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Research paper

Optimal well-being in the aftermath of anxiety disorders: A 10-year longitudinal investigation

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ABSTRACT

Background: : Although preliminary research has explored the possibility of optimal well-being after depression, it is unclear how rates compare to anxiety. Using Generalized Anxiety Disorder (GAD) and Panic Disorder (PD) as exemplars of anxiety, we tested the rates of optimal well-being one decade after being diagnosed with an anxiety disorder. Based on reward deficits in depression, we pre-registered our primary hypothesis that optimal well-being would be more prevalent after anxiety than depression as well as tested two exploratory hypotheses.
Method: : We used data from the Midlife in the United States (MIDUS) study, which contains a nationally representative sample across two waves, 10 years apart. To reach optimal well-being, participants needed to have no symptoms of GAD, PD, or major depressive disorder (MDD) at the 10 year follow-up and exceed cut-offs across nine dimensions of well-being.
Results: : The results failed to support our primary hypothesis. Follow-up optimal well-being rates were highest for adults previously diagnosed with MDD (8.7%), then PD (6.1%), and finally GAD (0%). Exploratory analyses revealed optimal well-being was approximately twice as prevalent in people without anxiety or depression at baseline and provided partial support for baseline well-being predicting optimal well-being after anxiety. Results were largely replicated across different classifications of optimal well-being.
Limitations: : Findings are limited by the somewhat unique measurement of anxiety in the MIDUS sample as well as the relatively high rate of missing data.
Conclusions: : We discuss possible explanations for less prevalent optimal well-being after anxiety vs. depression and the long-term positivity deficits from GAD.

1. Introduction

Anxiety disorders are common and disabling. The World Health Organization estimates that anxiety disorders interfere with daily function for 275 million people worldwide (Global Burden of Disease Collaborative Network, 2017). Two common anxiety disorders are Generalized Anxiety Disorder (GAD) and Panic Disorder (PD) with 12-month prevalence rates of 3.1% and 2.7%, respectively (Kessler et al., 2005). GAD captures the chronic, less severe anxiety associated with worry and PD captures more brief and intense panic attacks along with the fear of future episodes and avoidance of activities to prevent them (Barlow, 2008). In this study, we use GAD and PD as exemplars of anxiety disorders.

Anxiety disorders are not necessarily chronic. In a nationally representative sample from the United States collected between 1990 and 1992, 29.4% of people met criteria for anxiety disorders in the past 12 months. Only 30.5% retained diagnostic criteria 11 years later (Kessler et al., 2005). Across 5 years, remission rates for anxiety disorders, such as generalized anxiety disorder (GAD), panic disorder (PD), and social anxiety disorder vary between 30 and 60% (Yonkers et al., 2001, 2000). Because individuals fall below the diagnostic threshold over time, it can be presumed that some people not only recover from their anxiety disorder(s), but subsequently achieve good outcomes such as high levels of psychological well-being (optimal well being; OWB). Understanding

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good outcomes among anxiety disorders patients is crucial for understanding the mechanisms that are worthy targets of intervention. Before conducting more applied work, it is essential to address these fundamental gaps in knowledge. With this in mind, the present study estimated OWB prevalence rates following the diagnosis of two anxiety disorders (PD and GAD) in a nationally representative sample of the United States.

1.1. Optimal well-being after psychopathology

Little is known regarding the prevalence of high levels of psychological well-being *after* a mental health diagnosis (Wood and Tarrier, 2010; Rottenberg et al., 2018). Well-being can broadly be conceptualized as "[the] perceived enjoyment and fulfillment with one's life as a whole" (Disabato et al., review), and subsumes elements such as positive emotions (e.g., happiness), life satisfaction, purpose in life, and close social relationships (for different models of well-being, see Diener, 1984; Ryff, 1989; Keyes et al., 2002). Unfortunately, clinical psychology and psychiatry research has often not considered well-being as an endpoint (Wood and Tarrier, 2010), which is part of a larger neglect of functional endpoints in outcome research (McKnight and Kashdan, 2009).

By omitting well-being as an outcome, mental health fields lose important predictive and phenomenological information about psychopathology. Meta-analyses find that psychiatric symptoms correlate only modestly with functional impairment (McKnight and Kashdan, 2009; Mcknight et al., 2016), suggesting that current symptomatic endpoints provide incomplete assessments of functioning. Studies also find that incorporating information about well-being into diagnostic endpoints can improve the prediction of mental health outcomes, above and beyond psychiatric symptoms alone (Keyes et al., 2010; Rottenberg et al., 2019). Perhaps most important is that many patients with anxiety disorders have treatment goals that go beyond abatement of symptoms, like forming meaningful relationships, experiencing personal growth, and improving attitudes towards oneself (Holtforth et al., 2009) – all of which are components of well-being.

Given the importance of well-being as an outcome, our research team has drawn from models of well-being and human functioning (Diener, 1984; Ryan and Deci, 2001; Ryff, 1989) to outline criteria to define OWB after psychology (Rottenberg et al., 2018). These criteria implement a population-based norms approach containing three elements: 1) a lifetime history of a mental health diagnosis, 2) the absence of a 12-month mental health diagnosis, and 3) high well-being, indicated by exceeding the top quartile of population-based norms on a battery of psychological-well-being measures (see Rottenberg et al., 2018 for extended discussion of the population-based approach).

1.2. Anxiety vs. depression

Whether the prevalence rates of OWB differ across mental health diagnoses is not yet known. In general, data suggest that 50–70% individuals with Major Depressive Disorder (MDD) recover within one year and only 6–15% experience a chronic course (Richards, 2011). Using a nationally representative sample, our team found that 10% of individuals with a previous MDD diagnosis were not only symptom-free 10 years later, but also experienced OWB: well-being levels akin to the top 25% of non-depressed adults in the United States (Rottenberg et al., 2019). We hypothesized that rates of OWB would be even higher for anxiety disorders for four reasons. First, in contrast to MDD, meta-analytic data suggest that distress related to anxiety disorders is only modestly correlated with the severity of functional impairment ($rs = 0.01$ to 0.46) (McKnight, Monfort, Kashdan, Blalock, Calton, 2016). Second, based on epidemiological data, MDD ranks as the 2nd most burdensome disease in the U.S. in terms of years lived with disability (YLDs) whereas anxiety disorders rank 7th (Vos et al., 2017). Third, the positive emotions, thoughts, and behaviors that are central to definitions of well-being are antithetical to the diagnostic features of MDD such as deficits in reward seeking and processing (i.e., anhedonia) (American Psychiatric Association, 2013). Meanwhile, reward deficits are not part of the diagnostic criteria for anxiety disorders. Finally, data suggest that depression is associated with greater negative stereotypes and mental health stigma than anxiety (Wood et al., 2014), pinpointing a cause of social rejection.

1.3. Prediction of OWB

Moving from descriptive to predictive models, our goal was to predict the likelihood of OWB from information acquired at their intake assessment 10 years earlier (baseline). We tested a prediction model in people with GAD or PD that was previously supported for participants with MDD (Rottenberg et al., 2019): whether anxious individuals who experienced higher well-being at baseline would be more likely to be symptom-free and achieve optimal levels of psychological well-being 10 years later.

1.4. Hypotheses

We tested three hypotheses in the present study. First, we expected that OWB would be more common after anxiety disorders (GAD and PD) than MDD. Specifically, we predicted that the prevalence of OWB 10 years later among individuals with GAD or PD at baseline would be greater than 10%, as this was the prevalence previously reported for MDD (Rottenberg et al., 2019). This hypothesis was pre-registered on September 24, 2018 (https://osf.io/puq8f/). Second, to test the relative prevalence of OWB among mentally healthy individuals, we tested the rudimentary hypothesis that people without GAD, PD, or MDD at baseline (i.e., healthy group) would have a higher prevalence of OWB 10 years later than those with one or more of those disorders at baseline (i.e., clinical group). Third, we tested whether baseline well-being predicted who reached OWB at follow-up among the individuals with an anxiety disorder (i.e., GAD and/or PD). The second and third hypotheses were not pre-registered and are considered exploratory.

2. Methods

2.1. Participants and procedures

To test our hypothesis, Wave 1 and Wave 2 data were used from the Midlife Development in the United States study (MIDUS; http://midus.wisc.edu/scopeofstudy.php), a nationally representative sample of middle-aged (25–74 years) English-speaking adults recruited via a random-digit-dialing procedure (Brim et al., 2004). All MIDUS study procedures involving human participants were approved by Harvard Medical School in 1998 (IRB approval number: X112894–1). At Wave 1, all participants completed a 30-minute phone interview ($N = 3487$) and most completed a self-report survey ($n = 3043$). We focused on participants diagnosed with Generalized Anxiety Disorder (GAD), Panic Disorder (PD), or MDD at baseline ($N = 649$) who completed all follow-up procedures 10 years later ($N = 256$): clinical group. For comparisons, we also used participants without GAD, PD, or MDD at baseline ($N = 2838$) who completed all follow-up procedures 10 years later ($N = 1207$): healthy group.

As expected for a 10-year follow-up, a large percentage of the MIDUS sample dropped out of the study and were missing data at Wave 2 (58.0%). The rate of missing data did not differ across the clinical (60.6%) and healthy (57.5%) groups ($\chi 2 = 1.94$, $df = 1$, $p = .164$). Table 1 contains the demographic information for those in the clinical group, healthy group, and those missing at Wave 2. The far right of the table also contains tests for significant differences between participants with data at follow-up (i.e., clinical and healthy group combined; $n = 1463$) vs. those missing at follow-up (i.e., missing data at Wave 2; $n = 2024$). All differences were significant: participants missing at follow-up were more likely to be younger, have less household income, be male,

Table 1
Sample demographics across study groups.

	Clinical Group ($N = 256$)		Healthy Group ($N = 1207$)		Missing at Wave 2 ($N = 2024$)		Observed vs. Missing
Age (median & IQR)	44 [36, 52]		47 [37, 57]		45 [34, 57]		$\chi2(1) = 4.76$*
Income (median & IQR)	45k [26k, 87k]		60k [33k, 98k]		43k [23k, 78k]		$\chi2(1) = 37.65$***
	Number	Percent	Number	Percent	Number	Percent	
Sex							$\chi2(1) = 7.00$**
Female	177	69.1%	603	50.0%	986	48.7%	
Male	79	30.9%	604	50.0%	1038	51.3%	
Race							$\chi2(5) = 67.27$***
White	233	91.0%	1110	92.0%	1243	61.4%	
African American	6	2.3%	50	4.1%	145	7.2%	
Native American	2	0.8%	7	0.6%	13	0.6%	
Asian/Pacific Islander	1	0.4%	9	0.7%	24	0.1%	
Other	9	3.5%	13	1.1%	58	0.3%	
Multiracial	1	0.4%	7	0.6%	15	0.7%	
Missing/Refused	4	1.6%	11	0.9%	526	26.0%	
Education							$\chi2(3) = 120.37$***
Less than high school	20	7.8%	63	5.2%	297	14.7%	
Graduated high school	72	28.1%	456	37.8%	598	29.5%	
Some college	90	35.2%	338	28.0%	665	32.9%	
Graduated college	74	28.9%	350	29.0%	462	22.8%	
Marital Status							$\chi2(4) = 61.00$***
Married	135	52.7%	867	71.8%	1002	68.5%	
Separated	13	5.1%	13	1.1%	26	1.8%	
Divorced	68	26.6%	160	13.3%	228	15.6%	
Widowed	11	4.3%	50	4.1%	61	4.2%	
Never Married	29	11.3%	117	9.7%	146	10.0%	

Note. The "Observed vs. Missing" column presents significant tests. The age and income tests are Mood's test of median differences and sex, race, education, and marital status tests are chi-square tests of independence.

lack data on race/ethnicity, have less than a high school education, and be married. Note, the majority of missing/refused data for race at Wave 1 in the Missing at Wave 2 group is due to participant's completing the phone interview at Wave 1, but not completing the self-report survey at Wave 1 where race was assessed.

2.2. Measures

Diagnoses in the past 12 months were assessed during the phone interview at both waves using the Composite International Diagnostic Interview – Short Form (CIDI-SF), which was based on the SCID-III criteria. GAD was operationalized as worrying more than most people, most days, about more than one thing, and sometimes or often struggling to control that worry, for the past 12 months. PD was operationalized as two or more panic attacks in non-dangerous situations with several physiological symptoms over the past 12 months. Presence of MDD was operationalized as a two-week period in the past 12 months with depressed mood or anhedonia most of the day, nearly every day. Research demonstrates high inter-rater reliability for each CIDI-SF (GAD = 0.99, PD = 0.98, MDD = 0.93) (Kessler et al., 1998). Symptom count scores for each CIDI-SF disorder were created and ranged from 0 to 10 for GAD, 0 to 6 for PD, and 0 to 7 for MDD. The Supplemental Materials contain details about the CIDI-SF interview questions and structure.

Well-being was measured via the self-report survey at both waves using items created by the MIDUS investigators and from the Scales of Psychological Well-being (SPWB; Ryff, 1989). All observed scores were created by unweighted averages of items, recoded such that higher scores reflect greater well-being. Life satisfaction items were rated on a 1–10 rating scale and included domain-specific health, work, children, and spouse/partner items as well as a single overarching rating. Affect items were rated on a 1–5 rating scale. Positive affect items included feeling cheerful, in good spirits, extremely happy, calm and peaceful, satisfied, and full of life. Negative affect items included feeling sad, nervous, restless/fidgety, hopeless, effortful, and worthless. The other six well-being dimensions were measured on a 1–7 rating scale by the SPWB: autonomy, environmental mastery, personal growth, positive relationships, purpose in life, and self-acceptance. The 3-item subscale version of the SPWB was used for Wave 1 and the 7-item subscale version for Wave 2. A general well-being total score was also created by converting the nine scales to Percentage of Maximum Possible (POMP) units and taking the unweighted average. The specific item wording and coefficient alphas of each scale are reported in the Supplemental Materials.

Consistent with emerging research, we operationalized OWB as 1) no GAD/PD/MDD symptoms at follow-up and 2) meeting objective well-being cutoff criteria using a population-based approach (Rottenberg et al., 2018, 2019). The primary well-being cutoff criterion was consistent with prior research; it required 8 out of 9 well-being dimension scores at or above the 50th percentile and 3 out of 9 scores at or above the 84th percentile (i.e., the "strict" criterion). As sensitivity analyses to determine whether results were consistent with other well-being cutoffs, we included two less stringent well-being criteria: 8 out of 9 (i.e., the "medium" criterion) and 5 out of 9 (i.e., the "loose" criterion) well-being dimension scores at or above the 50th percentile with neither requiring any scores at or above the 84th percentile. Finally, we conducted a comprehensive examination of domain-specific OWB (i.e., scores at or above the 84th percentile) across the nine well-being dimensions to determine which are the easiest for adults once diagnosed with GAD, PD, and MDD to experience 10 years later. These domain-specific tests of OWB are considered exploratory and presented in the Supplemental Materials.

2.3. Data analytic plan

To test the first hypothesis, proportions of OWB were calculated for each disorder: GAD, PD, and MDD. The primary test is for the strict well-being criterion; however, the medium and loose well-being criteria are provided as sensitivity analyses. Tests of differences between each pair of proportions (e.g., GAD vs. MDD) were conducted. Because many participants had diagnostic comorbidities, the groups were not independent. Therefore, a z-test that accounts for partially dependent groups

was used (Derrick et al., 2015). For the second hypothesis, proportions of OWB were calculated for participants in the clinical group vs. healthy group. Because the groups were fully independent, traditional χ2-tests of the difference between proportions was used. Only participants with full data at both time points were included in analyses for tests of the first two hypotheses due to the difficulty with pooling results from statistical tests of differences in proportions with multiply imputed data.

Finally, the third hypothesis was tested with binary logistic regression models to determine whether general well-being at baseline predicted the probability of OWB 10 years later in participants with anxiety disorders (GAD and PD), after controlling for various demographic variables and baseline anxiety symptoms. To account for missing data from baseline to follow-up, multiple imputation by chained equations was used to estimate the regression coefficients, which decreases bias of parameter estimates and increases efficiency of standard errors (Buuren, 2018). One hundred imputed datasets were created via predictive mean matching and the results were pooled according to Rubin's rules (Rubin, 2011). In addition, repeated measures t-tests were conducted to confirm that OWB was associated with *increases* in well-being over time as opposed to simply starting with higher well-being at baseline.

3. Results

3.1. Descriptive statistics

We first present comorbidity patterns in the clinical group. Table 2 presents the frequency counts and percentages of each disorder combination at baseline. The top two rows refer to participants with MDD and the bottom two rows refer to participants without MDD. The most common disorder combination was MDD only followed by PD only. The most common comorbidity was PD and MDD followed by GAD and MDD. The comorbidity of GAD and PD was the least common disorder combination, despite them both being anxiety disorders. The descriptive data for the baseline well-being POMP total score suggested a significant mean difference (Cohen's $d = 1.06$, (95% CI = [0.90, 1.23]) between the clinical group ($M = 0.66$, $SD = 0.14$) and healthy group ($M = 0.78$; $SD = 0.10$). Descriptive data for each of the 9 well-being scales is provided in the Supplemental Materials (i.e., Table S2). The largest differences were for the affect scales with the smallest differences for the autonomy, personal growth, and purpose in life scales.

3.2. Hypothesis 1: OWB comparing anxiety vs. depression

We tested whether OWB after GAD or PD would be more common than OWB after MDD. Table 3 presents counts and percentages of OWB at 10-year follow-up across baseline disorders of GAD, PD, or MDD. Percentages with different letter superscripts are significantly different from each other at $p < .05$. In general, OWB rates for PD were similar to MDD, while those for GAD were lower. The no symptom rates at follow-up are presented in the top rows of Table 3. Ten years later, 66.7% of participants with GAD, 60.2% with PD, and 63.6% with MDD no longer had symptoms of that particular disorder, suggesting relatively high single-disorder recovery rates. However, some participants retained or developed symptoms of one of the other two disorders, especially those diagnosed with GAD at baseline. While 45.9% of participants with PD and 51.3% with MDD at baseline reported no symptoms of any disorder 10 years later, the percentage was only 28.6% for GAD (GAD vs. PD: $d = -17.3\%$, $z = -2.18$, $p = .029$; GAD vs. MDD: $d = -22.7\%$, $z = -3.04$, $p = .002$).

The overall OWB rates that combined no symptoms at follow-up and the various well-being criteria are presented in the bottom rows of Table 3. Overall OWB rates declined with the increasingly stringent well-being criteria. Participants with GAD experienced the steepest decline for both the medium well-being criterion (GAD vs. PD: $d = -6.8\%$, $z = -1.43$, $p = .152$; GAD vs. MDD: $d = -10.9\%$, $z = -2.03$, $p = .043$) and strict well-being criterion (GAD vs. PD: $d = -6.1\%$, $z = -1.64$, $p = .101$; GAD vs. MDD: $d = -8.7\%$, $z = -1.98$, $p = .047$). PD and MDD had roughly similar rates of overall OWB based on each well-being criteria. When only comparing the participants who had no symptoms of any disorder 10 years later, those with GAD were not significantly less likely to meet the loose (GAD vs. PD: $d = -3.9\%$, $\chi2 = -0.06$, $p = .806$; GAD vs. MDD: $d = -4.7\%$, $z = -0.33$, $p = .738$), medium (GAD vs. PD: $d = -11.7\%$, $\chi2 = -0.89$, $p = .345$; GAD vs. MDD: $d = -17.7\%$, $z = -1.35$, $p = .176$) or strict (GAD vs. PD: $d = -13.3\%$, $\chi2 = -1.79$, $p = .181$; GAD vs. MDD: $d = -17.0\%$, $z = -1.55$, $p = .121$) well-being criteria.[1]

Table 2
Diagnostic comorbidity in the clinical group at Wave 1.

	Clinical Group	
MDD No	No PD	Yes PD
No GAD	0 (0.0%)	46 (18.0%)
Yes GAD	10 (3.9%)	5 (2.0%)
MDD Yes	No PD	Yes PD
No GAD	132 (51.6%)	36 (14.1%)
Yes GAD	16 (6.3%)	11 (4.3%)
TOTAL Dx: MDD = 195, PD = 98, GAD = 42		

Note. GAD = Generalized Anxiety Disorder; PD = Panic Disorder; MDD = Major Depressive Disorder; Percentages of the total frequency; Dx = disorders.

3.3. Hypothesis 2: OWB comparing clinical and healthy groups

Table 3 also presents results for participants in the clinical versus healthy group. In general, OWB rates 10 years later for those in the clinical group were lower than the healthy group. The no symptoms of any disorder rate at follow-up was 52.3% for participants in the clinical group, while the rate was 84.6% for those in the healthy group ($d = -32.3\%$, $\chi2 = 132.13$, $p < .001$). Overall OWB rates were lower among those in the clinical group for the loose ($d = -25.1\%$, $\chi2 = 53.18$, $p < .001$), medium ($d = -17.9\%$, $\chi2 = 34.14$, $p < .001$) and strict ($d = -11.4\%$, $\chi2 = 19.00$, $p < .001$) well-being criteria. When only comparing the participants who had no symptoms 10 years later, those in the clinical group were less likely to meet the loose ($d = -6.3\%$, $\chi2 = 2.11$, $p = .146$), medium ($d = -12.1\%$, $\chi2 = 7.63$, $p = .006$) and strict ($d = -7.5\%$, $\chi2 = 3.88$, $p = .049$) well-being criteria.

3.4. Hypothesis 3: prediction of OWB

We next tested whether baseline well-being predicted the likelihood of overall OWB for participants with GAD or PD. The complete data cases were participants in the clinical group with an anxiety disorder ($n = 124$), although multiple imputation was used to incorporate participants missing at Wave 2 who had GAD or PD at baseline. Overall OWB (based on the three different well-being criteria as well as no symptoms of any disorder) was the outcome, the general well-being POMP total score at baseline was the focal predictor, and demographics (i.e., sex, age, education), mental health treatment the year leading up to Wave 2,[2] and anxiety symptoms were covariates. Sex and GAD symptoms had to be removed from the strict well-being criterion regression because there were no males or people with GAD who met the OWB criteria resulting

[1] Due to only one GAD and PD comorbidity within the no symptoms 10 years later subsample, traditional tests for difference in proportions were used as the test that accounts for subsample dependencies (i.e., comorbidity) requires at least 2 paired cases.

[2] Mental health treatment was quantified as a count variable of the number of times the participant saw a professional for an emotional or psychiatric problem in the past 12 months (Median = 1; IQR = [0, 4], Range = [0, 122]). Professionals included psychiatrists, general practitioners or other medical doctors, psychologists/counselors/therapists, or spiritual healers (e.g., minister, rabbi).

Table 3
Optimal well-being (OWB) rates across disorders at Wave 2.

	GAD		PD		MDD		Clinical group		Healthy group	
OWB OPERATION	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Data at wave 1 and 2	42	100.0%	98	100.0%	195	100.0%	256	100.0%	1207	100.0%
No past disorder symptoms	28	66.7%	59	60.2%	124	63.6%	NA	NA	NA	NA
No GAD/PD/MDD symptoms	12	28.6%[a]	45	45.9%[b]	100	51.3%[b]	134	52.3%[a]	1021	84.6%[b]
Loose well-being criterion	7	16.7%[a]	28	28.6%[ab]	63	32.3%[b]	82	32.0%[a]	689	57.1%[b]
Medium well-being criterion	1	2.4%[a]	9	9.2%[ab]	26	13.3%[b]	32	12.5%[a]	367	30.4%[b]
Strict well-being criterion	0	0.0%[a]	6	6.1%[ab]	17	8.7%[b]	21	8.2%[a]	237	19.6%[b]

Note. GAD = generalized anxiety disorder; PD = panic disorder; MDD = major depressive disorder; Clinical group = GAD and/or PD and/or MDD; Healthy group = No GAD and no PD and no MDD.
[a,b] differently lettered superscripts indicate significantly different proportions ($p < .05$) and are separate for 1) GAD vs. PD vs. MDD and 2) Clinical group vs. Healthy group.

in unstable coefficients. Results in Table 4 indicate that baseline well-being marginally predicted the primary strict well-being criterion; however, the association was non-significant for the alternative medium or loose well-being criteria as well as no symptoms of any disorder at follow-up. While both GAD and PD symptoms significantly predicted no symptoms at follow-up, they did not for any of the well-being criteria. For those 1 SD below and above the mean on baseline well-being, their fitted probabilities of OWB were 0.3% vs. 4.1% for the strict, 1.5% vs. 5.4% for the medium, and 16.3% vs. 24.2% for the loose well-being criteria, while it was 38.8% vs. 39.7% for no symptoms of any disorder. Well-being was a significant predictor of OWB when only the three demographics were included as covariates: strict ($b = 8.39$, $se = 4.20$, $p = .050$), medium ($b = 5.44$, $se = 2.71$; $p = .047$), or loose ($b = 2.92$, $se = 1.42$; $p = .042$) well-being criteria as well as no symptoms of any disorder ($b = 2.70$, $se = 1.12$, $p = .017$).

Finally, we tested whether participants with GAD or PD who we classified as reaching OWB reported *increases* in well-being over 10 years rather than simply starting higher on well-being at baseline. Table 5 reports the means, standard deviations, and Cohen's d values for the well-being POMP total score across each Wave and classification of participants as either a) having symptoms of any disorder at Wave 2, b) having no symptoms of any disorder, but not meeting the well-being criteria, or c) also meeting the well-being criteria. Those with OWB reported large increases in well-being from Wave 1 to Wave 2, In contrast, there were only small increases in well-being for participants with any symptoms at follow-up ($n = 68$): Cohen's $d = 0.16$ ($p = .201$) from Wave 1 ($M = 0.60$, $SD = 0.15$) to Wave 2 ($M = 0.62$, $SD = 0.15$). Mixed factorial ANOVAs tested whether there was differential change over time across the participant classifications. The Wave * classification interaction was non-significant for the strict well-being criterion ($F(2, 121) = 2.65$, $p = .075$) but significant for the medium ($F(2, 121) = 3.65$, $p = .039$) and loose ($F(2, 121) = 10.04$, $p < .001$) well-being criteria.

4. Discussion

We tested three hypotheses related to optimal well-being (OWB) after anxiety disorders (GAD or PD) in a nationally representative sample from the United States. Our first, pre-registered hypothesis that OWB at follow-up 10 years later was more likely after anxiety than depression was not supported. The primary test was for the strict well-being criterion; however, the medium and loose well-being criteria were provided as sensitivity analyses. We observed results opposite to our hypothesis, regardless of the well-being criteria. A greater percentage of adults experienced OWB 10 years after MDD relative to GAD. Adults recovering from PD exhibited OWB rates lower than MDD but not as low as GAD. Our second hypothesis that OWB was more likely for participants without any disorders at baseline (healthy group) compared to those with a disorder(s) at baseline (clinical group) was supported. Overall OWB rates in the healthy group were double or more those in the clinical group. Our third hypothesis that baseline well-being, while

Table 4
Logistic regression results of well-being at Wave 1 predicting optimal well-being (OWB) at Wave 2.

	Strict well-being criterion (Pseudo-$R^2 = 0.185$)						Medium well-being criterion (Pseudo-$R^2 = 0.176$)					
Predictor	*b*	*se*	*t*	*df*	*p*	*fmi*	*b*	*se*	*t*	*df*	*p*	*fmi*
(Intercept)	−10.303	3.96	−2.60	134.28	.010	.360	−6.146	2.88	−2.13	171.13	.034	.303
Well-being	8.441	4.32	1.95	125.94	.053	.425	4.568	2.90	1.58	144.73	.117	.376
Male	NA	NA	NA	NA	NA	NA	−0.484	0.76	−0.64	153.63	.526	.350
Age	−0.014	0.04	−0.39	195.05	.700	.408	0.006	0.03	0.20	174.81	.840	.294
Education	0.149	0.18	0.84	164.67	.404	.311	0.194	0.14	1.41	146.48	.161	.371
Treatment	−0.049	0.09	−0.52	190.01	.601	.628	−0.010	0.04	−0.25	166.32	.806	.316
GAD symptoms	NA	NA	NA	NA	NA	NA	−0.345	0.36	−0.96	111.47	.339	.483
PD symptoms	0.186	0.28	0.68	179.82	.500	.403	−0.247	0.34	−0.72	133.74	.471	.409
	Loose well-being criterion (Pseudo-$R^2 = 0.117$)						No GAD/PD/MDD symptoms (Pseudo-$R^2 = 0.226$)					
Predictor	*b*	*se*	*t*	*df*	*p*	*fmi*	*b*	*se*	*t*	*df*	*p*	*fmi*
(Intercept)	−2.342	1.58	−1.48	143.77	.141	.378	0.730	1.38	0.53	147.29	.598	.368
Well-being	1.715	1.60	1.07	126.65	.286	.431	0.140	1.40	0.10	124.05	.920	.440
Male	0.003	0.43	0.01	116.32	.994	.466	0.465	0.37	1.25	123.45	.215	.441
Age	0.004	0.02	0.23	142.30	.815	.383	0.004	0.02	0.26	127.05	.798	.430
Education	0.089	0.08	1.17	165.56	.244	.318	0.072	0.07	1.03	158.36	.306	.337
Treatment	−0.008	0.02	−0.44	127.87	.660	.427	−0.037	0.03	−1.37	76.01	.174	.627
GAD symptoms	−0.207	0.11	−1.81	143.01	.073	.381	−0.357	0.10	−3.50	142.98	.001	.381
PD symptoms	−0.119	0.15	−0.80	142.33	.424	.383	−0.340	0.14	−2.51	138.11	.013	.395

Notes. b = unstandardized regression coefficient; se = standard error; t = Wald t -ratio; df = small-sample multiple imputation degrees of freedom p = two-sided p-value; fmi = fraction of missing information; Pseudo-R^2 = Nagelkerke R^2; Sex (i.e., Male) and GAD symptoms were removed from the regression equation for the strict well-being criterion because no male participants or participants with GAD symptoms at baseline met the criterion, causing their coefficients to be very unstable.

Table 5
Mean differences of Well-being POMP total scores between Wave 1 and Wave 2.

	No GAD/PD/MDD symptoms, but no well-being criteria							Optimal Well-Being (OWB)						
		Wave 1		*Wave 2*		*Change*			*Wave 1*		*Wave 2*		*Change*	
OWB Operation	*n*	*M*	*SD*	*M*	*SD*	*ΔM*	*d*	*n*	*M*	*SD*	*M*	*SD*	*ΔM*	*d*
Strict	50	0.65	0.12	0.72	0.11	0.07	.48*	6	0.81	0.13	0.92	0.04	0.11	1.02*
Medium	46	0.65	0.12	0.71	0.10	0.06	.43*	10	0.76	0.15	0.88	0.06	0.12	1.01*
Loose	22	0.63	0.10	0.62	0.09	−0.01	−0.07	34	0.69	0.14	0.81	0.07	0.12	1.00*

Note. d = Cohen's d or the standardized mean difference; ΔM = unstandardized mean difference; OWB Operation = Well-being criteria used to define optimal well-being after psychopathology; $^{*}p < .05$, $^{**}p < .01$; $^{***}p < .001$.

meeting diagnostic criteria for GAD or PD, would predict OWB 10 years later was not supported. Baseline well-being did not significantly predict OWB at follow-up after controlling for anxiety symptoms and mental health treatment. Overall, the patterns of findings were similar regardless of how stringent the well-being cutoffs were.

4.1. Overall OWB

The initial hurdle of reaching OWB was having no symptoms at follow-up. Over 60% of participants reported no symptoms of their baseline disorder a decade later, which is consistent with prior research demonstrating the majority of people with MDD, PD, and GAD no longer meet diagnostic criteria for that particular disorder in the long term (Fuller-Thomson et al., 2014; Andersch and Hetta, 2002; Yonkers et al., 2003). While the present findings demonstrate comparable rates of recovery between disorders, diagnostic differences emerged when examining participants who did not report symptoms of any of the three disorders. Relative to MDD and PD, disproportionately fewer people were asymptomatic of all disorders after GAD, meaning symptoms of MDD and/or PD persisted or emerged even though someone had no symptoms of GAD. This is consistent with newer conceptual models of psychopathology which suggest manifestations of psychopathology (e.g., specific disorder criteria) can change over time, even if underlying transdiagnostic features of psychopathology (e.g., frequent negative emotions, negative repetitive thinking, experiential avoidance, etc.) remain constant (Krueger and Eaton, 2015).

To qualify as reaching OWB, participants needed to report elevated well-being in addition to being asymptomatic of all disorders. Regardless of which well-being criteria was used, fewer participants with GAD at baseline had OWB compared to those with MDD. Under the strict well-being criterion, 0% participants had OWB after GAD. In contrast, 9% had OWB after MDD, which is comparable to our previous result[3] (10%; Rottenberg et al., 2019). Our results suggest that the differences in overall OWB rates between GAD and MDD may be solely due to differences in no symptom of any disorder rates. More research is needed to clarify the degree to which no symptoms vs. well-being deficits explain the overall OWB differences across anxiety and depressive disorders.

4.2. GAD vs. MDD

After our pre-registered hypothesis was not supported, we considered empirical and theoretical reasons to suggest rates of OWB would indeed be higher after depression than anxiety. In individuals with comorbid anxiety and depression, GAD has a uniquely detrimental impact on well-being (Mittal et al., 2006), which persists after depressive symptoms remit (Misri and Swift, 2015). Even if someone is currently asymptomatic, a former diagnosis of GAD may continue to undermine their ability to thrive, indicating a particular need for interventions designed to foster well-being. Likewise, existing treatments could incorporate well-being interventions alongside those aimed at reducing symptoms to improve the trajectories of people with GAD.

Subtle cognitive and affective differences between MDD and GAD may explain why OWB is less common for people after GAD. Repetitive negative thinking is elevated in both disorders, yet people with MDD report higher levels of rumination, or negative thoughts about the past, while people with GAD report higher levels of worry, or negative thoughts about future threats (Hendriks et al., 2014). Worry may be more detrimental to recovery and well-being than rumination. The rumination from dwelling on past negative life events in MDD may dissipate as the time since the life event (e.g., divorce) grows longer, opening the door for future well-being. This could be particularly true for the ~50% of people with MDD who never experience a second depressive episode and may be characterized better as struggling with adjustment as opposed to true psychopathology (Lorenzo-Luaces, 2015). Surprisingly, even previously meeting the criterion for the suicidal ideation MDD symptom may not prevent elevated well-being later on if the suicidal ideation has been gone for at least a year (Bryan et al., 2021). In contrast, the process of new, evolving worries in GAD may reflect enduring personality patterns (Mahaffey et al., 2016). People with GAD also tend to be more reactive to their experiences than people with MDD. GAD symptoms uniquely predict emotional reactivity to present-moment thoughts while MDD symptoms uniquely predict a lack of present-moment awareness (Curtiss and Klemanski, 2014). Similarly, people with GAD demonstrate greater emotional reactivity to negative stimuli and worst imagined outcomes compared to those with MDD, who display blunted emotional reactivity (Macnamara et al., 2015). Perhaps increased emotional reactivity in GAD - in the form of worry - compared to blunted reactivity in MDD is more pernicious, reducing well-being in the long term.

The simplest explanation stems from the diagnostic criteria themselves. MDD is an episodic disorder characterized by periods of low or no symptoms punctuated by full-fledged pathology. Diagnostic criteria for a single episode require symptoms to be present most-of-the-day nearly every day for only two weeks (American Psychiatric Association, 2013). In contrast, GAD is not episodic and requires symptoms more days than not anywhere from 6 to 12 months. People who report GAD symptoms lasting six months or more compared to three months display a more severe and chronic course of illness (Burstein et al., 2014). Diagnostic criteria for GAD may capture inherently more enduring psychopathology by requiring symptoms to last many times longer than MDD. It is unclear whether more chronic courses of clinical depression (e.g., Persistent Depressive Disorder) would experience similar overall OWB rates as GAD.

4.3. Clinical versus healthy group

Given the sometimes chronic and fluctuating course of psychopathology (Olino et al., 2010), it is not surprising that OWB 10 years later was higher in the healthy compared to the clinical group. Even among those with no symptoms of any disorder at follow-up, those in the clinical group were significantly less likely to reach the strict well-being

[3] Even though Rottenberg et al. (2019) and the present study used the same MIDUS dataset, the percentage is slightly smaller in the present study because OWB after MDD required no symptoms of MDD, PD, or GAD in the present study while OWB after MDD required only no symptoms of MDD in Rottenberg et al. (2019).

criterion. The present finding reiterates that full symptom recovery does not guarantee high well-being, and that people with priori psychopathology do not automatically experience psychological well-being after symptoms have remitted. Mental health treatments aimed solely at symptom reduction may benefit from the inclusion of interventions designed to help people thrive. Few people in the clinical group met the criteria for OWB in the domains of negative and positive affect. Affect may be the most difficult dimensions of well-being for individuals with psychopathology to reach very high levels of. This is consistent with emotional dysfunction being at the core of anxiety and depression (Coifman and Summers, 2019). However, people with psychopathology value other aspects of their well-being besides affect. Patients with depression report wanting more positive self-perceptions (e.g., self-acceptance), healthy social functioning (e.g., positive relationships), and agency (e.g., autonomy) (Chevance et al., 2020). These non-affective dimensions of well-being may be more common for people with prior psychopathology to reach high levels of. The baseline mean differences in well-being between the clinical group and healthy group indicate the smallest differences for autonomy, personal growth, and purpose in life. Interventions that target these well-being dimensions may be fruitful for helping people live rich and meaningful lives after psychopathology (e.g., well-being therapy; Fava, 2016).

4.4. Who experiences OWB?

We found that baseline well-being did not predict a greater likelihood of OWB 10 years later. While the impact of baseline well-being was significant when only controlling for demographics, the impact decreased and become non-significant upon controlling for baseline anxiety symptom severity. Surprisingly, anxiety symptoms were not significant either suggesting that perhaps OWB after anxiety is caused by phenomena not measured in the present study. This contrasts with what was found for depression where baseline well-being retained a significant effect on OWB after accounting for both baseline depressive and anxiety symptoms (Rottenberg et al., 2019). Note, the discrepancy is not solely due to the complete cases sample sizes ($n = 124$ vs. $n = 239$) since similar predictors resulted in only half the Pseudo-R^2 for anxiety (18.5%) compared with depression (40.7%). Although transdiagnostic models are popular within research on internalizing psychopathology, this discrepancy in findings highlights that the path to OWB may differ across anxiety and depressive disorders. While the path from experiencing MDD to well-being may involve a return to reacting to emotionally provocative stimuli, the path from anxiety disorders to well-being may involve a reduction in emotional reactivity. Regardless of how someone reaches OWB, we found that participants with OWB after anxiety experienced significant increases in well-being over time and did not simply start with higher well-being at baseline.

4.5. Limitations and future directions

Several limitations should be noted. First, the MIDUS study used the CIDI-SF to assign psychiatric diagnoses. The assessment criteria do not align perfectly with the DSM-III-R criteria (or the DSM-5) (American Psychiatric Association, 2013). For example, CIDI-SF items fail to assess persistent worry about having another panic attack, concerns about the implications of panic symptoms (e.g., "I'm going crazy", "I'm having a heart attack"), or behavioral changes due to panic attacks (e.g., excessive avoidance). As such, results related to PD should be interpreted with caution. When applying stricter, DSM criteria, the prevalence of OWB may be lower than found here for PD. Second, attrition from Wave 1 to 2 led to relatively small subsamples of individuals with full data at Wave 2 who met diagnostic criteria for anxiety or depressive disorders at Wave 1. For this reason, as well as OWB after psychiatric diagnoses being a new area of research, we elected to minimize Type II errors and not to control for multiple comparisons; however, Type I errors are still a concern and future researchers will need to replicate our findings – especially those involving domain-specific OWB. Nevertheless, it is possible that participants who were most burdened by mental health concerns were too impaired to complete Wave 2 measures, resulting in biased rates of remission and OWB. Differential OWB rates across GAD, PD, MDD and other disorders warrant further investigation with larger samples and multi-method measurement approaches of high functioning/well-being (e.g., informant reports, experience sampling in daily life; Rottenberg et al., 2018). We hope this work inspires greater interest in the possibility of high functioning after psychopathology. Researchers and clinicians must seek to better understand contributors to OWB, which may be less common in GAD, to eventually increase the well-being of those diagnosed with anxiety and depressive disorders in the United States.

Data statement

The raw data and R code that support the findings of this study are openly available on the Open Science Framework under the project "Estimating and Predicting Thriving Status in the Aftermath of Anxiety Disorders: A 10-Year Longitudinal Investigation (https://osf.io/puq8f/) within the folder "JAD Initial Submission".

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CRediT authorship contribution statement

David J. Disabato: Methodology, Software, Formal analysis, Data curtion, Writing – original draft, Writing – review & editing. **Todd B. Kashdan:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing, Supervision, Project administration. **James D. Doorley:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing. **Kerry C. Kelso:** Writing – review & editing. **Kristina M. Volgenau:** Data curtion, Writing – review & editing. **Andrew R. Devendorf:** Writing – review & editing. **Jonathan Rottenberg:** Project administration.

Conflicts of interest

All authors declare that they have no conflicts of interest.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jad.2021.05.009.

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