Cook, B., Allman, R. M., & Parmelee, P. (2017). Geographic variation in mental health care disparities among racially/ethnically diverse adults with psychiatric disorders. *Social Psychiatry and Psychiatric Epidemiology, 52*, 939–948.

Kirsch, J. A., & Ryff, C. D. (2016). Hardships of the Great Recession and health: Understanding varieties of vulnerability. *Health Psychology Open, 3*(1), 2055102916652390.

Klaiber, P., Wen, J. H., Ong, A. D., Almeida, D. M., & Sin, N. L. (2022). Personality differences in the occurrence and affective correlates of daily positive events. *Journal of Personality, 90*(3), 441–456. https://doi.org/10.1111/jopy.12676

Lee, S., Charles, S. T., & Almeida, D. M. (2021). Change is good for the brain: Activity diversity and cognitive functioning across adulthood. *The Journals of Gerontology: Series B, 76*(6), 1036–1048.

Lee, S., Koffer, R. E., Sprague, B. N., Charles, S. T., Ram, N., & Almeida, D. M. (2018). Activity diversity and its associations with psychological well-being across adulthood. *The Journals of Gerontology: Series B, 73*(6), 985–995.

Lewinsohn, P. M., & Graf, M. (1973). Pleasant activities and depression. *Journal of Consulting and Clinical Psychology, 41*(2), 261–268.

Lyubomirsky, S., & Layous, K. (2013). How do simple positive activities increase well-being. *Current Directions in Psychological Science, 22*, 57–62.

Macphillamy, D., & Lewinsohn, P. (1982). The pleasant events schedule—studies on reliability, validity, and scale intercorrelation. *Journal of Consulting and Clinical Psychology, 50*(3), 363–380. https://doi.org/10.1037/0022-006X.50.3.363

Manos, R. C., Kanter, J. W., & Busch, A. M. (2010). A critical review of assessment strategies to measure the behavioral activation model of depression. *Clinical Psychology Review, 30*(5), 547–561. https://doi.org/10.1016/j.cpr.2010.03.008

Mazzucchelli, T., Kane, R., & Rees, C. (2009). Behavioral activation treatments for depression in adults: A meta-analysis and review. *Clinical Psychology: Science and Practice, 16*(4), 383–411.

Mitchell, B. L., Thorp, J. G., Wu, Y., Campos, A. I., Nyholt, D. R., Gordon, S. D., Whiteman, D. C., Olsen, C. M., Hickie, I. B., & Martin, N. G. (2021). Polygenic risk scores derived from varying definitions of depression and risk of depression. *JAMA Psychiatry, 78*(10), 1152–1160.

Musliner, K. L., Seifuddin, F., Judy, J. A., Pirooznia, M., Goes, F. S., & Zandi, P. P. (2015). Polygenic risk, stressful life events and depressive symptoms in older adults: A polygenic score analysis. *Psychological Medicine, 45*(8), 1709–1720.

Na, P. J., De Angelis, F., Nichter, B., Wendt, F. R., Krystal, J. H., Southwick, S. M., Levey, D. F., Gelernter, J., Polimanti, R., & Pietrzak, R. H. (2022). Psychosocial moderators of polygenic risk for suicidal ideation: Results from a 7-year population-based, prospective cohort study of US veterans. *Molecular Psychiatry, 27*(2), 1068–1074.

Peeters, F., Nicolson, N. A., Berkhof, J., Delespaul, P., & deVries, M. (2003). Effects of daily events on mood states in major depressive disorder. *Journal of Abnormal Psychology, 112*, 203–211.

Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*, 385–401.

Ryff, C. D., & Krueger, R. B. (2018). Approaching human health as an integrative challenge: Introduction and overview. In C. D. Ryff & R. F. Krueger (Eds.), *The Oxford Handbook of Integrative Health Science* (pp. 3–22). Oxford University Press.

Sheldon, K. M., Boehm, J., & Lyubomirsky, S. (2013). Variety is the spice of happiness: The hedonic adaptation prevention model. In I. Boniwell, S. David, & A. Ayers (Eds.), *Oxford Handbook of Happiness* (pp. 901–914). Oxford University Prress.

Surachman, A., Wardecker, B., Chow, S.-M., & Almeida, D. (2019). Life course socioeconomic status, daily stressors, and daily well-being: Examining chain of risk models. *The Journals of Gerontology: Series B, 74*(1), 126–135.

Thompson, R. J., Mata, J., Jaeggi, S. M., Buschkuehl, M., Jonides, J., & Gotlib, I. H. (2012). The everyday emotional experience of adults with major depressive disorder: Examining emotional instability, inertia, and reactivity. *Journal of Abnormal Psychology, 121*(4), 819.

Urban-Wojcik, E. J., Mumford, J. A., Almeida, D. M., Lachman, M. E., Ryff, C. D., Davidson, R. J., & Schaefer, S. M. (2022). Emodiversity, health, and well-being in the Midlife in the United States (MIDUS) daily diary study. *Emotion, 22*(4), 603.

Wray, N. R., Lin, T., Austin, J., McGrath, J. J., Hickie, I. B., Murray, G. K., & Visscher, P. M. (2021). From basic science to clinical application of polygenic risk scores: A primer. *JAMA Psychiatry, 78*(1), 101–109.

Wray, N. R., Ripke, S., Mattheisen, M., Trzaskowski, M., Byrne, E. M., Abdellaoui, A., Adams, M. J., Agerbo, E., Air, T. M., & Andlauer, T. M. (2018). Genome-wide association analyses identify 44 risk variants and refine the genetic architecture of major depression. *Nature Genetics, 50*(5), 668–681.