

*Brief report***Adverse childhood experiences, daily worries, and positive thoughts: A daily diary multi-wave study**Reout Arbel^{1*} , Hannah L. Schacter², Kelly F. M. Kazmierski², Marie-Ève Daspe² and Gayla Margolin²¹Department of Counseling and Human Development, University of Haifa, Israel²Department of Psychology, University of Southern California, Los Angeles, California, USA

Objective. To examine adverse childhood experiences (ACEs) as a prospective predictor of the day-to-day associations between worries and positive thinking among late adolescents.

Method. Cumulative ACEs were measured from parent and youth reports between the ages of 9.9 and 18.1. Late adolescents ($N = 103$) reported daily worries and positive thoughts across ten days.

Results. Adverse childhood experiences predicted higher and more variable levels of day-to-day worry. Increases in positive thinking on one day predicted less next-day worry for adolescents with low, but not high, ACE scores.

Conclusions. Daily worry during late adolescence may be an important consequence of earlier exposure to ACEs. Early interventions focused on worry reduction and improved emotion regulation might mitigate worry among high-ACE youth.

Adverse childhood experiences (ACEs), including abuse and neglect, predict later emotional disorders (e.g., anxiety) characterized by high levels of worry (Verstraeten, Bijttebier, Vasey, & Raes, 2011). For example, youth's ACEs predict higher global worry at 6-month follow-up (Young & Dietrich, 2015). Yet, the long-term effects of ACEs on adolescents' *daily* worries are unknown. These associations are especially relevant during late adolescence, when day-to-day worries (e.g., concerns about friends) are common (Arbel, Perrone, & Margolin, 2016).

In addition, the impact of adversity on worry *variability* remains untested. ACEs are linked to bias towards threats (Briggs-Gowan *et al.*, 2015) and stress recovery difficulties (McLaughlin, Conron, Koenen, & Gilman, 2010), which might contribute to high and stable day-to-day worry. Alternatively, ACEs also relate to emotional lability (Dvir, Ford, Hill, & Frazier, 2014) and attention difficulties (Blair & Raver, 2012), which might be evidenced in fluctuating levels of worry.

Positive thoughts, which mitigate worry and are often the foundation of anxiety treatments (Eagleson, Hayes, Mathews, Perman, & Hirsch, 2016), might impact the

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day-to-day dynamics of worry. The present study tests whether daily positive thoughts lessen daily worries, and whether this holds regardless of exposure to ACEs.

Using multi-wave data from a community sample of late adolescents, we tested prospective associations between cumulative ACEs and (1) mean-level daily worry, (2) variability of day-to-day worry, and (3) same-day and across-day links between worry and positive thinking. We expected ACEs to predict greater day-to-day worry (HO1). We also hypothesized an effect of ACEs on worry variability (HO2), without specifying its direction, given the mixed literature. We anticipated that among those with fewer ACEs, greater positive thinking would be associated with lower same- and next-day worries; for youth with more ACEs, we expected that daily increases in positive thinking would not mitigate worry (HO3).

Method

Overview and participants

This study included 103 youth (45 females, $M_{\text{age}} = 18.06$) from a diverse, urban community who provided daily data in the fifth wave of a longitudinal study (32.3% Hispanic/Latino; 37.4% White; 20.2% African American/Black; 29.3% multiracial; 13.1% other). Mean participant age at each wave was 9.9, 11.1, 12.6, 15.3, and 18.1 years. The sample combines two community-recruited cohorts, with additional families entering at Wave 3 and thereafter following identical procedures to already-enrolled participants. At Wave 5, Qualtrics-based surveys were emailed each day at 5 P.M. for 10 consecutive days, asking about daily events including worries and positive thoughts. During a preceding laboratory visit, youth reported anxiety symptoms. ACE scores were not significantly different between longitudinal study participants who did ($n = 103$) vs. did not ($n = 86$) complete daily diaries at Wave 5, $t(187) = -1.04$, $p = .30$. All data collection was approved by the university review board.

Instruments

Childhood adversity

Adverse childhood experience measurement was modelled on the Adverse Childhood Experiences Questionnaire (Felitti *et al.*, 1998), assessing whether 10 forms of adversity occurred during childhood. In each wave (1–5), youth, mothers, and fathers completed questionnaires measuring emotional, physical and sexual abuse, neglect, being unloved, interparental aggression, and parental separation/divorce, substance abuse, mental illness, and incarceration. If any reporter endorsed that one of these adversities occurred during any wave, youth received a score of 1 for that construct. As experiencing diverse forms of adversity exerts a cumulative, linear detrimental impact (Felitti *et al.*, 1998), scores assessed the total number of forms of adversity experienced and could range from 0 (no adversity) to 1 (see Miller *et al.*, 2014 for more details).

Daily worry and daily positive thinking

From the daily surveys, we developed a 26-item daily worry scale assessing typical adolescent worries (e.g., relationships, academics) (Arbel *et al.*, 2016), as well as a 16-item positive thinking scale. Participants rated each worry and positive thought on a 4-point

scale ranging from 0 (not at all) to 3 (a lot). Scores represent the mean across all items. Within-day reliability was .89 for daily worries and .80 for positive thoughts.

Anxiety symptoms

Participants reported anxiety symptoms using the Symptom Checklist-90 (Derogatis, Lipman, & Covi, 1973; α for this sample = .88).

Analytic analyses

To measure the instability of daily worry, we computed the root mean square of successive differences (RMSSD) (Ebner-Priemer & Trull, 2011). High instability values require both high variability and low temporal dependency. Ordinary least squares regression (OLS) models tested the effect of ACEs on RMSSD scores and mean daily worries. The moderating effect of ACEs (Level 2) on same- and across-day links (Level 1) between worry and positive thinking was tested with two cross-level interactions in a multilevel modelling, while adjusting for autoregressive effects (Hofmann, 1997). Including participants' age, sex, anxiety levels, and the number of waves on which ACE data were collected did not change the magnitude or significance of the effects, so they were dropped from final models for parsimony. Analyses were conducted in Mplus (Muthén & Muthén, 2012).

Results

Descriptive statistics and correlations

Table 1 presents between-person means, standard deviations, and intercorrelations for all measures. Sex comparisons on all variables produced no significant differences (all

Table 1. Descriptive statistics and correlations for person-level averages of all study variables and covariates

Variable	1	2	3	4	5	6
Worries ^a – Wave 5						
Positive thinking ^a – Wave 5	.42***					
Worries inconsistency ^b – Wave 5	.46***	.25*				
ACEs – Waves 1–5	.24*	.05	.31**			
Anxiety – Wave 5	.36***	.03	.35**	.13		
Age – Wave 5	–.04	.09	.09	.02	–.04	
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Total sample	.32 (.27)	.87 (.55)	.21 (.12)	4.45 (1.7)	0.27 (0.37)	18.06 (1.09)
Females	.33 (.23)	.87 (.05)	.22 (.12)	4.49 (1.83)	0.27 (0.46)	18.13 (1.12)
Males	.31 (.30)	.86 (.83)	.20 (.14)	4.43 (1.54)	0.26 (0.28)	17.96 (1.05)

Notes. ACEs = adverse childhood experiences. *N* = 103.

^aAverage score across 10 days.

^bInconsistency scores are the root mean square of successive differences (RMSSD).

* $p < .05$; ** $p < .01$; *** $p < .001$.

$ps > .20$). Mean worry was significantly lower than mean positive thinking, $t(102) = 11.19, p < .001$, and the two were positively correlated. ACEs were positively associated with mean worry and RMSSD worry score but not with positive thinking.

ACEs and worries

Adverse childhood experiences significantly predicted higher mean worry, $\beta = .23, SE = .11, p = .03, R^2 = 0.20$ (HO1), and greater worry instability (while controlling for mean levels of worry), $\beta = .22, SE = .10, p = .04, R^2 = 0.43$ (HO2).

ACEs moderate within- and across-day links between worry and positive thinking

Unexpectedly, worry correlated positively with same-day positive thinking, $\beta = .22, SE = .05, p < .001$. However, positive thinking did not predict next-day worry, $\beta = .05, SE = .06, p < .43$. Cross-level interactions showed that ACEs did not moderate same-day associations between positive thinking and worry, $\beta = .001, SE = .01, p = .97$, but did moderate the effect of positive thinking on next-day worry, $\beta = .04, SE = .02, p = .04$ (HO3).

Simple slopes analysis is illustrated in Figure 1. As expected, for adolescents exposed to low ACEs ($-1 SD = 2.7$ ACEs), more positive thinking on one day predicted less next-day worry, $b = -.09, SE = .04, p = .02$. However, for average ($M = 4.5$ ACEs), $b = .001, SE = .02, p = .96$, or high ACE levels ($+1 SD = 6.4$ ACEs), $b = .04, SE = .03, p = .15$, positive thinking did not predict next-day worry.

Discussion

Adverse childhood experiences predicted higher and more variable worry (HO1, HO2), and youth with high ACEs did not experience buffering effects of positive thoughts on next-day worries (HO3). Positive associations between worry and ACEs are consistent with ACE-exposed youth showing threat bias (Briggs-Gowan *et al.*, 2015). Furthermore,

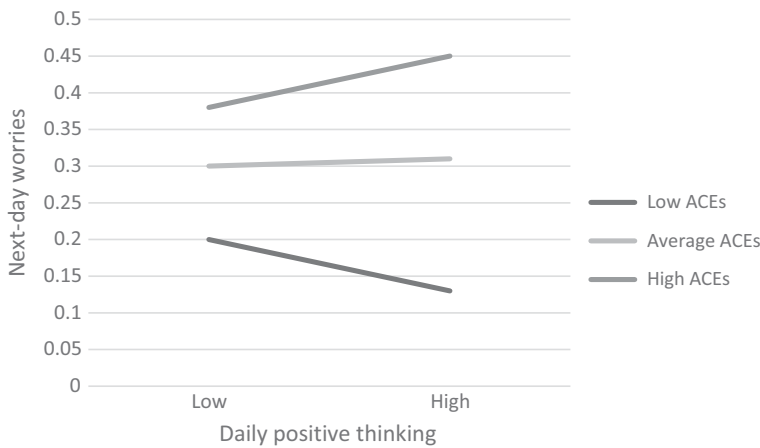


Figure 1. Daily positive thinking and next-day worries in low, average, and high ACE levels. ACEs = adverse childhood experiences.

our data suggest that in the context of ACEs, worry levels fluctuate with probable peaks interspersed with 'off' worry times. Prior findings linked instability in related constructs (e.g., rumination) to dysregulated behaviours (Selby, Franklin, Carson-Wong, & Rizvi, 2013). This high and unstable pattern of worry might reflect emotional lability (Dvir *et al.*, 2014), as observed in individuals reporting ACEs (Dvir *et al.*, 2014). However, high worry variability may also protect against burnout. For example, laboratory findings show better executive shifting in uncertain contexts among youth from adverse backgrounds (Mittal, Griskevicius, Simpson, Sung, & Young, 2015). Future studies need to explore the costs and benefits of day-to-day worry instability in the context of ACEs. For example, to what extent do peaks in worry correspond to anticipated stressors and predict problem-solving efficacy? Do 'off' worry times help protect against stress overload? Although ACEs have a dose–response effect on health (e.g., McLaughlin *et al.*, 2010), future studies will need to test potential divergent effects of ACE types and timing on worry.

Regardless of ACE levels, worry and positive thinking co-occurred within days, potentially reflecting variability in adolescents' day-to-day situational demands. For example, daily events, such as an upcoming date, might stimulate both negative and positive thoughts. Multiple assessments per day are needed to establish the temporal order of these effects. Adolescents may also generate more positive thoughts to mitigate concurrent worry. Indeed, a different pattern was documented *across* days, wherein positive thoughts predicted *reduced* next-day worries for low-ACE youth. Although positive and negative thoughts are likely to co-occur, it may take time for positive thoughts to counterbalance worry, such that their beneficial effect appeared only the next day. However, for high-ACE-exposed youth, positive thoughts did not reduce worrying. Experiencing greater adversity may prime sensitivity to detecting threats and make the effect of positive thoughts more fleeting, as the attention quickly leaves the positive and returns to scanning for possible threats. In addition, future research should consider whether ACEs do not impede overall positive thought generation, but rather the generation of positive thoughts *within the specific domain* in which worry exists. This might reflect difficulty employing effective regulation strategies among high-ACE youth (Dvir *et al.*, 2014) and should be tested directly in future studies.

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