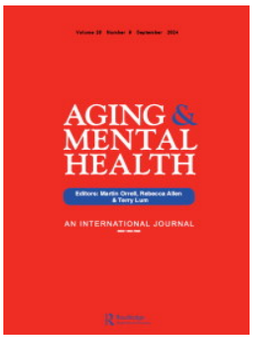

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Longitudinal changes in coping strategies across midlife and older adulthood: findings from the midlife in the United States study

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ABSTRACT

Objectives: Most studies examining age differences in coping across adulthood come from cross-sectional studies and focus on the broader categories of problem- and emotion-focused coping. We aimed to establish a factor structure for coping items used in a national, longitudinal study of aging (MIDUS) and examine age patterns in coping strategies over 10 years.

Method: We performed exploratory and confirmatory factor analysis, and factorial invariance testing. Next we conducted a series of multilevel models for each coping factor with participants from waves II and III of the MIDUS study ($N = 2{,}661$, $M_{age} = 55$, 58% women, 84% White).

Results: We found a four-factor solution: instrumental action; denial/disengagement; positive reappraisal; focus and venting of emotions. Invariance was established across time and age. At baseline, age was positively associated with the use of three strategies, though younger adults used more focus and venting of emotions. There was an overall decrease over 10 years in use of all strategies, which was moderated by age. Positive reappraisal declined more steeply among midlife participants, whereas the remaining strategies declined more for older participants.

Conclusion: Results highlight the multi-dimensionality of MIDUS coping items and underscores the import of age in understanding changes in coping across midlife and older adulthood.

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KEYWORDS
Positive reappraisal; instrumental action; coping effort; psychological well-being; factorial invariance

Midlife has become increasingly more stressful (Almeida et al., 2020), which has consequences for physical health in later life *via* biological stress responses (e.g. higher levels of inflammation, which are a major risk factor for chronic conditions; Liu et al., 2017). Daily stress underscores one pathway in which midlife influences physical and mental well-being in later life (e.g. Almeida, 2024; Infurna et al., 2020; Lachman et al., 2015).

However, other aspects of stress processes such as coping—attempts to manage or solve stressful situations (Lazarus & Folkman, 1984)—are important for optimal aging (Aldwin & Igarashi, 2016). Certain coping strategies are linked with inflammation among older adults; for example, instrumental action predicted lower daily cortisol output (O'Donnell et al., 2008). Thus, how one copes with stress is vital in understanding what psychological processes can be leveraged to promote and explain well-being in mid- and later life.

While there is ample evidence documenting how coping develops across the lifespan (e.g. Aldwin et al., 2023), such knowledge largely comes from cross-sectional studies (Aldwin et al., 2021). Thus, far less is known about how coping *changes* with age, compared with age differences in use of coping strategies. Further, age differences in coping may depend on the type(s) of strategies invoked. Research often acknowledges two types of coping strategies: problem- and emotion-focused (efforts focused on solving external problems and tending to [negative] emotions, respectively; Lazarus & Folkman, 1984), while additional strategies remain understudied (see Skinner et al., 2003). Thus, the current study examined (1) how use of multiple coping strategies changed across a 10-year period, and (2) if age (at baseline) moderated this change. We addressed these aims using the Midlife in the United States (MIDUS) study, a nationally recruited, longitudinal of study of US adults focused on social, behavioral, and psychological factors that predict differences in well-being and health during mid- and later life.

Theories of coping across adulthood

Theories focused on how coping changes across the lifespan largely come from developmental theories of adaptation (see Aldwin et al., 2023). For example, the motivational theory of lifespan development (Heckhausen et al., 2010; Schulz & Heckhausen, 1996) connotes use of primary control strategies (efforts to control the environment, e.g. *I don't give up until I solve the problem*) increase through midlife, stabilize, then decrease in older adulthood, which has been mirrored in longitudinal studies of general control beliefs (Cerino et al., 2023; Lachman et al., 2009). Secondary control strategies (changing oneself to align with environmental forces, e.g. *I remind myself I can't do everything*) follow a similar pattern but remains stable through later life. Primary and secondary control roughly reflect problem- and emotion-focused coping, respectively.

Second, the strength and vulnerability integration (SAVI; Charles, 2010) model and socioemotional selectivity theory (SST; Carstensen et al., 2003) suggest age-related advantages in use of emotional-related strategies, albeit due to different underlying processes. Third, the coping, appraisal, and resilience in aging (CARA; Aldwin & Igarashi, 2016) model postulates coping is a resilience process that facilitates resilient/optimal aging outcomes. In sum, theoretical perspectives link changes in coping with shifts in other psychological constructs amidst

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developmental gains and losses that arise as people grow older (Baltes et al., 1999). Based on these theories, we expect MIDUS participants in midlife should remain stable in use of problem- and emotion-focused strategies, whereas older adult participants will decrease in their use of problem-focused strategies but remain stable in their use of emotion-focused coping.

Coping and aging

Skinner et al. (2003) identified over 100 different coping strategies, which are typically sorted into broader categories; the large number of strategies is due, in part, to different naming mechanisms across measures. There are three coping categories that are central to this study.

Problem-focused

Problem-focused coping reflects behaviors and cognitions directed to managing or solving a problem (Lazarus & Folkman, 1984), including planning (e.g. *making a plan of action*) and restraint strategies (e.g. *wait for the right time to do something*; Carver et al., 1989). Age differences in use of problem-focused coping across adulthood are mixed: some research suggests inverse age associations (Trouillet et al., 2011), while another reported older adults used less problem solving than midlife participants (Meléndez et al., 2012). Another study found age differences for some (e.g. restraint coping) but not all subscales of problem-focused coping (e.g. planning; Phillips et al., 2014).

Results for how use of problem-focused coping changes over time are also inconsistent. Across 20 years, Brennan et al. (2012) observed a decline in use of problem-focused strategies (e.g. problem solving) across late-midlife and older adulthood, though there were no analyses focused on age differences in this change. However, across a shorter study period of five years, sexagenarians showed an increase in use of problem-focused coping strategies, but a decrease was observed among octogenarians (Martin et al., 2008). Although cross-sectional studies suggest different age patterns for problem-focused coping, longitudinal studies suggest eventual decline, warranting a closer examination into the capacity for age differences in change among mid- and later life adults.

Emotion-focused

Emotion-focused coping strategies are aimed at tending to (negative) emotional responses and reactions (Lazarus & Folkman, 1984). Examples include denial (e.g. *refuse to believe it happened*), focusing and venting of emotions (e.g. *get up and let emotions out*), and acceptance (e.g. *get used to the idea that it happened*; Carver et al., 1989). Results are mixed regarding age differences: though most studies suggest less use among older participants (Phillips et al., 2014; Segal et al., 2001), one study found no age differences in use of emotion-focused strategies (Trouillet et al., 2011). These differences may be in part due to the specific strategies measured, as Phillips et al. found inverse age associations for some (e.g. mental disengagement), but not all strategies (e.g. denial). When age was categorized into young-, mid-, and later life, younger adults used more emotion expression than older adults and reported higher levels of avoidance than both midlife and older adult participants (Meléndez et al., 2012).

These inverse age associations appear to extend to longitudinal studies. Use of suppression (delaying emotion expression until an appropriate time) increased across young adulthood and midlife, and decreased from 60-65 onward (Diehl et al., 2014). This decline in later life mirrors decreased use of emotion-focused strategies over 20 years across older adulthood (Brennan et al., 2012). Thus, emotion-focused coping seems to be used less often across the lifespan.

Positive reappraisal

Positive reappraisal coping (e.g. *grew as a person in a good* way; Folkman et al., 1986), reflects cognitive strategies to create positive meanings when faced with stress (Park & Folkman, 1997). Age differences are mixed, as studies with lifespan samples suggest null differences (Meléndez et al., 2012; Phillips et al., 2014; Trouillet et al., 2011). However, over 20 years, late-midlife and older adults decreased in use of this specific strategy (Brennan et al., 2012). While evidence for age differences seem sparse, it appears positive reappraisal might decrease across adulthood.

MIDUS coping studies

The current study uses a national, longitudinal study of aging—MIDUS—to examine how coping changes across mid- and later life. Previous MIDUS coping studies are largely cross-sectional and connected coping with physical or psychological health. One longitudinal study found (1) higher problem- and emotion-focused coping (labeled avoidance and approach, respectively) were linked with increases in the same category and decreases in the opposite (e.g. higher problem-focused predicted greater use in follow-up, but less emotion-focused coping) and (2) older baseline age was associated with increases in only emotion-focused coping (Toyma & Hektner, 2023). However, as reviewed above, coping categories can be further expanded beyond problem- and emotion-focused, which could produce varying age differences and provide a more complete understanding of how coping changes across adulthood. To our knowledge, the factor structure of the MIDUS coping items has only been validated twice and both were cross-sectional; further, one of these studies had already created subscale scores (Nikolaev et al., 2023) and the other focused on a select number of individual items (Oh & Yang, 2021).

As such, we aimed to establish a factor structure using all coping items and examine whether this structure is stable across time, along with age, to better understand the aforementioned age patterns found in a prior MIDUS study (Toyma & Hektner, 2023). Establishing a factor structure of these items is critical, given recent evidence from a systemic review (Solberg et al., 2022) that the number of factors varies greatly and over 50% of studies found a solution that did not align with Carver et al. (1989) original factors.

Present study

Given that some (stressful) experiences in mid- and later life may are novel (e.g. caregiving for an aging parent; Lachman et al., 2015), it stands to reason that coping may also change and vary across adulthood. Further, given that older adults' exhibit "poorer" physiological stress responses (i.e. Charles, 2010) and that some coping strategies appear to buffer such reactions (O'Donnell et al., 2008), understanding how coping

changes can provide insight into potential health promotion efforts as people grow older. Age differences *versus* change in coping across adulthood often produce different patterns of results, often relying on local convenience samples. This raises questions about if such trends are applicable in a sample of nationally recruited adults, like MIDUS. Thus, the present study addresses the following questions:

1. What factor structure provides the best fit for the coping items in the MIDUS sample?
2. Are there age differences in coping strategies at baseline?
3. How does use of coping strategies change over 10 years?
4. Are there age differences in how coping effort changes, both linear and non-linear, across time?

Method

Procedure and sample

We used publicly available data (https://www.icpsr.umich.edu/web/ICPSR/series/203) from the MIDUS Survey project (https://midus.wisc.edu/). MIDUS began in 1995 and recruited adults aged 25-74 from the contingent United States through random digit dialing ($n = 7108$) to understand health and well-being across adulthood. At the second wave of data collection, an additional 592 Black participants from Milwaukee, WI were recruited. Participants completed a survey approximately every 10 years, resulting in three waves of longitudinal data (I: ~1995; II: ~2005; III: ~2015); the survey project was approved by the University of Wisconsin-Madison Institutional Review Board (#2016-1051).

At MIDUS II, a coping measure was added to the protocol. After removing participants who were missing on all coping items at both ($n = 1,965$) or one wave ($n = 352$), we restricted the analytic sample to participants who completed the coping measures at both timepoints ($N = 2,661$, $n_{observations} = 5,322$; Table 1). This adult lifespan sample ($M_{age} = 54.56$, $SD = 11.20$, Range = 30-84 years) was mostly women (58%), White (84%), married (69%), and completed ≤ associate degree (67%). We examined how the analytic sample varied from those who did not complete both coping assessments ($n = 2,317$, 47% of MIDUS II participants). The analytic sample was slightly younger and included a higher proportion of the Milwaukee sample, women, participants who identified as White, and had completed a bachelor's degree or higher.

Measures

Coping strategies

Participants indicated what "*Best describes how you usually experience a stressful event*" on 24 items from the Coping Orientation to Problems Experienced Inventory (COPE; Carver et al., 1989) at waves II and III (see Table 2 for complete list of items). Response options ranged from 1 (*a lot*) to 4 (*not at all*); all items were reverse-scored and higher scores indicated more frequent use of that strategy. The six COPE Inventory subscales included in the MIDUS study were: Active; Planning; Positive Reinterpretation and Growth; Denial; Behavioral Disengagement; Focus on and Venting of Emotions.

Demographics

All demographics reflect responses provided at wave II: **age** (continuous variable centered at baseline mean of 55 years), **sample type** (0 = Core, 1 = Milwaukee), **race** (1 = *White*, 2 = *Black*, 3 = *Other*[*Native American or Alaska Native; Asian; Native Hawaiian or Pacific Islander; Other*]), **gender** (0 = *men*, 1 = *women*), and **education** (1 = ≤ *high school*, 2 = < *bachelor's*, 3 = *bachelor's degree*, and 4 = > *bachelor's [some graduate school—professional degree]*).

Data analyses

Exploratory factor analysis (EFA)

Given inconsistencies in how the COPE Inventory is utilized across MIDUS studies, we ran an EFA with geomin rotation in Mplus Version 8 (Muthén & Muthén, 1998–2017) to determine whether

Table 1. Demographics of analytic sample (N = 2661) and comparisons with excluded participants (N = 2317).

	Analytic Sample ($n = 2661$)					Excluded Participants ($n = 2317$)			
	N	%	M	SD		N	%	M	SD
MIDUS Sample					$X^2(1) = 3.78$*				
Core	2405	90.38				2055	88.69		
Milwaukee	256	9.62				262	11.31		
Age					$t(4975) = -2.47$*				
Wave II			54.56	11.20				55.43	11.20
Wave III			63.86	11.14					
Gender					$X^2(1) = 17.93$**				
Women	1543	57.99				1205	52.01		
Race					$X^2(5) = 39.30$**				
White	2247	84.44				1797	77.59		
Black	312	11.72				375	16.19		
Other	102	3.83				144	6.22		
Education					$X^2(3) = 83.93$**				
≤ High school	857	32.24				941	40.68		
≤ Associate's degree	767	28.86				751	32.47		
Bachelor's degree	541	20.35				334	14.44		
Advanced education	493	18.55				287	12.41		
Marital Status									
Married	1831	68.81			$X^2(4) = 23.99$**	1482	64.04		
Separated	57	2.14				56	2.42		
Divorced	338	12.70				359	15.51		
Widowed	164	6.16				203	8.77		
Never married	269	10.11				214	9.25		

*$p < 0.05$, **$p < 0.001$.

Table 2. Factor loadings for four factor EFA and fit statistics for CFA with modification indices.

	Factor 1: Instrumental Action	Factor 2: Denial and Disengage-ment	Factor 3: Positive Reappraisal	Factor 4: Focus and Venting of Emotions
Concentrate my efforts.	**0.674***	−0.040*	0.176*	0.060*
Make plan of action	**0.751***	0.00	0.058*	0.031*
Take additional action	**0.781***	0.130*	0.027*	0.00
Take direct action to get around problem	**0.658***	0.141*	0.080*	−0.058*
Try to come up with strategy	**0.874***	0.050*	0.042*	0.013
I think about how to best handle problem	**0.689***	−0.01	0.222*	0.012
Do what has to be done	**0.477***	−0.065*	0.381*	0.025
I think hard about the experiences	**0.602***	−0.046*	0.267*	0.084*
Admit to self can't deal and quit	−0.304*	**0.507***	0.085*	0.117*
Pretend it hasn't happened	0.009	**0.862***	−0.138*	−0.130*
Give up attempt	−0.361*	**0.477***	0.118*	0.120*
Refuse to believe it happened	0.028	**0.767***	−0.120*	0.014
Give up trying to reach goal	−0.350*	**0.447***	0.068*	0.191*
I say to myself this isn't real	0.052*	**0.617***	−0.061*	0.119*
Act as though it hasn't happened	−0.017	**0.816***	−0.044*	−0.251*
Reduce amount of effort	−0.352*	**0.472***	0.139*	0.044*
Learn something from experiences	0.123*	−0.073*	**0.740***	0.013
See in different light	0.098*	0.145*	**0.667***	−0.125*
Try to grow	0.160*	−0.057*	**0.652***	0.006
Look for something good.	−0.012	0.102*	**0.820***	−0.154*
Get upset and really aware	0.022	0.159*	−0.116*	**0.673***
Let feelings out	0.01	−0.034*	0.139*	**0.753***
Feel a lot of emotional distress and express	0.009	0.154*	−0.068*	**0.694***
Get upset and let emotions out	−0.036*	0.027	−0.031*	**0.837***
Fit Statistics (CFA)				
Log Likelihood	−81254.58			
Bayesian Information Criteria (BIC)	165475.31			
RMSEA	0.049			
CFI	0.94			
TLI	0.93			

Note. Modification indices were added above 50.

statistically relevant subscales emerged from the data. Eigenvalues, between 1—6 factors, were plotted on a scree plot to determine the most appropriate number of factors. We then examined fit statistics for the suggested number of factors (one above and below that number) to determine a tentative number of factors.

Confirmatory factor analysis (CFA)

To confirm the tentative number of factors from the EFA, we ran three CFAs in Mplus Version 8 to determine whether the best factor model from the EFA remained the best fit. Global model fit was tested with −2 Log Likelihood (−2LL), root mean square error of approximation (RMSEA), comparative fix index (CFI), and Tucker Lewis index (TLI). Modification indices were added (to determine if addition of parameter[s] improve model fit) one at a time, if initial models did not obtain acceptable fit, to ensure models were not over-fit.

Configural, weak, and strong invariance testing across waves and age. We tested for measurement invariance across waves II and III, as well as across younger (30–44), midlife (45–64), and older adults (65+), to test if factors were interpreted the same across time and age groups. Configural invariance tests whether the number of factors and loading patterns are similar across waves or groups. To fit configural invariance, we fit the CFA model with the best factor structure for each wave or group, leaving all factor loadings and item intercepts free to vary. Then, we compared fit statistics—ΔX^2 and CFI—for significant differences. Weak (i.e. metric) invariance tests whether factor loadings are the same across waves or groups. To test for weak measurement invariance, we constrained the factor loadings to be equivalent across waves or age groups. Item intercepts remained freely varied. Significant differences in model fit from the configural model indicate that invariance was not met. Strong (i.e. scalar) invariance tests for measurement bias across the waves or groups. To test for strong measurement invariance, we added item intercept constraints for equivalence and compared change in model fit once more.

Primary analyses

Given the nested structure of the data (two waves of assessment nested within 2,661 people) we utilized multilevel modeling (MLM) with SAS PROC MIXED (SAS version 9.4; SAS Institute Inc, 2013) to address remaining research questions. Separate models for average use of each coping strategy as the outcome were computed. We utilized maximum likelihood (ML) estimation to handle missing data (which was quite small, ranging from 0.02% [instrumental action] to 10% [gender]) and unstructured covariance matrices. ML provides several advantages over other estimation techniques (e.g. utilizes all available data without requiring averaging of participant data) and is a common tool for use with longitudinal models (for more information, see Hoffman & Stawski, 2009). Models additionally included a random intercept.

The following model tested research questions two and three pertaining to age differences in coping and longitudinal change across two waves:

$$\text{Level 1(wave)}: CopingStrategy_{ij} = \beta_{0i} + \beta_{1i}\left(Wave_{ij}\right) + e_{ij}$$

$$\begin{aligned}\text{Level 2(person)}: \beta_{0i} &= \gamma_{00} + \gamma_{01}\left(Sample_i\right) + \gamma_{02}\left(Education_i\right) \\ &+ \gamma_{03}\left(Race_i\right) + \gamma_{04}\left(BaselieAge_i\right) \\ &+ \gamma_{05}\left(BaselineAge_i * BaselineAge_i\right) + u_{0i} \\ \beta_{1i} &= \gamma_{10} + u_{1i}\end{aligned}$$

Each coping strategy from the CFA (see above) for person *i* was regressed on $Wave_{ij}$ to provide an estimate for longitudinal change in coping across two waves of MIDUS. Sample $type_i$ (Core or Milwaukee), $education_i$, $race_i$, and linear ($BaselineAge_i$) and quadratic ($BaselineAge_{i*}$ $BaselineAge_i$) baseline age were included as between-person (level 2) covariates.

Next, we tested whether change in coping was moderated by age differences:

$$\text{Level 1 (wave)}: CopingSubscale_{ij} = \beta_{0i} + \beta_{1i}\left(Wave_{ij}\right) + e_{ij}$$

$$\begin{aligned}\text{Level 2 (person)}: \beta_{0i} &= \gamma_{00} + \gamma_{01}\left(Sample_i\right) + \gamma_{02}\left(Education_i\right) \\ &+ \gamma_{03}\left(Race_i\right) + \gamma_{04}\left(BaselineAge_i\right) \\ &+ \gamma_{05}\left(BaselineAge{*}BaselineAge_i\right) + u_{0i} \\ \beta_{1i} &= \gamma_{10} + \gamma_{11}\left(BaselineAge_i\right) \\ &+ \gamma_{12}\left(BaselineAge{*}BaselineAge_i\right) + u_{1i}\end{aligned}$$

This equation differs in that we included linear ($BaselineAge_i$) and quadratic ($BaselineAge_{i*}$ $BaselineAge_i$) baseline age as between-person moderators for change in coping.

Results

Factor structure of coping items

EFA

Eigenvalues plotted in a scree plot suggested that the best solution was a four-factor solution (1 = 8.2, 2 = 4, 3 = 2, 4 = 1.1, 5 = 1). Factor loadings from this EFA can be found in Table 2.

CFA

We then confirmed the above factor structure. After examining and adding modification indices above 50, global fit statistics were acceptable to good (see Table 2). As such, we utilized a four-factor solution for the 24 coping items. These factors (Supplemental Online Materials, Figure S1) were furthermore known as (1) instrumental action (e.g. *make a plan of action*), (2) denial and disengagement (e.g. *refuse to believe it happened*), (3) positive reappraisal (e.g. *learn something from experience*), and (4) focus and venting emotions (e.g. *let feelings out*).

Factor invariance across age and time

Invariance models can be found in the Supplemental Online Materials (Table S1). The four-factor model showed acceptable fit indices for configural invariance across age groups (young adults, midlife, and older adults), $\chi^2 = 2458.24$ (714), $p < 0.0001$, RMSEA = 0.05, CFI = 0.93, TLI = 0.92, and time, $\chi^2 = 3862.40$ (476), $p < 0.0001$, RMSEA = 0.05, CFI = 0.93, TLI = .92. This suggested that the subscales were similar across both age and time. Next, we tested weak invariance; notably, we compared constrained models for weak invariance to the previous model for configural invariance to test for weak invariance. Changes in chi-square ($\Delta\chi^2_{age} = 34.33$, $\Delta df = 40$; $\Delta\chi^2_{time} = 27.44$, $\Delta df = 20$) and CFI ($\Delta CFI_{age} = 0.00$, $\Delta CFI_{time} = 0.00$), were not statistically significant, suggesting weak invariance. This suggested that the magnitude of factor loadings were similar across age and time, respectively. Finally, we tested for strong invariance by comparing the strong and weak invariance models with changes in chi-square and CFI. Changes in chi-square and CFI were statistically significant for both age ($\Delta\chi^2_{age} = 233.91$, $\Delta df = 56$, $\Delta CFI_{age} = 0.007$) and time ($\Delta\chi^2_{time} = 82.51$, $\Delta df = 19$, $\Delta CFI_{time} = 0.003$). This suggests that intercepts were not equal across age and time.

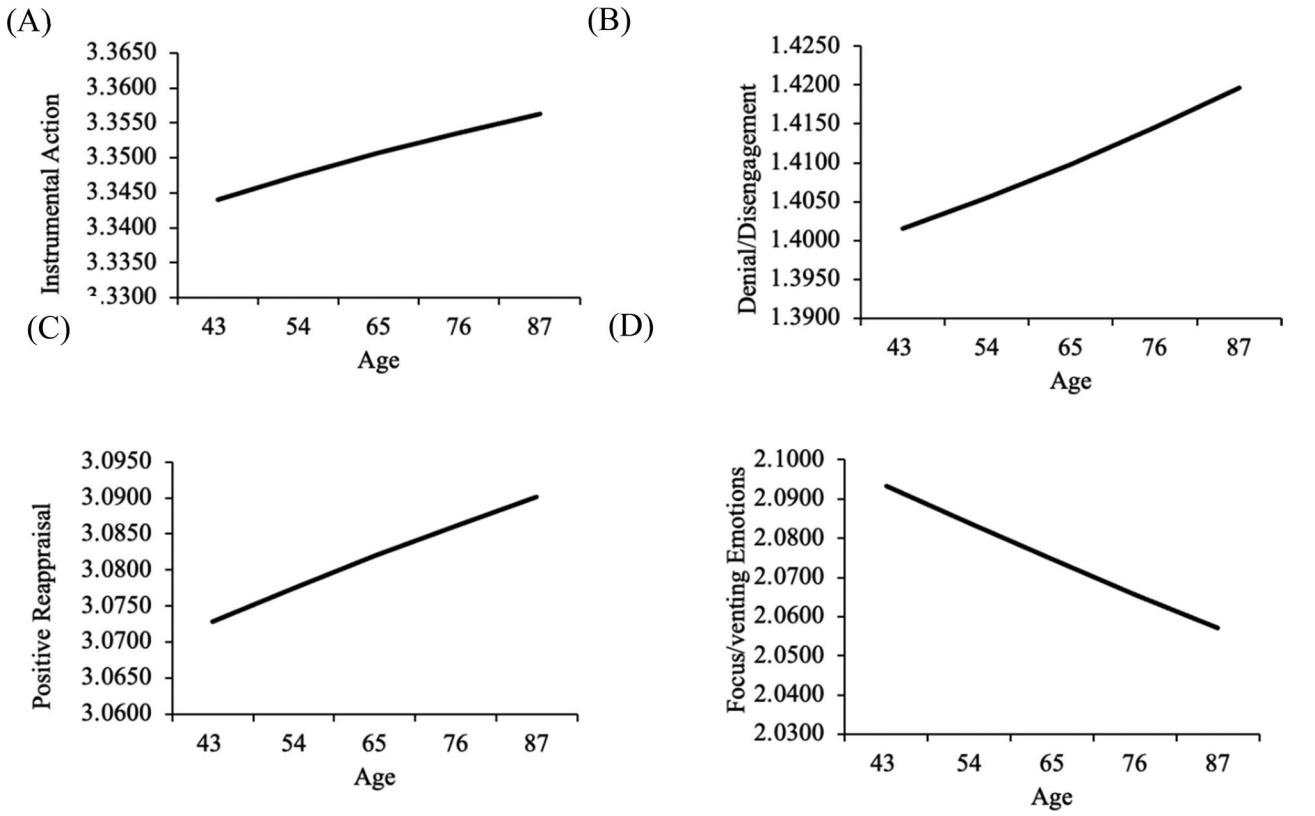

Figure 1. Baseline age differences in average use of coping strategies.
Note. Baseline age differences for all coping factors reflect estimates obtained from Model 1 in Tables S3–S6 in Supplemental Online Materials. Linear and quadratic effects of age were significant for all coping factors and are graphed in above panels.

Initial bivariate correlations between sociodemographic and coping factors

Preliminary correlations (Table S2) suggested that people with higher education reported more instrumental action and positive reappraisal and less denial and disengagement, and focus and venting emotions compared to people with less education. Being older was related to reporting more denial and disengagement and positive reappraisal and reporting fewer focus and venting of emotions, compared to being younger. Women, compared to men, reported more denial/disengagement, positive reappraisal, and focus and venting emotions.

Baseline age differences

Participants who were older reported higher use of instrumental action, denial/disengagement, and positive reappraisal compared to people who were younger (Panels a, b, and c in Figure 1; Tables S3–S5, Model 1) and lower levels of focus and venting of emotions compared to younger participants, $y = 0.005$, $SE = 0.001$ 95% CI: [0.002, 0.01] (panel d in Figure 1). While the quadratic effect of age was also significant for all coping strategies, the terms were quite small (e.g. instrumental action: $y = -0.0001$, [−0.0002, −0.001]); as such, caution should be taken for interpretation of non-linear age effects.

Change in coping over 10 years

Changes in average use of the four coping factors can be found in Tables S3–S6 (Model 1). On average, individuals declined in average use of instrumental action, $y = -0.05$ [−0.08, −0.03], denial/disengagement, $y = -0.05$ [−0.07, −0.02], positive reappraisal, $y = -0.05$ [−0.08, −0.03] and focus and venting of emotions, $y = -0.06$ [−0.09, −0.03] over the 10-year period.

Age differences in change in coping

Instrumental action and positive reappraisal

Linear age was significantly related to declines in instrumental action, $y = -0.003$ [-0.005, −0.001] and positive reappraisal, $y = -0.003$ [-0.005, −0.007] (Tables S3 and S5, Model 2); there was no significant quadratic effects of age moderating change over the 10-year period (Model 3). Using the Johnson-Neyman technique (e.g. Cerino et al., 2023; Johnson & Neyman, 1936; Rast et al., 2014) with 95% confidence bands to infer statistical significance across different baseline ages, regions of significance testing are provided in the bottom panels of Figures 2 and 3. While average use of these strategies declined for the entire sample, the decrease was steeper for participants who were older at baseline.

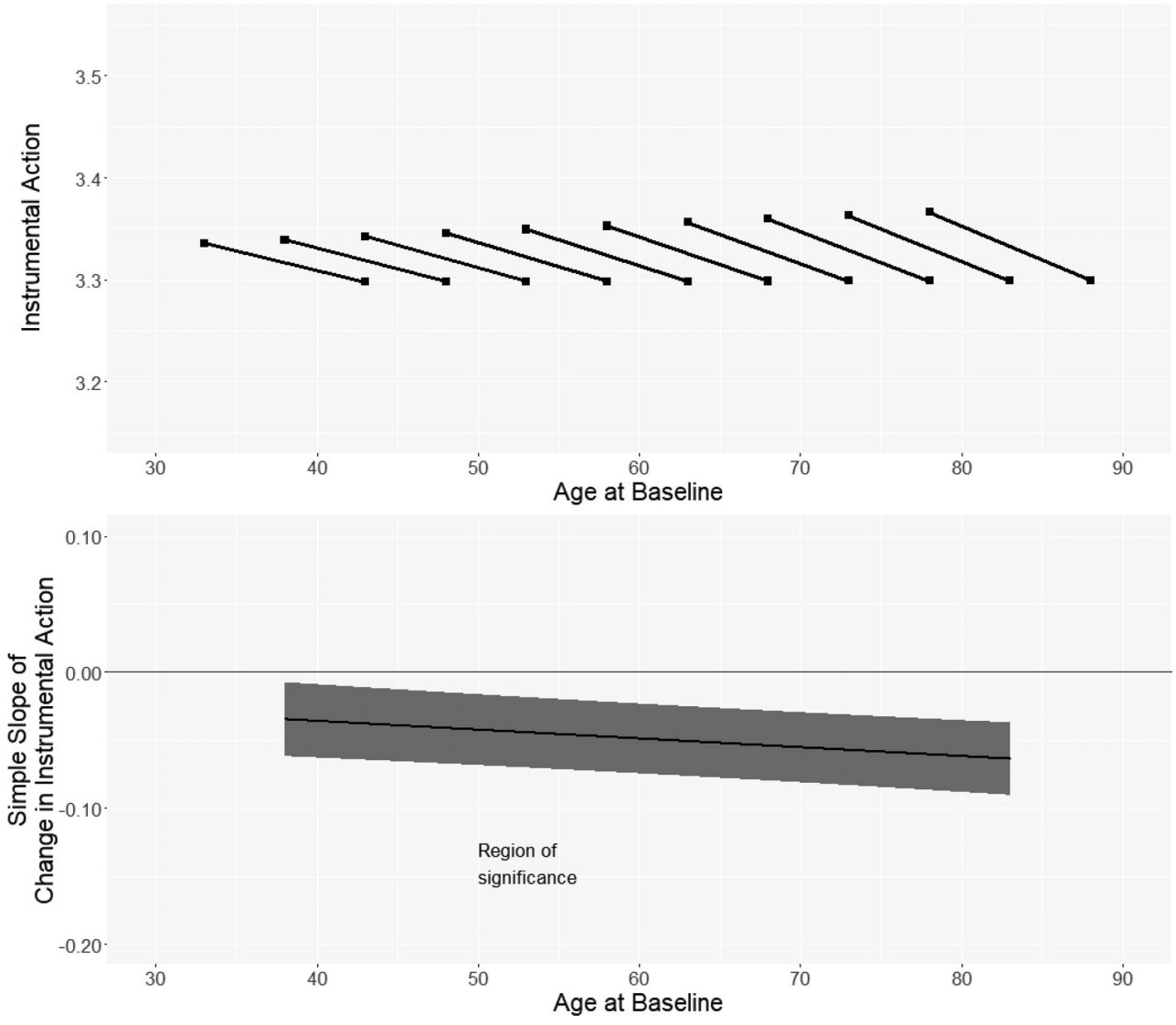

Figure 2. Age differences in change for instrumental action.
Note. The grey band in bottom panel represents 95% confidence intervals to infer statistical significance for the rate of linear change in instrumental action across 10 years for different age groups. As all values fall below 0, the rate of change is significant across all age groups, though slightly steeper for older participants.

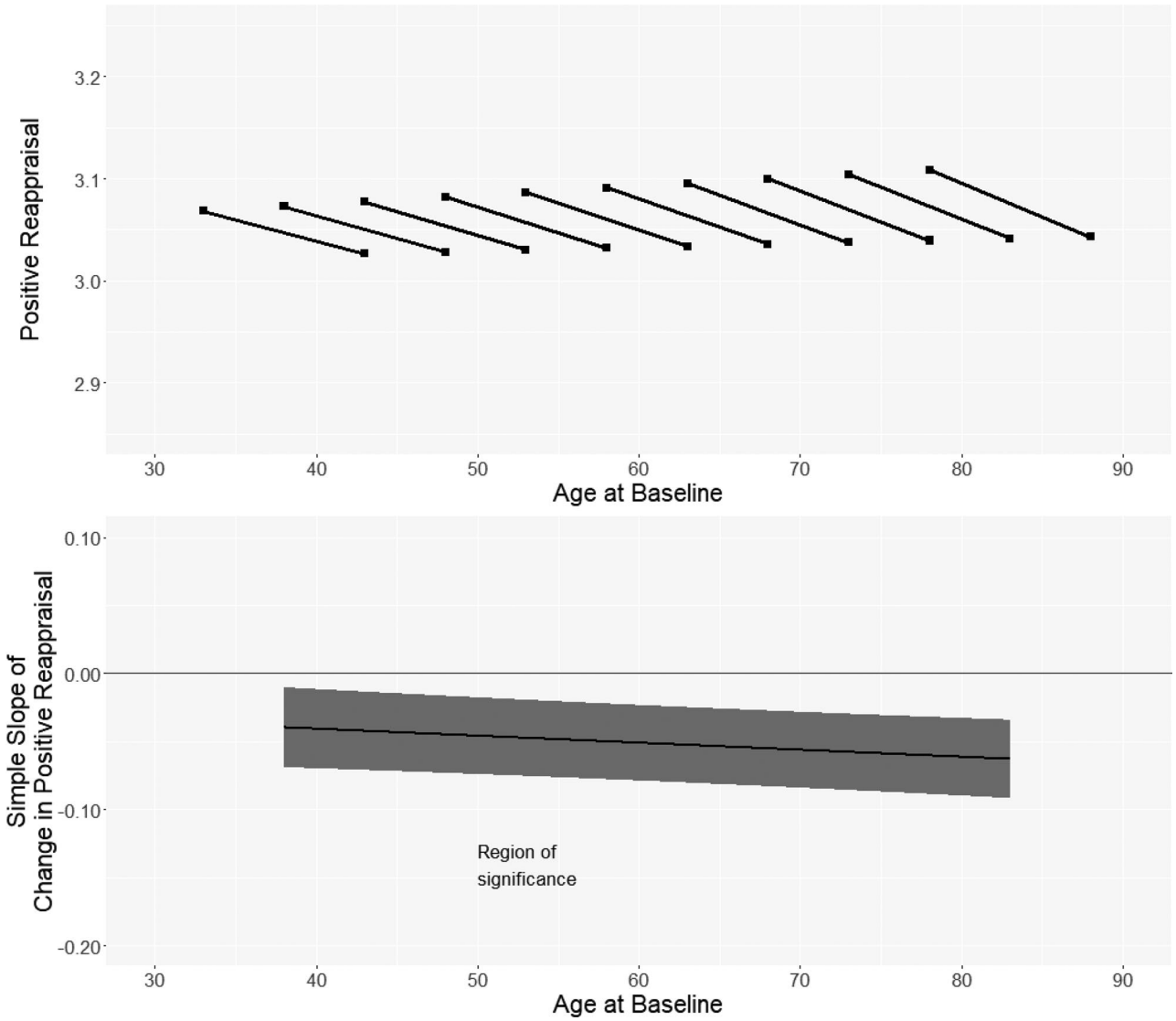

Figure 3. Age differences in change for positive reappraisal.
Note. The grey band in bottom panel represents 95% confidence intervals to infer statistical significance for the rate of linear change in positive reappraisal across 10 years for different age groups. As all values fall below 0, the rate of change is significant across all age groups, though slightly steeper for older participants.

Denial and disengagement

There was preliminary evidence for a positive linear effect of age, $y = 0.003$ [0.002, 0.006], suggesting participants who were older at baseline experienced less of a decrease (Table S4, Model 2). However, once the significant quadratic effect of age was accounted for, $y = 0.002$ [0.0001, 0.0003] (Model 3), linear age was no longer significant. Figure 4 plots this quadratic baseline age moderation (Top Panel) with regions of significance testing using 95% confidence bands to infer statistical significance across different baseline ages (Bottom Panel). While average use declined for the entire sample, the decrease was slightly steeper for midlife participants than individuals in younger and older adulthood at baseline.

Focus and venting of emotions

Although the linear age model suggested no age effect (Table S6, Model 2), the quadratic model found both a linear, $y = -0.005$ [-0.010, −0.001] and quadratic effect of age, $y = 0.0003$ [0.001, 0.0004]. Figure 5 plots this quadratic baseline age moderation (Top Panel) with regions of significance testing using 95% confidence bands to infer statistical significance across different baseline ages (Bottom Panel). While average use of focus and venting of emotions declined for the entire sample over the 10-year period, the decrease was steeper for older adults than the declines for comparatively younger participants.

Discussion

The current study tested whether meaningful sub-scales emerged from a commonly utilized coping measure (COPE Inventory; Carver et al., 1989). Moreover, we expanded upon previous cross-sectional research to better understand how coping changed across time and if this varied by age.

Factor structure of coping items with MIDUS sample

Our first goal was to establish a factor structure and invariance of the coping items in the MIDUS study. Four factors emerged and we established invariance across both time and age, to ensure changes or stability across time were not confounded with a change in factor structure(s).

Two factors loosely fit into problem-focused or approach coping (*instrumental action; positive reappraisal*) and the other two factors reflect emotion-focused or avoidance coping (*denial/disengagement; focus and venting of emotions*). The *instrumental action* factor combined the COPE Inventory's

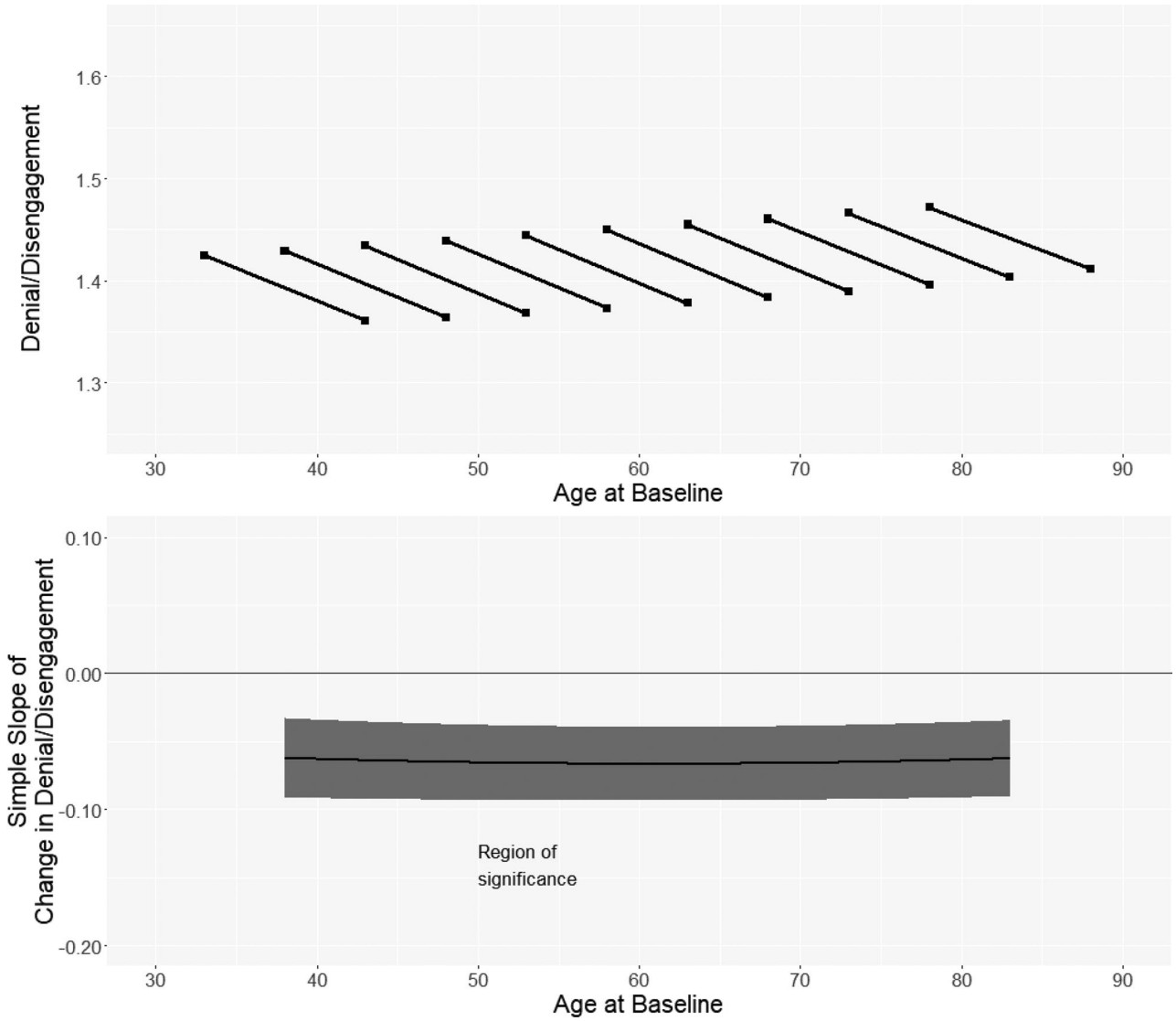

Figure 4. Age differences in change for denial/disengagement.
Note. The grey band in bottom panel represents 95% confidence intervals to infer statistical significance for rate of linear and quadratic change in denial and disengagement across 10 years for different age groups. As all values fall below 0, the rate of change is significant across all age groups, though slightly steeper for midlife participants.

"active" and "planning" subscales, while *denial/disengagement* combined "behavioral disengagement" and "denial" subscales. Notably, *positive reappraisal* and *focus on and venting of emotions* emerged as separate constructs from which they are typically aggregated to create the larger problem- and emotion-focused coping categories, respectively.

These distinctions are important, as studies have established varying effects for health across different coping strategies. For example, anxiety symptoms were significantly lower among older adults who used more positive reappraisal, while planning and active coping were non-significant (Orgeta & Orrell, 2014). Further, although greater use of denial, disengagement, and focus/venting of emotions all predicted shorter lifespan, associations were only significant for the former two and effects were larger (Trudel-Fitzgerald et al., 2022). Thus, further differentiation and specification of coping strategies provide a more complete understanding of well-being across adulthood.

Change in coping strategies across 10 years

Similar to the larger lifespan coping effort literature (see Aldwin et al., 2021), we observed an overall decline in the average rate in which each coping strategy was used. Although this overall decrease in strategies aligns with Brennen and colleagues' (2012) results over a 20-year span, direct comparisons are complicated by use of different coping scales, which use slightly different strategies/items. Our pattern of results also support theorized decreases in primary control strategies, though we did not observe an increase in coping strategies that reflect secondary control (Schulz & Heckhausen, 1996).

One possibility in the overall decline across the four coping strategies is inverse associations between stress and age (e.g. Almeida et al., 2020); thus, as people experience less stress, they report fewer coping strategies. Alternatively, the decline in coping could reflect age-related advantages of "lived experiences" (e.g. Charles, 2010), in that across time, people learn which strategies prove most effective from past stressful experiences and apply this knowledge in current situations. Thus, an interesting line of future research should focus on developmental aspects of coping across adulthood, specifically from prior experiences (e.g. Aldwin & Igarashi, 2016).

It is important to note that declines in coping effort do not suggest "worse" coping among older adults. Though we were unable to examine *coping efficacy*—how well coping strategies

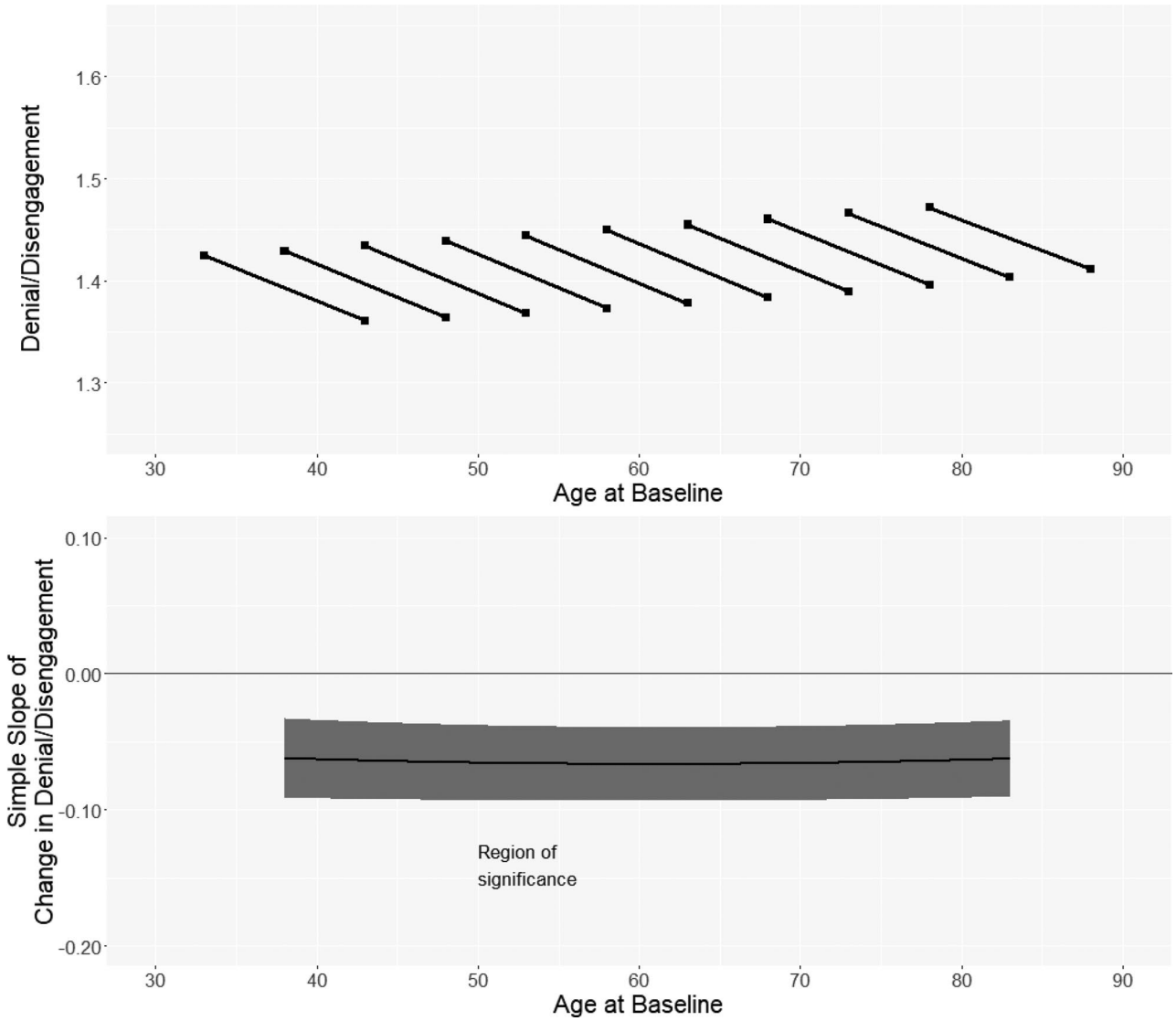

Figure 5. Age differences in change for focus and venting of emotions.
Note. The grey band in bottom panel represents 95% confidence intervals to infer statistical significance for rate of linear and quadratic change in focus and venting of emotions across 10 years for different age groups. As all values fall below 0, the rate of change is significant across all age groups, though slightly steeper for older participants.

work to manage the problem—prior work has shown null age differences, despite inverse associations between age and coping effort among midlife and older adult samples (e.g. Aldwin et al., 2019; Meeks et al., 1989). It will be critical for future work to determine how coping efficacy of the four factors of coping identified here change over time.

Age differences in coping strategies

Baseline

Among older MIDUS participants, use of instrumental action, denial/disengagement, and positive reappraisal was higher, while younger participants used more focus and venting of emotion coping strategies. These results are at odds with other studies focused on age differences, though as noted above, direct comparisons are complicated by different coping inventories used (Trouillet et al., 2011) or a different approach to constructing the coping factors (Phillips et al., 2014). For example, in the latter study, there was an inverse age association for "mental disengagement", but null differences for "behavioral disengagement". Further, Phillips and colleagues categorized their convenience sample into two age groups: younger (18-12) and older (65+) adults, whereas our study's age range spanned 30-98 and over 50% were in midlife (ages 45-64). Thus, given that MIDUS is nationally recruited, our results may better reflect age trends in coping across the adulthood, but especially among mid- and later life.

Longitudinal

Few prior studies have examined age differences in coping across time. For example, Martin et al. (2008) demonstrated that use of problem-focused coping increased across five years for persons in their 60s but decreased among octogenarians. In contrast, our results suggested uniform linear decline for instrumental action, along with positive reappraisal over a 10-year follow-up period (Figures 2 and 3, respectively), similar to Brennan et al. (2012) which examined change over a 20-year period. However, the steeper decline observed for comparatively older participants in our study does align with hypothesized decreases in primary control strategies (e.g. Heckhausen et al., 2010).

A slightly different pattern of results emerged for denial/disengagement and focus/venting of emotions. While the former evidenced slightly larger decreases for midlife participants,

focus and venting of emotions seemed to decrease more for older participants. This pattern overlaps with a recent study using MIDUS participants, which found stability in global control beliefs—perceptions or ratings that actions will produce desirable outcomes—for participants in midlife (Cerino et al., 2023). Perhaps midlife participants felt consistent control in their life due to continued (i.e. less decline) use of focusing and/or venting their emotions. Further, less frequent use of denial and disengagement coping strategies may reflect stressors prevalent or novel at midlife, such as those related to health of self (i.e. chronic disease onset) or family members, such as declining health of parents (Infurna et al., 2020), which they needed to actively confront or manage.

Further, both SAVI (Charles, 2010) and SST (Carstensen et al., 2003) postulate age-advantages for emotion-related strategies, though neither discuss if these changes reflect effort or efficacy (as noted above). However, under certain situations, such as those with health conditions, venting of emotions and disengagement were linked with higher levels of psychological distress (see Dempster et al., 2015). Thus, for some, less use of these strategies can promote better psychological well-being, suggesting potential age-advantages among our participants in mid- and later life.

Limitations and future directions

There were several limitations that may contribute to generalizability or interpretation of results. First, the COPE Inventory reflects coping *styles* (e.g. general reactions to stress). As argued by the transactional model of stress and coping (Lazarus & Folkman, 1984), coping strategies may function differently across contexts or may only be used for certain situations. To our knowledge, very few studies have examined coping processes for daily stressors, despite robust, but separate, literatures of daily stress and coping. Thus, future research would greatly benefit from studies that examine stress and coping processes in everyday life. Recent work using MIDUS and its National Study of Daily Experiences sub-project found that perceived control over daily interpersonal stressors across 10-years stayed stable, but control over non-interpersonal stressors declined (Cerino et al., 2024). It would be informative for future research to evaluate the extent to which coping processes may manifest as control strategies for daily stressors across the adult lifespan.

Second, there are other aspects of coping strategies, such as coping efficacy, that are not included in the MIDUS questionnaire. Although we were able to examine age differences in coping effort over a 10-year period, it would have been pertinent to further examine these associations for coping efficacy, given different age patterns between coping effort and efficacy (Aldwin et al., 2019; Meeks et al., 1989). Future work would do well to examine changes in use of coping strategies and efficacy, for a more wholistic understanding of how coping changes across the lifespan, as both have been proposed as central resilience processes in facilitating optimal aging outcomes (Aldwin & Igarashi, 2016).

Third, while our study aims focused on age differences in how coping changed over 10 years, it is important to note we found demographic differences (at baseline) in coping across gender, education, and race (Tables S3-S3 in Online Supplemental Materials). For example, Black participants used most coping strategies more frequently compared to White participants, though research has suggested further differences (e.g. Kawakami et al., 2020). Related, although MIDUS is nationally recruited, our analytic sample varied from MIDUS participants without complete coping data (e.g. younger, more women) and was selective along certain sociodemographic characteristics (e.g. race). Given that the U.S. population is experiencing several demographic shifts (i.e. more older adults and more racial/ethnic diversity), future work should continue to focus on examining differences in coping across multiple sociodemographic characteristics (e.g. racial, sexual, and gender identity) and explore their intersection with age (e.g. gender*age). Finally, while we accounted for educational attainment as a proxy for socioeconomic status (SES), future work should evaluate change in coping across adulthood as a function both objective and subjective (e.g. social status) indicators of SES.

Implications and conclusion

In this study, we validated a four-factor (time and age invariant) solution for coping items among participants in a nationally recruited and ongoing longitudinal study of aging (MIDUS) and found age differences in how use of these strategies changed across time. Given that midlife now appears more stressful than previously observed (Almeida et al., 2020), it is imperative to understand how coping can facilitate optimal and resilient aging (Aldwin & Igarashi, 2016). For example, certain coping strategies have been shown to buffer against adverse biological stress responses (e.g. cortisol; O'Donnell et al., 2008), highlighting one pathway through which coping affects physical health and could extend the health span of older individuals.

As certain stressors may be unique to mid- and later life, such as caregiving for a parent and/or spouse (Lachman et al., 2015), interventions should focus on not only helping individuals manage current experiences, but also equip individuals for healthy ways to cope with anticipated experiences (e.g. Mroz et al., 2023). Thus, equipping adults with the appropriate skills to cope with stress, through clinical practices such as cognitive behavioral therapy (CBT), might prove just as beneficial as other healthy aging promotion guidelines (e.g. exercise and eating healthy; National Institute on Aging, 2022).

Disclosure statement

No potential conflict of interest was reported by the authors.

Authors note

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