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Relation Between Cognitive and Behavioral Strategies and Future Change in Common Mental Health Problems Across 18 Years

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Major depressive disorder (MDD), generalized anxiety disorder (GAD), and panic disorder (PD), constitute common mental disorders that may have chronic and disabling courses. Cognitive and behavioral theories posit that lack of engagement in certain strategies (goal persistence, self-mastery, positive reappraisal) increases vulnerability toward these disorders. Further, scar effect theories assert that experiencing more of these disorders may diminish engagement in such strategies within individuals across time. However, dynamic longitudinal associations between cognitive–behavioral strategies (CBS) and disorder counts across adulthood are not well understood. Using bivariate latent difference score models, this study aimed to test the dynamic trajectories between disorder counts and each CBS across 18 years. Participants were 3,294 community-dwelling adults ages 45.62 years (SD = 11.41, range = 20–74; 54.61% female) who took part in 3 waves of measurement spaced 9 years apart. Self-mastery, disorder counts, and their change were not significantly related. However, higher within-subject increase in goal persistence (but not self-mastery or positive reappraisal) led to greater future decline in disorder counts, but not vice versa. Last, within individuals, greater prior levels of goal persistence and positive reappraisal predicted larger subsequent reduction in disorder counts, and vice versa. The reciprocal, bidirectional associations between specific CBS (goal persistence, positive reappraisal) and disorder counts support both vulnerability and scar models of depression and anxiety. Treatments for MDD, GAD, and PD should attempt to enhance perseverance and optimism. Theoretical and clinical implications are further discussed.

General Scientific Summary

Greater within-subject increased goal persistence (but not positive reappraisal or self-mastery) led to larger future declines in disorder counts. However, within-subject change in disorder counts did not substantially influence future change in each cognitive or behavioral strategy. Further, higher initial levels of goal persistence and positive reappraisal (but not self-mastery) predicted subsequent larger decrease (or smaller increase) in disorder counts, and vice versa.

Keywords: chronicity, depression, anxiety, strategy, latent difference

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Major depressive disorder (MDD), generalized anxiety disorder (GAD), and panic disorder (PD) subsume a latent cluster distinctly marked by pervasive and dysregulated negative affect (Waszczuk, Kotov, Ruggero, Gamez, & Watson, 2017). These disorders place persons at risk for a wide array of cardiovascular, respiratory, neuroendocrine, and autoimmune diseases (Denollet, Pedersen, Vrints, & Conraads, 2013; Hausteiner et al., 2010). Moreover, such clinical syndromes incur substantial costs in terms of in-

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This study was conducted in compliance with American Psychological Association ethical standards in the treatment of human participants and approved by the Institutional Review Board (IRB). Informed consent was obtained from participants as per IRB requirements at Harvard University, Georgetown University, University of California at Los Angeles, and University of Wisconsin. Because this study used a publicly available data set, it was exempt from IRB approval.

Additional analyses, as well as all syntax, results, and Open Science Framework references, are provided in the online supplemental materials. The data used in this publication were made available by the Data Archive on University of Wisconsin—Madison Institute on Aging. Since 1995 the Midlife Development in the United States study has been funded by the John D. and Catherine T. MacArthur Foundation Research Network, National Institute on Aging Grant P01-AG020166, and National Institute on Aging Grant U19-AG051426. The original investigators and funding agency are not responsible for the analyses or interpretations presented here. The authors do not have any conflicts of interest or financial disclosures.

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creased health care utilization, suicidality, disability, unemployment, and absenteeism (Birnbaum et al., 2010; Nepon, Belik, Bolton, & Sareen, 2010; Newman, Llera, Erickson, Przeworski, & Castonguay, 2013). Enhancing the understanding of the relations between these disorders and cognitive or behavioral strategies (CBS) is thus essential.

Convictions that one has the capacity to direct processes and outcomes of multiple life domains (self-mastery; Bandura, 2012; Lachman & Weaver, 1998) and persevering in goal-striving despite hardships (goal persistence; Wrosch, Heckhausen, & Lachman, 2000) predict fewer mental disorders. Further, viewing the bright side of unfortunate events (positive reappraisal; Lambert, Graham, Fincham, & Stillman, 2009) is associated with lower psychopathology. Thus, decreased frequencies of MDD, GAD, and PD relate to either directly addressing the issue at hand (problem-focused coping) or interpreting events adaptively (emotion-focused coping; Folkman & Moskowitz, 2004). These tactics also reflect degree of perceived control. Self-mastery and goal persistence are attempts to mold the environment (primary control), whereas positive reappraisal enables people to alter themselves to suit the situation (secondary control; Heckhausen, 1997). Taken together, goal persistence and self-mastery reflect problem-focused primary control strategies, whereas positive reappraisal is a form of emotion-focused secondary control. Self-mastery, goal persistence, and positive reappraisal are theorized and shown to be malleable targets and mechanisms of change in cognitive–behavioral therapy (Bandura, 1977, 1988, 2012; Craske et al., 2009; Gallagher et al., 2013; Goldin et al., 2012; Zautra et al., 2012). Collectively, higher level of engagement in these cognitive and behavioral tactics tends to be linked to fewer disorders. Accordingly, improving the understanding of these changeable CBS constructs is important.

Multiple theories propose how anxiety and depressive disorders can precede, be a consequence of, or relate dynamically to deficits in CBS repertoire. The triple vulnerability model postulates that dysregulated worry, panic, and depression are intrinsically linked to inadequate efforts toward self-mastery, positively reappraising adversities, or pressing on toward one's goals across time (Barlow, 2000, 2002). The learned helplessness theory (Maier & Seligman, 2016) proposes that disorders of anxiety and depression are prospectively connected to hopelessness, pessimism, diminished motivation, and behavioral inactivity. Goal-based coping models (Carver & Connor-Smith, 2010) argue that anxiety and depressive disorders tend to correspond with lack of problem-focused coping in controllable situations (reducing the chance of self-mastery across time) and inadequate emotion-focused coping in uncontrollable situations. Further, these prevalent forms of psychopathology tend to dovetail with goal disengagement that hinders opportunities for learning to cope with distress. In the context of inalterable stressors, however, emotion-focused coping (i.e., positive reappraisal) is entwined with reduced presence of MDD, GAD, and PD. At the same time, experience of anxiety or depressive disorders without intervention can entrench certain maladaptive habits, mindsets, and attitudes (cf. scar effect theories; Lewinsohn, Steinmetz, Larson, & Franklin, 1981; Uliaszek et al., 2012).

A wealth of between-subjects evidence supports these theories. Several two-wave longitudinal studies showed that higher self-mastery was associated with greater future depressive symptoms across individuals (e.g., Elliot, Thrash, & Murayama, 2011; Maciejewski, Prigerson, & Mazure, 2000; Martinent et al., 2017). Persons who adopted more (vs. less) attitudes of taking charge and maintaining hope despite difficulties displayed less subsequent MDD, GAD, and PD symptoms (Arnau, Rosen, Finch, Rhudy, & Fortunato, 2007; Wei, Russell, & Zakalik, 2005). Engaging in positive reappraisal was also associated with lower depressive symptoms following 6−12 weeks (Lambert, Fincham, & Stillman, 2012), and having more mastery goals was related to less academic anxiety a year later (Daniels et al., 2008). Persevering toward career-related goals predicted less negative affect after 6 months (Hamm, Perry, Chipperfield, Stewart, & Heckhausen, 2015). Further, enhanced self-mastery, perseverance, and positive reappraisal among caregivers predicted greater psychological well-being approximately a decade later (Litzelman, Tesauro, & Ferrer, 2017). Also, substantiating scar models, persons with elevated depression and anxiety showed increased future patterns of negative thinking and deficits in goal pursuit and self-efficacy (McCarty, Vander Stoep, & McCauley, 2007; Sowislo & Orth, 2013). As such, deploying adaptive CBS is longitudinally closely associated with less presence of anxiety and depression.

Nonetheless, these nomothetic regression analyses do not speak to dynamic change within subjects. Because these cognitive–behavioral models assume idiographic (intraindividual) trajectories, it is essential to apply suitable statistical techniques to make accurate deductions (Molenaar & Campbell, 2009). Analyses focused on within-subject variation are important to examine within-subject change, establish temporal precedence, and draw causal (vs. correlational) inferences (Hamaker, Kuiper, & Grasman, 2015). Latent difference (or change) score (LDS) modeling (Curran, Howard, Bainter, Lane, & McGinley, 2014; Grimm, Ram, & Estabrook, 2017) is a cutting-edge, data-analytic approach that partials out within- and between-subjects variance by combining cross-lagged panel and latent growth curve models (LGCMs; McArdle, 2009; Meredith & Tisak, 1990). To this end, LDS models allow for inferences of causality and *within*-subject change as well as controlling for regression to the mean (Wright et al., 2015). However, only a few studies have employed LDS analyses and thus can attest to the stated cognitive–behavioral theories. Those that have used these analyses nonetheless found that within subjects, higher levels and shifts in perseverance, mastery beliefs, and reappraisal predicted more future decrease in generalized anxiety, panic, and depressive symptoms (Hayes-Skelton, Calloway, Roemer, & Orsillo, 2015; Radkovsky, McArdle, Bockting, & Berking, 2014; Teachman, Marker, & Smith-Janik, 2008; Wirtz, Radkovsky, Ebert, & Berking, 2014). Plausibly, adaptive CBS and disorder counts may be reciprocally dynamically linked across time.

We thus used bivariate dual LDS analyses to investigate dynamic intraindividual links between CBS and disorder counts (frequency of MDD, GAD, or PD) in a large adult sample. Notably, these theories likely apply to the etiology, maintenance, and treatment of many disorders (Brown et al., 2014; Mineka & Oehlberg, 2008; Zoellner, Pruitt, Farach, & Jun, 2014). However, because the current study was a secondary analysis, this necessarily limited us to the dataset, which included diagnoses of only MDD, GAD, and PD. Nonetheless, our study offers novel contributions to the literature. First, compared to prior studies, we used a longer, 18-year period to examine the dynamic relations between disorder counts and CBS. This advances understanding of the chronic remitting−relapsing course of these disorders (e.g., Eaton et al., 2008; Hardeveld, Spijker, De Graaf, Nolen, & Beekman, 2010; Yonkers, Bruce, Dyck, & Keller, 2003). Further, the community sample herein extends studies conducted on clinical treatment-seeking samples (e.g., 14-year study by Ramsawh, Raffa, Edelen, Rende, & Keller, 2009). Also, identifying naturalistic growth trajectories of specific strategies connected to reductions in disorder counts may help to refine treatment. Collectively, testing these relations may advance cognitive and behavioral theories (Clark & Beck, 2010; Kanter et al., 2010; Leyro, Zvolensky, & Bernstein, 2010). Overall, such analyses can test the putative coupling between each CBS and disorder count across time within subjects.

On the basis of the outlined rationale and evidence, we tested two overarching hypotheses to extend the understanding of the dynamic, within-subject associations between each CBS (self-mastery, goal persistence, positive reframing) and disorder counts. Based on cognitive vulnerability theories (Hong & Cheung, 2015), Hypothesis 1 asserted that within subjects, increasing or heightened engagement in a specific CBS would predict larger future decrease in disorder counts. In Hypothesis 2, based on scar effect models (Burcusa & Iacono, 2007), we predicted that within subjects, high or increased disorder counts would lead to more subsequent decline in CBS.

Method

Participants

The current study used the Midlife Development in the United States (MIDUS) dataset with three waves of data collection: 1995−1996 (Time 1 [T1]), 2004−2005 (T2), 2012−2013 (T3; Ryff et al., 2017). Because this study used a publicly available dataset, it was exempt from Institutional Review Board approval. Sample sizes were 7,108 at T1; 4,963 at T2; and 3,294 at T3 (see Vittengl, 2017, for information on attrition and missing data). The 3,294 adults in the current sample participated in all three waves. Individuals averaged 45.62 years (SD = 11.41, range = 20–74), 54.61% were female, and 42% were college-educated. Ethnic distribution was 89.01% White; 3.25% African American; and 7.73% Native American, Asian, Pacific Islander, or others. Dropout versus completer analyses are presented in the online supplemental materials.

Measures

Goal persistence. The five-item Persistence in Goal-Striving scale (Wrosch et al., 2000) was used to measure goal persistence. Items (e.g., "When I encounter problems, I don't give up until I solve them") were rated on a 4-point scale ranging from 0 (*not at all*) to 3 (*a lot*). Cronbach's alphas were .760, .773, and .784 at T1, T2, and T3, respectively.

Self-mastery. The four-item Personal Mastery scale (Lachman & Weaver, 1998), which tapped into self-efficacy (e.g., "I can do just anything I really set my mind to"), was used to assess self-mastery. Items were rated on a 7-point scale ranging from 0 (*strongly disagree*) to 6 (*strongly agree*). Cronbach's alphas were .730, .744, and .745 at T1, T2, and T3, respectively.

Positive reappraisal. The four-item Positive Reappraisal scale (Wrosch et al., 2000) was used to assess positive reappraisal. Items (e.g., "I can find something positive, even in the worst situations") were rated on a 4-point scale ranging from 0 (*not at all*) to 3 (*a lot*). Cronbach's alphas were .799, .786, and .773 at T1, T2, and T3, respectively. Table 1 presents the items of the CBS measures.

Disorder counts. Diagnoses for past 12-month MDD, GAD, and PD at each wave were made using the Composite International Diagnostic Interview—Short Form (CIDI−SF; Kessler, Andrews, Mroczek, Ustun, & Wittchen, 1998; Wittchen, Zhao, Kessler, & Eaton, 1994) based on criteria in the *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed., rev.; *DSM–III–R;* American Psychiatric Association, 1987). Specificity and sensitivity of the CIDI−SF for MDD were 93.9 and 89.6, respectively. For GAD, specificity was 99.8 and sensitivity was 96.6, and for PD, specificity was 99.5 and sensitivity was 90.0 (Kessler et al., 1998). Disorder counts was defined as the number of current disorders, ranging from 0 (*absence of disorders*) to 3 (*presence of all three disorders*).

Table 1
Items of Each of the Specific CBS Measure

Construct	Item	Coding scheme
Persistence in goal striving	1. When things don't go according to my plans, my motto is, "Where there's a will, there's a way."	0 = *Not at all*
	2. When faced with a bad situation, I do what I can do to change it for the better.	1 = *A little*
	3. Even when I feel I have too much to do, I find a way to get it all done.	2 = *Some*
	4. When I encounter problems, I don't give up until I solve them.	3 = *A lot*
	5. I rarely give up on something I am doing, even when things get tough.	
Positive reappraisal	1. I find I usually learn something meaningful from a difficult situation.	0 = *Not at all*
	2. When I am faced with a bad situation, it helps to find a different way of looking at things.	1 = *A little*
	3. Even when everything seems to be going wrong, I can usually find a bright side to the situation.	2 = *Some*
	4. I can find something positive, even in the worst situations.	3 = *A lot*
Self-mastery	1. I can do just about anything I really set my mind to.	0 = *Strongly disagree*
	2. When I really want to do something, I usually find a way to succeed at it.	1 = *Somewhat disagree*
	3. Whether or not I am able to get what I want is in my own hands.	2 = *Disagree*
	4. What happens to me in the future mostly depends on me.	3 = *Neither agree nor disagree*
		4 = *Agree*
		5 = *Somewhat agree*
		6 = *Strongly agree*

Note. CBS = cognitive and behavioral strategies.

Data Analyses

To ensure adequate power, we performed a priori Monte Carlo simulations (gold standard approach for power analyses; Muthén & Muthén, 2002; Thoemmes, MacKinnon, & Reiser, 2010) mirroring our study conditions. Power was based on an effect size of Cohen's $d = .10$ for level and change of CBS predicting change in disorder count, and vice versa. After 20,000 replications per condition, we found 94.8% to 95.1% chance to detect all within-subject regression estimates.

Next, we conducted a series of structural equation models using the *lavaan* package in R (Rosseel, 2012). First, we assessed whether the study variables were time-invariant. To examine longitudinal measurement invariance, we used the weighted least square estimator with means and variances adjusted given the ordinal nature of the data. Configural invariance was tested with confirmatory factor analyses (CFAs) during each wave. Subsequently, we performed multiple-wave CFAs for all waves concurrently based on these factor structures: one-factor model for each CBS and three-factor model of all CBS. Next, we progressively tested the more restrictive multiple-wave CFAs to determine whether factor loadings (Λs) were equal across waves (metric invariance) and whether both Λs and intercepts (τs) were equal across waves (scalar invariance). Last, we examined whether Λs, τs, and residual variances (εs) were equal across waves (strict invariance). A statistically significant $\Delta\chi^2$ difference test (i.e., χ^2 value for the constrained model is greater than for the unconstrained model) indicates the data fit substantively worse than for the unconstrained model (Bollen, 1989). However, because $\Delta\chi^2$ is sensitive to large sample sizes despite trivial misfit changes, we used change in practical fit indices to test invariance at each step (Cheung & Rensvold, 2002; Meade, Johnson, & Braddy, 2008). Change in comparative fit index (ΔCFI) values of $\leq$–.010, change in root-mean-square error of approximation (ΔRMSEA) values of $\leq$.015, and change in standardized root-mean-square residual (ΔSRMR) of $\leq$.030 from the unconstrained to constrained model reflects measurement invariance (Chen, 2007; Cheung & Rensvold, 2002).

Next, we conducted bivariate dual LDS models to test the longitudinal within-subject directional relations between each CBS and disorder counts. Advantages of this approach included accounting for temporal precedence, allowing for causal inferences, controlling for regression to the mean, and modeling true change by adjusting for measurement error (Grimm et al., 2017; McArdle, 2009; McArdle, Hamagami, Chang, & Hishinuma, 2014). To test our hypotheses, we focused three bivariate LDS models on the within-subject change-to-change regression effects (δs; impact of T1–T2 change in a CBS on T2–T3 change in disorder counts, and vice versa). Three other bivariate LDS models centered on within-subject level-to-change coupling effects (γs; impact of the level of a construct on subsequent change in the other construct). Thus, our bivariate dual LDS models were based on model parsimony, practical fit indices, and theory.[1] Figure 1 illustrates our bivariate LDS models.

For all LDS models, full information maximum likelihood with robust standard errors were used to handle missing data, appropriate under the missing at random assumption (Enders & Bandalos, 2001). We provided unstandardized regression coefficients (*b*s) and robust *SE*s. Alpha values were set at .01 instead of the typical .05 level given the large sample size. To assess model fit, we used these structural equation modeling (SEM) fit indices and heuristic cutoffs (Kline, 2016a, 2016b): CFI $\geq$ .95 (Bentler, 1990; McDonald & Marsh, 1990), RMSEA $\leq$ .060 (Browne & Cudeck, 1993; Steiger, 1990), and SRMR $\leq$ .050 (Hu & Bentler, 1999).

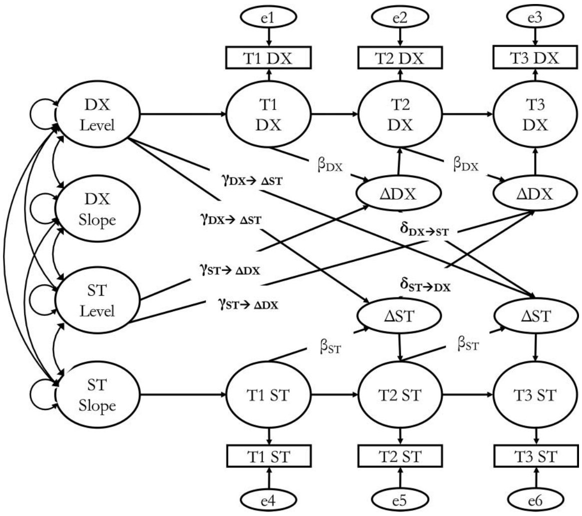

Figure 1. Bivariate dual latent change score model of a specific cognitive or behavioral strategy and disorder counts. Construct may be either a specific cognitive or a behavioral strategy (self-mastery, goal persistence, positive reappraisal) or disorder counts in terms of counts of major depressive disorder, generalized anxiety disorder, or panic disorder, ranging from 0 (*absence of disorder*) to 3 (*presence of all 3 disorders*). The γ and δ estimates represent the most important parameter estimates to test study hypotheses, as they indicate that either level or change in one construct impacts change in the other construct. T1–T3 = Time 1–Time 3; ST = cognitive or behavioral strategy; DX = disorder counts; α = constant change; β = proportional effect; γ = level-to-change coupling effect; δ = change-to-change effect.

Results

Longitudinal Measurement Invariance

Across all waves, there was equivalence of factor structure (configural invariance), Λs (metric invariance), τs (scalar invariance), and εs (strict invariance). Table 2 presents the fit indices for all invariance models for the three-factor model (see the online supplemental materials for more information on measurement invariance for each of the one-factor models). Based on acceptable absolute and relative fit indices, strict invariance was supported. Latent CBS variables were

[1] Self-feedback loops may be removed from latent difference score analyses if there is a theoretical rationale (Grimm, An, McArdle, Zonderman, & Resnick, 2012; Grimm, Ram, & Estabrook, 2017). Inherent to CBS and scar theories are feedback loops. Given that such feedback loops are not a confound to examining dynamic effects of cognitive–behavioral strategies on disorder counts (and vice versa), it would be theoretically inconsistent to control for them in our models. Thus, we did not include the proportional change effects (βs). Further, we did not include the regression change-to-change effects (δs) and coupling effects (γs) in the same model, because both estimates were highly collinear, rendering the resulting parameter estimates uninterpretable.

Table 2

Longitudinal Measurement Invariance of Cognitive and Behavioral Strategies (CBS) Across Time (Standardized Estimates)

Model	χ^2	*df*	*p*	CFI	RMSEA	SRMR
Three-factor model of CBS						
Time 1	516.075	62	<.001	.978	.049	.046
Time 2	508.530	62	<.001	.978	.050	.047
Time 3	395.927	62	<.001	.982	.045	.041
Configural (varying Λ, τ, ϵ across time)	1,410.921	186	<.001	.980	.048	.045
Metric invariance (equal Λ, varying τ, ϵ across time)	1,531.652	206	<.001	.978	.048	.046
Scalar invariance (equal Λ, τ, varying ϵ across time)	1,662.495	226	<.001	.976	.047	.048
Strict invariance (equal Λ, τ, ϵ across time)	1,713.251	252	<.001	.976	.045	.050
Configural invariance vs. metric invariance	$\Delta\chi^2(20) = 121.00$, $p < .001$, ΔCFI $= -.001$, ΔRMSEA $= -.0005$, ΔSRMR $= .0018$					
Metric invariance vs. scalar invariance	$\Delta\chi^2(20) = 131.00$, $p < .001$, ΔCFI $= -.002$, ΔRMSEA $= -.0003$, ΔSRMR $= .0015$					
Scalar invariance vs. strict invariance	$\Delta\chi^2(26) = 50.756$, $p = .003$, ΔCFI $= -.0004$, ΔRMSEA $= -.002$, ΔSRMR $= .0015$					

Note. Λ represents the factor loading; τ represents the intercept; ϵ represents error variance. CBS = cognitive and behavioral strategies; CFI = comparative fit index; RMSEA = root-mean-square error of approximation; SRMR = standardized root-mean-square residual.

thus assessed on the same scale across each wave, and the latent scores can be meaningfully compared across various time points.

Bivariate Latent Difference Score (LDS) Models

Tables 3 and 4 show change-to-change (δs) and coupling effects (γs) estimates, respectively (lengthier versions of analyses including other estimates are in the online supplemental materials). The input R syntax for all models herein have been uploaded to the Open Science Framework at https://osf.io/syr4n/?view_only=7a0cad41c5af4686a7e234980f25e040. All six bivariate LDS models showed excellent fit. Larger future decline in disorder counts was significantly predicted by bigger increase in goal persistence ($b = -.727$, $SE = .281$, $z = -2.585$, $p = .010$) but not positive reappraisal ($b = -.341$, $SE = .260$, $z = -1.311$, $p = .190$) or self-mastery ($b = .056$, $SE = .166$, $z = .339$, $p = .735$). Change in disorder counts did not affect future change in goal persistence ($b = -.998$, $SE = .498$, $z = -2.002$, $p = .045$), self-mastery ($b = 1.100$, $SE = 1.501$, $z = .733$, $p = .464$), or positive reappraisal ($b = -2.759$, $SE = 2.081$, $z = -1.326$, $p = .185$).

Degree of baseline self-mastery did not predict change in future disorder counts (T1 self-mastery → T1–T2 change in disorder counts: $b = .496$, $SE = .412$, $z = 1.205$, $p = .228$; T2 self-mastery → T2–T3 change in disorder counts: $b = .322$, $SE = .472$, $z = .682$, $p = .495$). Likewise, disorder counts did not lead to future change in self-mastery (T1 disorder counts → T1–T2 change in self-mastery: $b = .860$, $SE = .613$, $z = 1.404$, $p = .140$; T2 disorder counts → T2–T3 change in self-mastery: $b = .883$, $SE = .626$, $z = 1.409$, $p = .159$). However, self-mastery did not change across time (see expanded Tables 3 and 4 in the online supplemental materials).

Higher degree of goal persistence significantly prospectively led to greater subsequent reduction in disorder counts (T1 goal persistence → T1–T2 change in disorder counts: $b = -.885$, $SE = .246$, $z = -3.599$, $p < .001$; T2 goal persistence → T2–T3 change in disorder counts: $b = -.903$, $SE = .252$, $z = -3.584$, $p < .001$). Further, more disorder counts substantially predicted larger subsequent decrease in goal persistence (T1 disorder counts → T1–T2 change in goal persistence: $b = -1.175$, $SE = .264$, $z = -4.457$,

Table 3

Bivariate Latent Difference Score Models to Assess Within-Subject Change-to-Change Coupling Effects

Coupling and model fit	Goal persistence		Self-mastery		Positive reappraisal	
	β	(*SE*)	β	(*SE*)	β	(*SE*)
Within-subject coupling (change-to-change) effects (γs)						
$\delta\ \Delta ST_{T1-T2} \rightarrow \Delta DX_{T2-T3}$	$-.727^{**}$	(.281)	.056	(.166)	−.341	(.260)
$\delta\ \Delta DX_{T1-T2} \rightarrow \Delta ST_{T2-T3}$	−.998	(.498)	1.100	(1.501)	−2.759	(2.081)
Model fit indices						
χ^2	34.097		27.399		52.917	
df	8		8		7	
p	<.001		.001		<.001	
CFI	.990		.990		.986	
RMSEA	.038		.035		.049	
SRMR	.019		.024		.024	
AIC	24,576.974		36,008.794		26,517.612	
SABIC	24,632.500		36,064.320		26,576.060	

Note. $N = 3{,}294$. Construct may either be a specific strategy or disorder counts. T1−T3 = Time 1−Time 3; ST = cognitive or behavioral strategy; DX = disorder counts; CFI = comparative fit index; RMSEA = root-mean-square error of approximation; SRMR = standardized root-mean-square residual; AIC = Akaike information criterion; SABIC = sample-adjusted Bayesian information criterion.

** $p < .01$.

Table 4
Bivariate Latent Difference Score Models to Assess Within-Subject Level-to-Change Coupling Effects

Coupling and model fit	Goal persistence β	Goal persistence (*SE*)	Self-mastery β	Self-mastery (*SE*)	Positive reappraisal β	Positive reappraisal (*SE*)
Within-subject coupling (level-to-change) effects (γs)						
γ $ST_{T1} \rightarrow \Delta DX_{T1-T2}$	$-.885^{***}$	(.246)	.860	(.613)	$-.675^{***}$	(.180)
γ $ST_{T2} \rightarrow \Delta DX_{T2-T3}$	$-.903^{***}$	(.252)	.883	(.626)	$-.686^{***}$	(.184)
γ $DX_{T1} \rightarrow \Delta ST_{T1-T2}$	-1.175^{***}	(.264)	.496	(.412)	-1.528^{***}	(.370)
γ $DX_{T2} \rightarrow \Delta ST_{T2-T3}$	-1.356^{***}	(.285)	.322	(.472)	-1.587^{***}	(.402)
Model fit indices						
χ^2	5.097		24.220		12.177	
df	4		6		4	
p	.277		<.001		.016	
CFI	1.000		.994		.997	
RMSEA	.012		.033		.032	
SRMR	.013		.023		.024	
AIC	24,542.984		35,995.903		26,478.611	
SABIC	24,610.200		36,057.273		26,545.826	

Note. $N = 3{,}294$. ST = cognitive or behavioral strategy; DX = disorder counts; CFI = comparative fit index; RMSEA = root-mean-square error of approximation; SRMR = standardized root-mean-square residual; AIC = Akaike information criterion; SABIC = sample-adjusted Bayesian information criterion.
*** $p < .001$.

$p < .001$; T2 disorder counts → T2–T3 change in goal persistence: $b = -1.356$, $SE = .285$, $z = -4.763$, $p < .001$).

Higher positive reappraisal substantially forecasted decreased disorder counts (T1 positive reappraisal → T1–T2 change in disorder counts: $b = -.675$, $SE = .180$, $z = -3.760$, $p < .001$; T2 positive reappraisal → T2–T3 change in disorder counts: $b = -.686$, $SE = .184$, $z = -3.722$, $p < .001$). Moreover, higher disorder counts significantly predicted larger subsequent decreases in positive reappraisal (T1 disorder counts → T1–T2 change in positive reappraisal: $b = -1.528$, $SE = .370$, $z = -4.129$, $p < .001$; T2 disorder counts → T2–T3 change in positive reappraisal: $b = -1.587$, $SE = .402$, $z = -3.947$, $p < .001$).

Discussion

This study was the first to examine the within-subject prospective directional relations using bivariate dual LDS models among disorder counts, specific CBS, and their change over 18 years. Thus, it extends prior research (e.g., Hong, Lee, Tsai, & Tan, 2017) on coping strategy–symptom severity links that used LGCMs, which provide information on only correlational, between-subjects effects. We found that higher increase in only goal persistence (but not self-mastery or positive reappraisal) led to greater future decline in disorder counts. Conversely, change in disorder counts did not influence future change in each CBS. Also, within subjects, higher (vs. lower) goal persistence and positive reappraisal prospectively predicted greater future reduction in disorder counts. Moreover, higher disorder counts led to larger subsequent declines in goal persistence and positive reappraisal. Notably, these reciprocal level-to-change coupling effects were observed for goal persistence and positive reappraisal but not self-mastery.

Thus, level of self-mastery, disorder counts, and their change did not mutually impact each other. These results are counterintuitive because they do not align with self-efficacy models (e.g., Bandura & Locke, 2003), which argue that self-mastery and psychopathology are inversely associated across time within subjects. However, in our study, general self-mastery did not change. This may have precluded our ability to find relationships between change in self-mastery and disorder counts (and vice versa). Our inability to replicate prior findings of bidirectional within-subject change in self-mastery and symptom severity may also be due to these prior relationships' being found in the context of a treatment study as well as their use of a mastery measure specific to symptoms of the disorder treated (e.g., Gallagher et al., 2013). Perhaps any impact of self-mastery on psychopathology will occur only when aided with the provision of specific treatment skills by a therapist. This notion is consistent with the finding that self-mastery over panic symptoms was a mechanism by which therapy skills led to change in panic disorder symptoms (Gallagher et al., 2013). Future research can try to test these ideas.

Our finding of a relationship between change or level of goal persistence and subsequent change in disorder counts implies that heightened or increasing perseverance toward aspirations despite setbacks ameliorates or cultivates resilience against MDD, GAD, and PD. Tolerating challenges toward goal attainment led to steeper decreases in disorder counts because it enhanced willingness to metaphorically "roll with the punches." In doing so, people were less likely to be gridlocked by future-focused worry or past-centered ruminative brooding that fed into pseudo-problem-solving tendencies. Instead, tenacious goal pursuits can foster effective problem-solving approaches as people become more mindful of how their daily affairs, actions, and habits are instrumental in achieving their dreams. Moreover, tenacity in goal-striving may embolden people to take calculated risks despite the possibility of failure. Therefore, people are likely to expand their vistas and bring forth positive experiences and opportunities into their lives by taking chances and displaying fortitude. These findings also support the tenets of behavioral activation theories (Dimidjian, Barrera, Martell, Muñoz, & Lewinsohn, 2011; Ferster, 1973) and exposure therapy principles (Abramowitz, 2013). These models highlight the importance of putting oneself in various feared situations to learn to cope with distress and disconfirm negative expectancies. Our data are also consistent with emerging evidence on the efficacy of behavioral activation treatments for chronic worriers (e.g., Chu et al., 2016). Taken together, perseverance fosters a sense of purposefulness that results in sharper reductions in frequency of disorders.

Several possibilities can explain why level of positive reappraisal led to subsequent change in disorder counts and disorder count levels resulted in prospective change in positive reappraisal. Generally, this finding aligns with the optimism literature, such that more sanguine and hopeful people tend to have fewer mental health problems (Chopik, Kim, & Smith, 2015). Applying positive reappraisal when undergoing adversities nurtures optimism and the feeling that life is meaningful, comprehensible, and manageable, thus contributing to fewer disorder counts over time. Positive reappraisal may thus develop individuals' inner resources by helping them be more accepting toward uncontrollable life stressors. Moreover, focusing on the bright side can directly decrease worry, depression, and anxiety. Attending to aspects over which one has influence can motivate one to adopt or maintain healthy lifestyles and habits. These assertions are consistent with evidence that positive reappraisal and optimism dampen rises in negative affect and depressive symptoms (Lambert et al., 2009, 2012). Last, positive reappraisal may facilitate optimal processing of all aspects of the evidence to make realistic assessments.

Why level but not change in positive reappraisal affected future change in disorder counts merits attention. The long 9-year period may explain the discrepancy, because the dynamic change-to-change effects between disorder counts and positive reappraisal are likely to occur across shorter occasions (e.g., days, weeks, months; Butler, Gross, & Barnard, 2014; Nezlek & Kuppens, 2008). Observing increased shifts in positive reappraisal contributing to more reduction in disorder counts hence unfolds across specific contexts or events occurring at smaller timescales. However, general tendency toward positive reappraisal may facilitate longer term change in disorder counts. Future work with varying time lags should examine these ideas.

Remarkably, more disorder counts predicted steeper decreases in perseverance and positive reappraisal. This buttresses scar effect theories; that is, presence of untreated psychopathology increases future negative, pessimistic interpretive styles and behavioral repertoire deficits (Lewinsohn et al., 1981). It also accords with studies showing elevated symptomology led to more subsequent self-sabotaging actions, hopelessness, and thinking errors (Kindt, Kleinjan, Janssens, & Scholte, 2015). This observation occurs particularly across long durations (LaGrange et al., 2011). However, unlike in previous studies, we included categorical diagnoses and used within-subject, bivariate LDS models across three waves in a large, community adult sample. Thus, we extended prior two-wave regression models on the relations between CBS and dimensional symptom severity or episodes in children, adolescents, and young adults (Burcusa & Iacono, 2007; Stewart et al., 2004). On the whole, findings support bidirectional models of risk factors and disorder presence (e.g., Calvete, Orue, & Hankin, 2013).

The clinical applications of our study merit attention. To facilitate treatment, clinicians should help clients to metaphorically view the glass as half full (Korn, Sharot, Walter, Heekeren, & Dolan, 2014) and integrate personal goals within the treatment frame (cf. Michalak & Holtforth, 2006). For instance, a key message to relay continually in therapy is the vicious cycle caused by goal disengagement (e.g., giving up on important projects), which may offer temporary emotional relief but increase risk of disorder recurrence as regret and disappointment set in. Another important point to communicate is that boosting patients' optimism and resilience via perseverance in goal-striving despite obstacles will inevitably generate positive mood states and a sense of purpose. Doing so curtails the negative self-perpetuating effect of worry, panic, and depression symptoms. Absence of any clinical diagnoses of anxiety and depression in turn fosters more motivation to accomplish tasks and expand one's capabilities, thereby promoting confidence. Last, the transition from early to middle and middle to late adulthood presents more interpersonal, occupational, and financial autonomy as well as physical health changes. Individuals who habitually practice these strategies may thus be better able to manage aging-related demands better than those who do not.

Our study had several shortcomings. First, our data cannot speak to whether patterns found here apply to disorders other than MDD, GAD, and PD. It is possible that more positive reappraisal and goal persistence might also lead to reduced posttraumatic stress, social anxiety, and alcohol use disorder symptoms (e.g., Hawley, Rector, & Laposa, 2016; Smyth, Hockemeyer, & Tulloch, 2008; Worley et al., 2012). Future research should replicate these analyses with a wider range of disorders. Second, unmeasured third variables (e.g., genetic tendency toward disorders) may have explained the findings. Third, with the long 9-year interval, shifts in disorder status or CBS between waves may have been missed. Further, CIDI−SF scales were based on the *DSM–III–R*. Changes to the criteria with the *DSM–5* (American Psychiatric Association, 2013) could alter the findings (e.g., endorsing five out of nine depressive symptoms compared to four out of seven for MDD). Replication with the *DSM–5* is thus needed.

Key strengths of this report include use of reliable and valid measures, strong statistical power, bivariate dual LDS approach, and long duration. To conclude, findings clarified the dynamic longitudinal within-subject relations among the naturalistic trajectories of specific CBS and disorder counts across 18 years of adulthood. Heightened tenacious goal pursuit and positive reappraisal led to larger future reductions in disorder counts (and vice versa) within subjects. Although change in disorder counts had no effect on change in each CBS, larger increased goal persistence forecasted steeper subsequent declines in psychopathology.

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