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Evaluation of an intervention promoting emotion regulation skills for adults with persisting distress due to adverse childhood experiences

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ABSTRACT

This phase II trial evaluated psychosocial and health outcomes of an intervention designed to improve emotion regulation skills in adults suffering from Adverse Childhood Experiences (ACEs). The study utilized a pretest-posttest design in which 92 adults enrolled in the community-based program completed pretest measures, attended either a faith-based or secular version of the 12-week ACE Overcomers program, and then completed posttest measures. The theory-guided program involved group sessions providing education and skills training to improve emotion regulation, self-awareness, resilience, and social functioning. Pretest and posttest surveys included measures of emotional regulation (suppression, rumination, cognitive reappraisal, and mindfulness), resilience (ego resilience and general self-efficacy), emotional experiences (perceived stress, moods, and depressive symptoms), quality of life (the SF-36 domains), and physical symptoms and illness (symptom load and sick days). Analyses revealed significant improvements from pretest to posttest in all facets of emotion regulation ($p < .01$), psychological resilience ($p < .001$), mental well-being ($p < .001$) and physical symptoms and illness ($p < .001$), and in specific facets of quality of life ($p < .001$). The faith-based and secular versions of the program yielded comparable improvements in well-being. Improvements were comparable for older versus younger participants, except that younger participants reported greater improvements in perceived stress ($p < .05$). These preliminary findings support the application of an emotion regulation perspective to interventions for adults with high ACEs. The study, with its single-group design, represents a promising step in the translational research pathway and provides support for further studies utilizing comparison groups.

Adverse childhood experiences (ACEs) involving family dysfunction, physical abuse, and mental abuse can confer wide-ranging consequences across the lifespan (Felitti et al., 1998; Kalmakis & Chandler, 2015; Lupien, McEwen, Gunnar, & Heim, 2009; Miller, Chen, & Parker, 2011). Although research on the risks associated with ACEs has stimulated the development of ACEs prevention initiatives (Hall, Porter, Longhi, Becker-Green, & Dreyfus, 2012; Kagi & Regala, 2012), fewer efforts have focused on developing programs to assist adults with a history of ACEs in countering ongoing psychosocial and health consequences. Deficits in emotion regulation capacities represent one set of mechanisms through which ACEs might pose ongoing risks through adulthood. Unlike ACEs, these skills are malleable targets for intervention. Programs that provide training in emotion regulation skills for managing lingering effects of ACEs and current stressors hold promise for mitigating consequences of ACEs. This Phase II trial evaluated

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changes in well-being resulting from participation in a psycho-educational program designed to improve emotion regulation skills. Specifically, the study examined changes in emotion regulation practices, resilience, quality of life, and physical health from pre-intervention to post-intervention for adults experiencing ongoing distress associated with ACEs.

1. ACEs and their consequences over the lifespan

In seminal studies (Dube et al., 2001; Felitti et al., 1998), researchers evaluated associations between ACEs and health outcomes in large samples of Kaiser Permanente members in California. The research was guided by a theoretical model conceptualizing childhood adversity as the foundation for social, emotional, and cognitive problems, which in turn give rise to high-risk behaviors. These behaviors, along with chronic physiological stress effects, increase risks of disease, disability, and early death. Survey findings revealed high prevalence of ACEs as well as strong, dose-response relationships between ACEs and health outcomes such as diabetes, heart disease, cancers, substance abuse, pulmonary disease, depression, and premature mortality (Anda et al., 2006; Brown et al., 2009; Dube et al., 2001; Edwards, Dube, Felitti, & Anda, 2007; Felitti et al., 1998). Further research has demonstrated similar, linear associations between ACEs and chronic diseases, emotional distress, and psychiatric disorders after controlling for socioeconomic status and other potential confounds (McCrory, Dooley, Layte, & Kenny, 2015).

ACEs also place a substantial cost burden on the health care system. Additional lifetime costs for a child who has experienced maltreatment are estimated at over $200,000 on average, including an estimated $32,648 in additional childhood medical costs and another $10,530 in additional adult medical costs (Fang, Brown, Florence, & Mercy, 2012). With the high prevalence of ACEs, their significant health consequences, and their substantial costs to the healthcare system, there is a growing need to address the gap in research on interventions for adults suffering the consequences of ACEs.

2. Emotion regulation Skills: A malleable target for intervention

As delineated by the theoretical model guiding the initial ACEs study (Felitti et al., 1998), one proposed pathway linking ACEs to negative health outcomes is through emotional dysfunction and maladaptive coping with stressful events (Poole, Dobson, & Pusch, 2017a; Salinas-Miranda et al., 2015). Sustained emotional distress can cause chronic activation of the hypothalamus-pituitary-adrenal (HPA) axis (Kalmakis, Meyer, Chiodo, & Leung, 2015; Paquola, Bennett, & Lagopoulos, 2016; Reading, 2006; Woon & Hedges, 2008) which, in turn, can adversely affect social, cognitive and emotional development (Hunt, Slack, & Berger, 2017; Lupien et al., 2009) while laying the foundation for increased disease susceptibility later in life (Miller et al., 2011).

Deficits in social, cognitive, and emotional development induced by ACEs could hamper abilities to regulate anger, depression, and anxiety through appropriate expression and processing, cognitive reappraisal, and dispositional mindfulness (Boyes, Hasking, & Martin, 2016; Whitaker et al., 2014). In a recent survey of over 500 adults, we demonstrated that higher ACEs are associated with poorer emotion regulation tendencies, including lower levels of cognitive reappraisal and mindfulness as well as higher levels of suppression and rumination (Cameron, Hamilton, & Carroll, 2018). Further, these emotion regulation skills mediated the relationships of ACEs with poorer mental health, quality of life, and physical illness. These findings support other research suggesting that poor emotion regulation skills can undermine social, psychological, and physical well-being over the lifespan (Berking & Wupperman, 2012; Gross, 2008; Kuster, Orth, & Meier, 2012; Nyklíček et al., 2011). With previous interventions showing that emotion regulation skills can be learned and enhanced (Jazaieri et al., 2014; LeBlanc, Uzun, Pourseied, & Mohiyeddini, 2017), these skills represent promising targets for interventions aimed at reducing the deleterious consequences of ACEs.

3. The ACE Overcomers program

Motivated and theoretically informed by previous ACEs research, the ACE Overcomers program (Lockridge, 2012b, Lockridge, 2012a) is designed to reduce the detrimental psychological, social, and health consequences of ACEs. The program provides training in emotion regulation and social skills to foster resolution of previous traumatic experiences as well as promote resilience in the face of current adversity. It focuses on improving emotional expression and processing (Cameron & Jago, 2008), mindfulness (Brown & Ryan, 2003), resilience (Fredrickson, Tugade, Waugh, & Larkin, 2003), and problem-solving techniques (Blanchard-Fields, 2007). The program's principles and contents are consistent with those used in evidence-based interventions developed for other populations, including women with breast cancer, individuals with anxiety or depression, and adults facing challenging life experiences (Cameron, Booth, Schlatter, Ziginskas, & Harman, 2007; Giese-Davis et al., 2002; Hofmann, Sawyer, Witt, & Oh, 2010).

The 12-week program involves weekly group sessions with skills training offered through lectures and homework assignments. Participants attend either a faith-based or secular version of the program; they are generally equivalent and differ primarily in the references to biblical verses and prayer in the former and references to philosophical quotes in the latter.

The primary aims of this Phase II trial were to gather initial data on feasibility; program fidelity; and pretest-posttest changes in emotion management skills and quality of life. Pretest-posttest designs can be used effectively to gather critical information about feasibility including potential benefits, effect sizes, and unexpected negative consequences of interventions that can inform larger, randomized controlled trials (e.g., Brothers, Yang, Strunk, & Andersen, 2011). We recruited program participants to complete measures of emotion regulation skills, psychological well-being, physical health, and quality of life at the start (baseline) and after the end of the program (follow-up). We predicted that participants would show improvements in all skills and indices of well-being from baseline to follow-up. We also tested whether these changes differed for those completing the faith-based versus secular programs. Finally, we conducted a process evaluation to evaluate fidelity in program implementation.

Table 1
Overview and Underlying Principles of the ACE Overcomers Program Sessions.

	Overview of the 12 Sessions	Underlying Principles
1.	Introducing the ACE Study: Understanding the Effects of Abuse & Dysfunction, ACE Survey	Metacognitive reappraisal of self and life in light of the ACE Study
2.	How We Respond to ACEs	Understanding the physical and mental effects of stress.
3.	Overcoming Poor Self-Talk	Overcoming rumination
4.	Keys to Retrain the Brain	Calming the threat response, emotion regulation
5.	Gaining Control of Your Life (False Control vs. True Control)	Self-awareness
6.	Origin of Many Mind-Body-Spirit Illnesses	Reducing anxiety, self-soothing
7.	Overcoming Emotional Impotence (Gaining Strength to Meet Life's Challenges)	Self-efficacy
8.	Brain Plasticity	Hopefulness
9.	Grieving Your Loss without Self-Pity - Overcoming Depression Equation	Emotion regulation
10.	Steps to Healing the Wounds of Life	Reframing the difficulties of life, self-reflection
11.	Strategies to Strengthen Your Soul and Spirit + Strategy Worksheets	Self-efficacy
12.	Learning Relational Skills - Building the Capacity to Connect	Social functioning

As a secondary aim, we tested whether improvements in outcomes varied by age. Part of the design of the ACE Overcomers program is to appeal to adults across the age spectrum. Emotion regulation skills improve naturally with age (Ong, Bergeman, Bisconti, & Wallace, 2006), yet whether the ability to change these skills through a short-term intervention or the effects of skills development on well-being improve or diminish in older age remains unexplored.

4. Method

4.1. Study overview and design

The study was conducted from September 2013 to May 2015 with the faith-based and secular versions of the ACE Overcomers program each offered four times over this period. One-half of the programs began in September and the other half began in January in order to counterbalance potential seasonal changes in mental and physical well-being from fall to winter versus winter to spring. For the process evaluation, researchers attended the sessions to monitor the delivery of program contents. For the evaluation of psychosocial and health outcomes, we recruited program participants into a Phase II trial utilizing a single-group, pretest-posttest design to evaluate changes in psychological well-being, physical health indices, and quality of life from the program's onset to after its completion 12 weeks later. The university's Institutional Review Board approved this study.

4.2. ACE Overcomers program

The director and developer of the ACE Overcomers program conducted all sessions in accordance with the instructor manuals (Lockridge, 2012a, 2012b). Table 1 presents the topics and underlying principles of the 12 weekly, two-hour sessions. The program begins with a presentation of findings from ACEs research (Dube et al., 2001; Felitti et al., 1998) to enable participants to understand how abuse, neglect, and household dysfunction has affected them physiologically, emotionally, and psychologically. In Sessions 1 and 2, the facilitator discusses how the study findings provide insight into why people choose risky health behaviors and have difficulty regulating their emotions. This discussion provides a foundation for metacognitive self-examination that allows participants to reflect on themselves and others without judgment in ways that can begin to alleviate negative emotions such as guilt, anger, and shame. Subsequent sessions build upon this self-examination with concrete steps aimed at remediating the effects of childhood trauma. Participants learn skills for improving emotion regulation, self-awareness, resilience and self-efficacy, and social functioning. In addition to attending the 12 sessions, participants received a workbook providing summaries of the weekly lessons and homework assignments. For the faith-based version, the sessions and workbook chapters use biblical verses to support the lessons and points. For the secular version, the sessions and workbook chapters include quotations from well-known scientists, scholars, and philosophers to support the lessons and points. Otherwise, the two versions are equivalent in the material provided and discussed.

4.3. Process evaluation

Program integrity was assessed through a process evaluation. Trained research assistants attended program sessions and, using a list of the protocol topics and key points, checked whether or not they were covered. An evaluation was completed for 64 (67%) of the 96 sessions (12 sessions of the four faith-based programs and the four secular programs), with evaluations completed for all 12 sessions of the faith-based and secular programs. Analyses of the evaluation checklists revealed that over 98% of the topics and key points were sufficiently covered. The few exceptions occurred when discussions of a particular topic ran long or when the facilitator asked participants to read a certain section of the workbook on their own in the interest of time. These independent observations confirmed that the program was delivered as manualized.

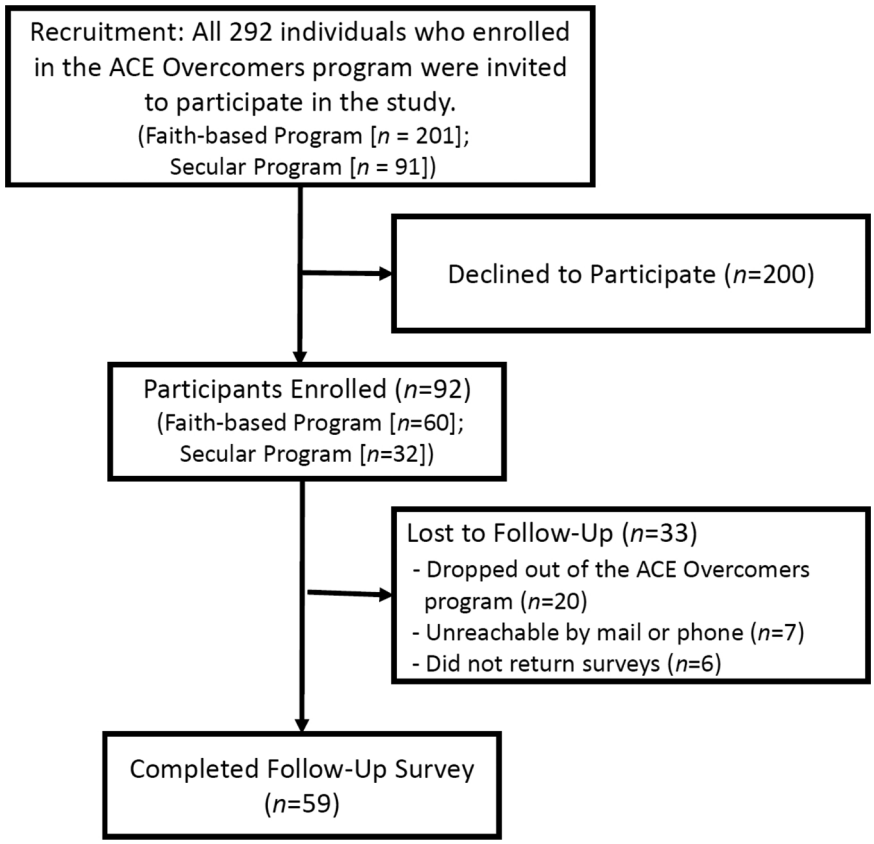

Fig. 1. Participant flow from study recruitment to the final sample.

4.4. Outcome evaluation participants

The sample included adults who participated in the ACE Overcomers program, which was offered free of charge and advertised through radio, newspaper, and other media to attract interested individuals from local communities. All 292 individuals who enrolled in the ACE Overcomers program were invited to take part in the study at the time of enrollment, and 92 consented to participation (see Fig. 1). These 70 women and 22 men ranged in age from 18 to 75 (M = 47.06, SD = 14.52) and identified their ethnicities as non-Hispanic White (59%), Hispanic (36%), or Other (5%). Over half of the participants were married (55%, with 28% widowed/divorced and 17% never married) and not employed (54%, with 19% employed part-time and 27% employed full-time). In terms of physical health, 70% reported one or more chronic health conditions such as diabetes or heart disease and an additional 11% reported having the cardiac risk conditions of hypertension or high cholesterol. The self-reported illness rates tended to be higher than the average rates for adults in the region. For example, rates for the sample versus regional population are 40% versus 28% for high blood pressure; 15% versus 12% for diabetes; and 19% versus 9% for asthma (Meng, Ahman, & Pickett, 2015). Participants tended to report high ACE scores (Median = 5, Mode = 6); 85% reported 2 or more ACEs, 54% reported 4 or more ACEs, and 33% reported 7 or more ACEs. Overall, 65% of the study participants attended the faith-based version of the program and 35% attended the secular version. These proportions approximate the proportions of the 292 program enrollees who selected the faith-based program (69%) versus the secular program (31%).

A total of 59 participants (64%) completed the follow-up survey; 20 (22%) dropped out of the ACE Overcomers program prior to its completion, 7 (8%) could not be reached by phone and their surveys were returned undelivered; and 6 (7%) failed to return the follow-up survey. Those who completed the follow-up survey did not differ from those who either dropped out of the program or did not complete the follow-up survey on any demographic characteristics, ACE scores, or outcome measures assessed at baseline, with the exception of age: Those who completed the follow-up survey tended to be older on average relative to those who did not; M = 50.96 versus M = 39.66, $F(1,90) = 13.22$, $p < .01$.

4.5. Procedure

Participants provided informed consent and then completed a baseline survey that included the ACE questionnaire and measures of emotion regulation tendencies (emotional suppression, rumination, cognitive reappraisal, and mindfulness), self-efficacy (ego resilience and general self-efficacy), emotional experiences (perceived stress, negative and positive moods, and depressive

symptoms), quality of life, and physical health (symptom load and sick days). Participants attended the 12-week program and at the first session received workbooks with summaries of the 12 weekly lessons. After the final session, participants completed a follow-up survey that included all baseline measures except for the ACE questionnaire. The baseline and follow-up surveys were mailed to participants or, for a few participants, distributed by a research assistant at the end of the final program session. Surveys were not completed during program sessions. Participants were assured the study was being conducted independently from the ACE Overcomers program and that individual data would not be shared with ACE Overcomers personnel. Participants received $15 gift cards after returning each questionnaire as a token of appreciation for their contributions to the study.

4.6. Measures

Unless otherwise noted, all measure scores reflect averages of item ratings. All internal consistency statistics are Cronbach's α calculated using the baseline item ratings provided by the study participants.

4.6.1. Adverse Childhood Experiences

The Ace Score Calculator (10-qacecalc.pdf; Adverse Childhood Experiences Study, 2017) is a 10-item measure of the number of adverse childhood experiences prior to age 18. The items assess whether or not (*yes* or *no*) the respondent had any experiences of abuse, neglect, and household dysfunction. The *yes* responses were tallied to generate scores ranging from 0 to 10. The measure demonstrates good test-retest reliability in adult populations with no evidence of significant bias in retrospective assessment (Dube, Williamson, Thompson, Felitti, & Anda, 2004; Hardt, Vellaisamy, & Schoon, 2010).

4.6.2. Emotional suppression

The Courtauld Emotional Control Scale (Watson & Greer, 1983) was used to assess tendencies to suppress negative emotions, It includes 7-item subscales assessing tendencies to suppress anxiety, e.g., "When I feel afraid (worried), I bottle it up;" anger, e.g., "When I feel angry (very annoyed), I hide my annoyance;" and depression, e.g., "When I feel unhappy (miserable), I keep quiet." Ratings ranged from 1 (*almost never*) to 4 (*almost always*). Internal consistency was high in the present study; $\alpha = 0.92$.

4.6.3. Rumination

The rumination short form of the Rumination and Reflections Questionnaire (RRQ; Trapnell, 1997; Trapnell & Campbell, 1999) was used to assess tendencies to ruminate over negative experiences (e.g., "I tend to ruminate or dwell over things that happen to me for a really long time afterward."). The six items were rated from 1 (*strongly disagree*) to 5 (*strongly agree*); $\alpha = 0.86$.

4.6.4. Cognitive reappraisal

The reappraisal subscale of the Emotion Regulation Questionnaire (Gross & John, 2003) was used to assess tendencies to cognitively reframe potentially stressful or negative experiences in more positive and optimistic ways (e.g., "When I'm faced with a stressful situation, I make myself *think about it* in a way that helps me stay calm.") The six items were rated from *strongly disagree* (1) to *strongly agree* (7); $\alpha = 0.89$.

4.6.5. Mindfulness

The Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003) was used to assess tendencies to be attentive to and aware of experiences in everyday life. The 15 items (e.g., "I find it difficult to stay focused on what's happening in the present", which is reverse-scored) were rated from 1 *(almost always)* to 6 (*almost never*). Ratings were combined so that higher scores reflect greater mindfulness tendencies; $\alpha = 0.90$.

4.6.6. Resilience

We used the Ego Resilience 89 (Block & Kremen, 1996; Caldwell & Shaver, 2012), to assess abilities to respond flexibly to challenging and shifting situations. The 14 items (e.g., "I quickly get over and recover when startled", "I enjoy dealing with new and unusual situations") were rated from 1 (*does not apply at all*) to 4 (*applies very strongly*); $\alpha = 0.80$.

4.6.7. General self-efficacy

We used the General Self-Efficacy Survey (Schwarzer & Jerusalem, 1995) to assess perceived competence in coping with stressful life events and novel or difficult tasks. This characteristic contributes to resiliency through facilitating goal-setting, investment of effort, persistence, and recovery from setbacks. The 10 items (e.g., "I can always manage to solve difficult problems if I try hard enough;" "I am confident that I could deal efficiently with unexpected events") were rated from 1 (*not at all true*) to 4 (*exactly true*); $\alpha = 0.88$.

4.6.8. Perceived stress

The 10-item Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983) was used to assess stress levels in the prior week (e.g., "In the past week, how often have you felt unable to control the important things in your life?"). Responses ranged from 1 (*not at all*) to 5 (*very often*); $\alpha = 0.86$.

4.6.9. Negative and positive moods

The Modified Differential Emotions Scale (Fredrickson et al., 2003) was used to measure mood states over the past week. Participants rated their experiences of each of 18 emotions in the past week from 0 (*not at all*) to 4 (*extremely*). The Negative Emotions subscale consists of anger, contempt, disgust, embarrassment, fear, guilt, sadness, and shame; $\alpha = 0.85$. The Positive Emotions subscale consists of amusement, awe, compassion, contentment, gratitude, hope, interest, joy, love, and pride; $\alpha = 0.89$.

4.6.10. Depressive symptoms

The 11-item version of the Centre for Epidemiological Studies Depression Scale (Radloff, 1977) was used to assess depressive symptoms. The items (e.g., 'I feel depressed', 'I feel sad') were rated from 0 (*rarely or none of the time*), to 3 (*most or all of the time*); $\alpha = 0.89$.

4.6.11. Quality of Life

The Short Form 36 (SF 36) measure was administered to assess mental and physical quality of life (Ware & Sherbourne, 1992; Ware, 2004). The 36-item measure includes eight subscales: vitality, mental health, role limitations due to mental health, social functioning, physical functioning, role limitations due to physical health, bodily pain, and general health. The first four subscales comprise the mental health subscales while the last four subscales comprise the physical health subscales. Each subscale contains 2 to 10 items, each rated using Likert scales. Subscale scores range from 1 to 100, with higher scores reflecting better quality of life.

4.6.12. Symptom load

A checklist of somatic complaints, adapted from the Health Appraisal Questionnaire (Felitti et al., 1998) included 17 common symptoms (e.g., episodes of fast heart beats or skipped beats, stomach pains, pain or swelling in your joints) rated from 1 (*not at all*) to 4 (*a lot*); $\alpha = 0.85$.

4.6.13. Sick days

Using an established measure (Cameron & Nicholls, 1998), participants were first asked, "In the past three months, how many illnesses (colds, flus, bouts of migraines or asthma, any illness) have you had?" Participants gave free responses in the space provided. They were then asked, "In the past three months, about how many days altogether have you been sick? That is, how many days altogether were you sick with the illnesses you referred to in the previous question?" Participants wrote in the number in the response term, "__ days". Responses ranged from 0 to 90.

4.7. Statistical analyses

To test predictions that participants would exhibit improvements from baseline to follow-up in all measured outcomes, we first conducted repeated measures Multivariate Analyses of Variance (MANOVAs) with each of five sets of dependent variables: emotion regulation tendencies, resilience, mental well-being, quality of life, and physical illness. Table 2 show the measures included within each set. Each MANOVA included Time (baseline versus follow-up) as a repeated measure, and a MANOVA showing significant Time effects overall was followed up with individual repeated measures ANOVAs for each individual measure. Tests of the assumptions of normality, outliers, absence of multicollinearity, and sphericity revealed the following violations of assumptions. First, SF-36 physical functioning scores and sick days at both time points exhibited significant skew; the values were therefore log-transformed for the statistical analyses. Second, the assumption of sphericity was violated in the MANOVA analyses of the emotion regulation measures, the emotional experiences measures, and the SF-36 quality of life measures. We therefore applied Greenhouse-Geisser corrections in these analyses.

We conducted additional MANOVAs with each of the five sets of dependent measures in which we included choice of program as a between-subjects variable to test whether changes from pretest to posttest differed for participants in the faith-based program versus those in the secular program. Finally, we conducted additional MANOVAs and, when significant, repeated measures ANOVAs with age group as a between-subjects variable to test whether the changes from baseline to follow-up in outcomes differed for younger adults (18–49 years old; 50% of the sample) and older adults (50–78 years old; 50% of the sample). Greenhouse-Geisser corrections were again applied in the analyses of the emotion regulation measures, the emotional experiences measures, and the SF-36 quality of life measures.

5. Results

5.1. Changes in outcomes from baseline to follow-up

The MANOVAs on emotion regulation tendencies revealed a significant Time effect; $F(1, 55) = 25.27$, $p < .0005$, $\eta_p^2 = 0.32$, observed power = 0.99. As shown in Table 2, repeated measures ANOVAs revealed significant improvements in all four emotion-regulation tendencies, showing decreases in emotional suppression and rumination as well as increases in cognitive reappraisal and mindfulness. The estimated effect sizes ranged from moderate ($\eta_p^2 > 0.09$) to large ($\eta_p^2 > 0.25$).

For the resilience measures, the MANOVA also yielded a significant Time effect overall; $F(1, 55) = 23.33$, $p < .0005$, $\eta_p^2 = 0.30$, observed power = 0.99. The repeated measures ANOVAs showed that participants exhibited moderate to large improvements in both ego resilience and general self-efficacy.

Table 2
Changes in Emotion Regulation Tendencies, Resilience, Mental Well-Being, Quality of Life, and Physical Symptoms and Illness from Baseline to Post-Intervention Three Months Later.

Outcome	Baseline *M* (*SD*)	Post-Intervention *M* (*SD*)	*F*	*p*	η_p^2	Observed Power
Emotion Regulation						
Suppression	2.43 (0.55)	2.24 (0.52)	10.07	.002	0.15	0.88
Rumination	3.50 (0.86)	2.98 (0.95)	30.10	.0001	0.30	0.99
Cognitive Reappraisal	4.66 (1.22)	5.02 (1.19)	5.86	.019	0.10	0.66
Mindfulness	3.74 (0.97)	4.11 (0.96)	12.43	.001	0.18	0.93
Resilience						
Ego Resilience	2.83 (0.47)	3.02 (0.44)	19.59	.0005	0.26	0.99
General Self-Efficacy	2.81 (0.55)	3.01 (0.53)	14.64	.0005	0.21	0.96
Emotional Experiences						
Perceived Stress	2.86 (0.81)	2.55 (0.78)	10.35	.002	0.15	0.81
Negative Mood	2.41 (0.86)	1.96 (0.69)	23.94	.0005	0.30	0.99
Positive Mood	3.15 (0.88)	3.42 (0.87)	12.64	.001	0.18	0.94
Depressive Symptoms	2.11 (0.72)	1.88 (0.66)	10.35	.002	0.15	0.89
SF-36 Quality of Life						
Vitality	44.56 (27.11)	52.72 (26.56)	6.77	.012	0.11	0.73
Emotional Well-being	56.70 (24.21)	65.58 (23.45)	11.75	.001	0.17	0.92
Role Limitations from Emotional Problems	49.40 (46.27)	71.43 (39.91)	14.85	.0005	0.21	0.97
Social Functioning	65.09 (30.05)	69.39 (28.69)	1.08	.304	0.02	0.18
Physical Functioning	74.51 (24.92)	76.21 (24.21)	0.19	.665	0.00	0.07
Role Limitations from Physical Health	61.54 (43.03)	63.46 (40.02)	0.80	.373	0.01	0.14
Pain	63.02 (26.81)	66.34 (27.46)	1.34	.251	0.02	0.32
General Health	62.60 (25.05)	67.72 (25.55)	4.61	.036	0.08	0.56
Physical Symptoms and Illness						
Symptom Load	2.10 (0.68)	1.87 (0.66)	9.60	.003	0.14	0.86
Sick Days	12.31 (20.22)	7.94 (14.92)	6.63	.013	0.12	0.71

Note: For SF-36 subscales, higher scores reflect better well-being. For SF-36 Physical Functioning and Sick Days, analyses were conducted on the log-transformed values but, to facilitate interpretation, the values reported here are the untransformed means and standard deviations.

The MANOVA of measures assessing mental well-being also revealed a large Time effect, $F(1, 57) = 24.40$, $p < .0005$, $\eta_p^2 = 0.30$, observed power = 0.99. The repeated measures analyses revealed decreases in perceived stress and negative mood, increases in positive mood, and decreases in depressive symptoms from baseline to post-intervention.

In terms of quality of life, A MANOVA of the eight SF-36 subscales resulted in a significant Time effect; $F(1, 54) = 11.71$, $p = .001$, $\eta_p^2 = 0.18$, observed power = 0.92. Repeated measures ANOVAs showed that participants exhibited moderate improvements in four of the SF 36 subscales: Vitality, emotional well-being, role limitations due to emotional problems, and perceived general health. Changes from baseline to post-intervention in social functioning, physical functioning, role limitations from physical health, and pain were not significant.

Finally, the Time effect in the MANOVA of the physical symptoms and illness measures was significant, $F(1, 47) = 11.77$, $p = .001$, $\eta_p^2 = 0.20$, observed power = 0.92. Participants reported significant reductions from baseline to follow-up in both daily somatic complaints and number of sick days over the prior three months. These estimated effects were moderate in size.

5.2. Differences between faith-based versus secular program attenders

MANOVAs revealed no significant differences between those attending the faith-based program and those attending the secular program in pretest-posttest changes on measures of emotion regulation skills, resilience, mental well-being, quality of life, or physical health (F's < 1.33, p's $> .25$).

5.3. Age-related differences in changes in outcomes

Analyses revealed only one age-group related difference in changes in outcomes from baseline to follow-up: Relative to older adults, younger adults exhibited significantly greater improvements in perceived stress; $F(1, 54) = 6.66$, $p < .02$, $\eta_p^2 = 0.11$. For younger adults, baseline $M = 3.19$, $SD = 0.85$ and follow-up $M = 2.56$, $SD = 0.85$; for older adults, baseline $M = 2.70$, $SD = 0.79$ and follow-up $M = 2.55$, $SD = 0.79$. For all other outcomes, the younger and older age groups exhibited comparable changes in outcomes over time (F's < 2.90, p's > 0.10).

6. Discussion

The present findings provide evidence that participation in the ACE Overcomers program is associated with moderate to large improvements in emotion regulation skills, psychological resilience, mental health, specific facets of quality of life, and physical health problems for adult community residents. The faith-based and secular versions of the program yielded comparable levels of improvements in these indices of psychological and physical well-being, indicating that both versions can confer these benefits. The absence of changes in the social and physical functioning facets of quality of life suggest that the program's immediate impact may not extend to these life domains, although further research can evaluate whether these facets improve in other population groups or over longer periods of time. The study adds empirical support for the psychosocial and health benefits of emotion regulation interventions for vulnerable populations (Cameron et al., 2007; Giese-Davis et al., 2002). The findings further prior research by demonstrating the promise in applying an emotion regulation perspective to improve resilience of adults suffering from ACEs. Unlike past childhood experiences which are immutable, emotion regulation and resilience represent malleable targets for intervention. Emotion regulation skills can be useful and cost-effective mechanisms for laying the foundation for improvements in mental and physical well-being.

The findings are consistent with theoretical models whereby childhood adversity is conceptualized as the immutable foundation for social, emotional, and cognitive problems, which are mediating variables in relationships between childhood adversity and impaired mental well-being, physical well-being, and quality of life. Growing evidence supports the mediational role of emotion regulation tendencies in the links between childhood maltreatment and mental health outcomes or psychopathology (Berking & Wupperman, 2012; Kim & Cicchetti, 2010), and they are also plausible mediators of other health outcomes more broadly. For example, reappraisal and suppression have been shown to be related to psychosocial functioning and well-being across the lifespan (John & Gross, 2004), and emotional suppression in particular has been linked with physical health outcomes such as cardiovascular disease (Mauss & Gross, 2004). The improvements in multiple outcomes associated with mental and physical well-being are also consistent with theories of psychological resilience (Fredrickson et al., 2003) and emotion regulation (Gross, 2008) as assets that can foster well-being and resolution of previous traumatic experiences (Poole, Dobson, & Pusch, 2017b). The observed reductions in physical symptoms and sick days as well as the improvements in perceived general health are encouraging endpoints that support further research on the physical health benefits of emotion regulation interventions for people suffering from ACEs. Such research could extend the evidence provided by the present, self-reported data by using objective measures of health as well as indices of health care use and costs. That 70% of the sample reported one or more chronic illnesses and an additional 11% were hypertensive or had high cholesterol attests to their vulnerability in terms of physical health status. The sample's high illness and risk burden is consistent with growing evidence on the critical health needs of adults with a history of ACEs.

The 78% program retention rate of the study participants is promising in light of the psychologically and socially vulnerable community sample, the substantial time commitment of program participation, and the voluntary nature of program participation. It suggests that the ACE Overcomers program is of appeal to a substantial proportion of those who started it. Study participants who dropped out of the program differed from the completers only in that they tended to be younger on average. The completers and non-completers are likely to be at comparable risk for deleterious health and other consequences as research suggests that, across different age cohorts of adults, ACEs have a similar relative contribution to multiple adverse outcomes (Dube, Felitti, Dong, Giles, & Anda, 2003). In terms of program acceptability, younger adults are likely to experience more difficulties in attending the program due to family responsibilities as well as work and other time demands. It is also possible that younger adults may find the program less appealing. Yet analyses revealed that, compared to older adults, younger adults exhibited greater improvements in perceived stress and equivalent levels of improvement in all other outcomes over time. The program thus appears to be as beneficial for younger adults as for older adults, and potentially more helpful in improving stress levels for younger adults.

That 11% of the sample fell out of contact over the three-month period reflects in part the difficulties of following this vulnerable population over time. The proportion who otherwise failed to return the follow-up questionnaire was low (6%). We could have applied statistical techniques that can take into account the missing data due to non-responses at follow-up to obtain greater statistical power. However, we chose to take the more conservative approach of conducting analyses only on those participants who completed the follow-up questionnaire. Imputing missing values are likely to have yielded larger effect sizes.

Strengths of this Phase II trial include the recruitment of a community sample diverse in age, ethnicity, marital status, and employment status and with moderate to high ACE scores on average. Another strength of the trial was the high degree of integrity in program delivery as indicated by the process evaluation. Finally, the program evaluation was conducted by an independent research team which reduced the risk of demand characteristics and social desirability concerns biasing participant responses.

Several study limitations highlight specific directions for future research. First, the study was limited by the use of a pretest-posttest design with no comparison group. However, prior research suggests that the observed improvements are unlikely to reflect improvements that would occur naturally and systematically over the study period. In prior research, we have found that the outcomes assessed are highly stable over a three-month period in the absence of intervention for adult community populations (Hamilton, Cameron, & Zawadzki, 2018). Nevertheless, alternative explanations for the systematic improvements involving threats to internal validity such as attention effects, regression to the mean, maturation, attrition, and placebo effects remain possible. The present study demonstrates feasibility in recruiting community residents with moderate to high ACE scores to participate in a randomized, controlled trial of the ACE Overcomers program and provides estimates of effect sizes for calculating sample sizes for such a trial.

Another study limitation is that a sizeable proportion of program enrollees did not consent to study participation and so we cannot determine the extent to which the observed improvements in well-being extend to this group. In further research, recruitment

strategies should target barriers such as reticence of this vulnerable sample to share personal feelings and troubling experiences and lack of time or motivation to complete and mail back questionnaires. The large number of questionnaires included in this study, while providing rich information about intervention-associated changes in a wide array of psychological, social, and physical health factors, may have been a particular barrier to recruitment. The present study findings can inform the development of shorter and more targeted questionnaires for use in future research. This study was designed to assess only immediate posttest outcomes, and future research should incorporate more distal follow-up assessments to test the duration of the intervention effects. Finally, the study design precluded tests of mediation. Future research could test the mediational effects of improved resiliency and emotion regulation skills in the relationships between program participation and physical and mental well-being. Such analyses can provide insights into the pathways through which improvements take place, which in turn can inform improvements in the intervention.

Other directions for future research warrant attention. First, growing evidence points to the potential roles of shame, guilt, and anger in mediating the relationships between trauma and adverse outcomes (Aakvaag et al., 2016; Holl et al., 2016). Further research can examine the impact of the ACE Overcomers intervention on these specific emotional experiences and whether they mediate the intervention's effects on psychosocial and physical well-being. In addition, the intervention and measures could be expanded to include a focus on improving sleep hygiene as another pathway through which people can improve their psychological and physical quality of life. This research direction is supported by growing evidence that ACEs are positively associated with sleep disturbances in adulthood (Chapman et al., 2011), and insufficient sleep in turn is associated with increased risk for chronic illnesses, mental distress, and risky health behaviors (Strine & Chapman, 2005). Finally, in light of evidence linking childhood maltreatment with insecure attachment styles (e.g., Perlman, Dawson, Dardis, Egan, & Anderson, 2016), future research could evaluate the roles of attachment styles in the processes through which ACEs lead to deficits in emotion regulation skills, weakened resilience, and adverse psychosocial and physical outcomes.

To conclude, the present findings provide evidence that participation in the ACE Overcomers program can lead to improvements in emotion regulation skills, psychological resilience and well-being, certain facets of quality of life, reduced illness days, and reduced somatic symptoms for community residents suffering from ACEs. More broadly, the evidence supports the benefits of the intervention approach of targeting emotion regulation skills as a means of improving psychological resilience, mental well-being, and physical health for adults with a history of childhood adversity. The findings represent a promising step in translational research that can bridge the gaps between trauma-informed assessment and community interventions.

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