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Special Issue Article

Resilience in Development: Pathways to Multisystem Integration

A multisystem, dimensional interplay of assets versus adversities: Revised benevolent childhood experiences (BCEs) in the context of childhood maltreatment, threat, and deprivation

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Abstract

This study expanded the Benevolent Childhood Experiences scale (termed the "BCEs-Original" scale) with 10 new multisystem items and identified a subset of items (termed the "BCEs-Revised" scale) that are systematically less commonly reported across samples. Total BCEs-Revised scores were tested against total BCEs-Original scores and three dimensions of childhood adversity (maltreatment, threat, and deprivation) as predictors of young adulthood mental health problems (depression, anxiety, and PTSD symptoms). Hypotheses expected stronger inverse associations of BCEs-Revised scores than BCEs-Original scores with all mental health problems. Participants were 1,746 U.S. young adults ($M = 26.6$ years, $SD = 4.7$, *range* = 19–35 years; 55.3% female, 42.4% male, 2.3% gender non-conforming; 67.0% White, 10.3% Asian, 8.6% Black, 8.4% Latine, 5.7% other) who completed a 20-item BCEs scale and well-validated instruments on childhood adversities and mental health problems. Compared to BCEs-Original scores, BCEs-Revised scores were significantly more strongly inversely associated with all mental health outcomes. Compared to childhood threat and deprivation, maltreatment was significantly more strongly associated with PTSD symptoms. After controlling for current depression symptoms, BCEs-Revised scores interacted with maltreatment to predict PTSD symptoms. Maltreatment and BCEs-Revised scores also influenced PTSD symptoms in person-oriented analyses. The BCEs-Revised scale has strong psychometric properties and unique strengths in research and practice. Implications for multisystem resilience are discussed.

Keywords: Positive childhood experiences; Childhood maltreatment; PTSD symptoms; Developmental psychopathology; Person-oriented approach

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Introduction

Over the last decade, developmental psychopathology (DP) research has increasingly moved away from operationalizing early adversity as cumulative adverse childhood experiences (ACEs) or total stressful life events (Ellis et al., 2022; McLaughlin et al., 2014). Instead, empirical efforts have shifted towards differentiating various types of childhood adversities along dimensions or subtypes of experience that uniquely influence development and predict long-term adaptation. For instance, child adversity researchers have sought to isolate particularly egregious forms of ACEs, such as childhood maltreatment (e.g., abuse and neglect), from other ACEs reflecting family dysfunction (e.g., children's exposure to parental substance use, incarceration, etc., McDonnell & Valentino, 2016; Narayan, Kalstabakken et al., 2017). Compared to childhood exposure to family dysfunction, maltreatment has been found to exert especially harmful effects on long-term outcomes (Atzl et al., 2019; Negriff, 2020; Sayyah et al., 2022).

Important theoretical advances on dimensional approaches to childhood adversity have also proposed that experiences of childhood threat (i.e., adversities that threaten children's physical integrity or mortality, including abuse and exposure to violence) uniquely confer risk for negative outcomes compared to experiences of childhood deprivation (i.e., adversities characterized by lack or absence of basic needs and environmental inputs, such as inadequate caregiving, neglect, and circumstances associated with poverty, such as food insecurity and homelessness; Berman et al., 2022; Ellis et al., 2022; McLaughlin et al., 2014). Indeed, threat versus deprivation dimensions have been empirically supported to differentially influence developmental outcomes across neurobiological, cognitive, physiological, and behavioral domains (Carozza et al., 2022; Greene et al., 2021; McLaughlin et al., 2021). Approaches that elucidate unique effects of specific dimensions of adversity on adaptation and maladaptation highlight that need to clarify how certain childhood experiences may uniquely confer risk for – or uniquely promote – different outcomes with direct implications for targeted prevention efforts to identify how to avert risk and promote resilience in families across generations (McLaughlin et al., 2021; Narayan et al., 2023).

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Another example of increased interest in dimensional models of childhood experiences is the recent focus on various types of positive childhood experiences (PCEs) as favorable developmental influences in the pathways from childhood adversity to adulthood health outcomes. PCEs research has surged in the past five years to complement the long-standing focus in psychology, psychiatry, and public health on the effects of cumulative risk, such as ACEs, on long-term health problems (Hays-Grudo et al., 2021; Narayan et al., 2021). PCEs are typically conceptualized as childhood assets and resources to promote long-term well-being in most typically developing individuals and protect against maladaptation in individuals growing up in adverse contexts (Narayan et al., 2021). Examples of PCEs include safe and supportive childhood caregivers and other social counterparts (e.g., friends, teachers, and neighbors), positive internal beliefs and capacities (e.g., self-esteem, faith), and a predictable quality of life (e.g., regular home routines, and family and community traditions; Bethell et al., 2019; Morris et al., 2021; Narayan et al., 2018). Some PCEs dimensions more exclusively focus on relational resources, such as support from family and friends (Bethell et al., 2019), whereas others focus on internal resources (core beliefs, self-esteem) in addition to relational resources (Narayan et al., 2018).

The topics of conceptualizing childhood adversities and PCEs are not new to the literature and have been studied by clinical and developmental scientists and sociologists for many decades (Antonovsky, 1996; Masten & Coatsworth, 1998). However, recent methodological advances have sharpened understanding about the unique effects of various childhood experiences and novel approaches to assess them efficiently and effectively. The purpose of this study was to further advance understanding of the nuances of childhood experiences by building on multisystem, dimensional models of PCEs and childhood adversity and examining their interplay for young adulthood mental health problems. We examined three dimensions of childhood adversity (maltreatment, threat, and deprivation) and tested these adversities against the most widely used instrument to measure PCEs, the Benevolent Childhood Experiences (BCEs) scale (Narayan et al., 2018), including two dimensions of BCEs.

Benevolent childhood experiences (BCEs)

The original dimensional model of BCEs

The construct of BCEs was developed to align with the DP perspective and the ecological systems framework, both of which posit that early experiences across multiple levels of children's ecologies are salient influences on subsequent development and adaptation (Bronfenbrenner & Morris, 1998; Sameroff, 2006; Toth & Cicchetti, 2013). In response to the decades-long focus in public health, medicine, and psychology on the enduring deleterious effects of childhood adversity on health and morbidity, the BCEs scale was developed to be a counterpart to the Centers for Disease Control and Prevention (CDC)'s traditional 10-item ACEs scale (Felitti et al., 1998; CDC, 2022). All original 10 BCEs items (see Table 1) were created according to long-standing findings in the resilience literature that certain positive relationships and resources are universally helpful for most developing children to thrive (Masten & Coatsworth, 1998; Masten et al., 2023).

Original BCEs items were also intended to be culturally sensitive and culturally generalizable, that is, not highly contingent upon socioeconomic status and instead, relevant to individuals who may have grown up in developing countries in addition to the U.S. At the time the original BCEs scale was first developed in 2015, there was a scarcity of brief instruments that assessed PCEs that were relevant to adults who grew up in rural or underdeveloped regions of the world.

Table 1. The Benevolent Childhood Experiences (BCEs) 20-item scale

Item #	*When you were growing up, during your first 18 years of life:*
1	Did you have at least one caregiver with whom you felt safe?
2	Did you have at least one good friend?
3	**Did you have beliefs that gave you comfort?**
4	**Did you like school?**
5	Did you have at least one teacher who cared about you?
6	**Did you have good neighbors?**
7	**Was there an adult (not a parent/caregiver or the person from #1) who could provide you with support or advice?**
8	Did you have opportunities to have a good time?
9	**Did you like yourself or feel comfortable with yourself?**
10	**Did you have a predictable home routine, like regular meals and a regular bedtime?**
11	**Did you feel accepted for who you were?**
12	Was there at least one adult who cared about your progress and achievements in school?
13	**Were you usually able to get a good night's sleep?**
14	Did you have access to food that was healthy and nutritious?
15	Did you have access to adequate medical care when you needed it?
16	**Did you feel that you were treated fairly (e.g., in your family and community)?**
17	Did you have adequate law enforcement in your community that made you feel safe?
18	Did you have at least one person to teach you how to say 'no' to negative influences?
19	**Did you regularly spend time outside in the sunshine or around nature?**
20	Did you have something that you felt you were good at or that made you proud?

Note. Items #1-10 are from Narayan et al. (2018). Bolded items compose the BCEs-Revised scale.

The pilot sample for the original BCEs scale consisted in part of very-low income, racially- and ethnically diverse pregnant individuals from agricultural, developing regions of Mexico, and Central and South America, and a subset of these participants only spoke Spanish. The 10 items that composed the original BCEs scale (termed "BCEs-Original" hereinafter) reflected internal and relational safety and security (e.g., the presence of at least one safe caregiver, at least one close friend, a teacher who cared, a positive self-concept, and core beliefs), and a positive and predictable quality of life (e.g., opportunities to have fun, regular home routines). All items were assessed from birth to age 18 and were intended to reflect assets and resources that children have available to them, rather than internal traits, qualities, or skills that are influenced by inherited abilities, biological variability, or temperamental factors. Positively-endorsed items were summed for a dimensional score ranging from zero to 10.

The initial psychometric study revealed that mean differences in total scores on the BCEs-Original scale did not significantly differ between individuals who identified as White versus Black versus Latine, between individuals who were English-speaking or monolingual Spanish-speaking, nor between individuals who were born in the U.S. versus foreign born (Narayan et al., 2018). Although the BCEs scale was developed in the U.S. and the pilot

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sample was relatively small ($N = 101$), pilot findings provided promising evidence that total BCEs scores did not differ based on individuals' racial/ethnic identity, nationality, or native language. A recent systematic review also showed that across all studies to date on positive childhood experiences, approximately two-thirds of all studies conducted in the U.S. and approximately two-thirds of all studies conducted outside the U.S. have used the BCEs scale, suggesting it has good international utility.

A revised dimensional model of BCEs

A primary goal of the current study was to improve upon dimensional measurement of BCEs by addressing two main shortcomings of the original scale. First, the BCEs-Original scale does not comprehensively assess multisystem PCEs because it does not include enough questions on aspects of identity, the broader community, or other socioecological factors. Given the high demand for comprehensive measurement and screening of PCEs in research, clinical work, and community mental health, particularly as a complement to measurement and screening of childhood adversity (Merrick & Narayan, 2020), this study tested 10 additional BCEs items (see Table 1, #11–20) for a more comprehensive set reflecting multisystem resilience. New items include physical and health factors (e.g., access to nutritious food, adequate medical care, and good sleep quality), public safety factors (e.g., adequate law enforcement), and environmental factors (e.g., regular exposure to the outdoors).

A second shortcoming of the BCEs-Original scale is that some original items lack adequate variability. Research across numerous community, low-income, and highly-impoverished samples has found that a subset of the original items are endorsed at extremely high rates, regardless of sample characteristics (e.g., income status, trauma history, racial or ethnic composition). For example, the vast majority of research participants across most samples typically report BCEs-Original items #1, 2, 5, and 8 (i.e., presence of at least one safe caregiver, at least one good friend, at least one teacher who cared, and opportunities to have a good time) at rates of at least 80–90% or even higher, which may contribute to ceiling effects of total BCEs-Original scores in many samples. Examples of the low variability of these four items are depicted in Table 2. Even though the first four samples in Table 2 were characterized by high levels of racial and ethnic diversity and socioeconomic stress (Merrick et al., 2019; Narayan et al., 2019), participants across all four samples generally reported the four specified items at high rates (all ≥80%). Furthermore, these samples all reported the remaining six BCEs items, #3, 4, 6, 7, 9, and 10 (i.e., positive beliefs, enjoyment of school, good neighbors, a supportive non-caregiver adult, a positive self-image, and a predictable home routine) at lower rates (i.e., <80%, with only two exceptions; see Table 2).

This threshold of <80% is a meaningful cutoff in the risk and resilience literature (Sameroff, 2006). In this literature, experiences are often deemed risk factors (defined as a factor that directly relates to a negative outcome or directly increases the odds of a negative outcome) if they are present in roughly 20–25% of the population (Narayan et al., 2015; Sameroff, 2006). Alternatively, if a factor is operationalized in a positive way (i.e., a childhood resource or asset), then it would be considered risky if it is absent in roughly 20–25% of the population. To improve variability of the BCEs-Original scale, we defined items that are reported at rates <80% to be considered a "less-commonly-reported" subset and developed more items to increase this subset.

To address the goals of improving multisystem BCEs and item variability, we developed 10 additional BCEs items (Table 1). These items were developed from a) reviewing the resilience literature (Masten et al., 2023), b) receiving input from researchers around the world who translated the BCEs-Original scale for non-U.S. studies, and c) incorporating feedback from multi-ethnic, multilingual health providers who participated in workshops on implementing the BCEs scale into clinical and community settings. The 20 total BCEs items were then administered in two large independent, community samples of U.S. young adults. Descriptive results showed that both of these samples reported high frequencies of the same BCEs-Original items (#1, 2, 5, 8; all ≥80%) and comparably low frequencies of the remaining BCEs-Original items (# 3, 4, 6, 7, 9, 10; <80%), similar to the first four samples. These two samples also reported a subset of the new BCEs items, #11, 13, 16, and 19 (i.e., feeling accepted, regularly sleeping well, being treated fairly, and regularly spending time outside, Table 2), at comparably lower rates (<80%). The current study then tested the "BCEs-Revised scale," comprised of all 10 "less-commonly-reported" items (#3, 4, 6, 7, 9, 10, 11, 13, 16, and 19), against the BCEs-Original scale and alongside various dimensions of childhood adversity.

Dimensions of childhood adversity

Theoretical foundations

According to the DP perspective, childhood experiences have a formative and enduring effect on adaptation and maladaptation across the lifespan and over generations (Narayan et al., 2021; Toth & Cicchetti, 2013). Indeed, experiences of childhood adversity explain a substantial proportion of the variance in risk for psychopathology symptoms and disorders across development and into adulthood (Green et al., 2010). Because childhood is a period when adaptive capacities for health and well-being are steadily developing, childhood adversity may interfere with the foundation of emotional, behavioral, and stress regulation skills, and prevent these competencies from consolidating. Moreover, if the adversities stem from danger within the caregiving system, children may not have adequate protective influences to shield them from adversity and help them co-regulate their emotions, behaviors, and stress responses (Masten & Coatsworth, 1998; Narayan et al., 2013; Sroufe et al., 2005). Children who experience any form of interpersonal adversity (e.g., direct maltreatment, violence between caregivers, lack of caregiver affection, insufficient food or medical care) may experience risks to their safety and physical well-being that weaken their fragile base to effectively cope and combat risk. Accordingly, efforts that identify the interplay of childhood assets (e.g., BCEs) and adversities may optimally inform how risk, promotive, and protective mechanisms operate together to influence long-term well-being.

Importantly, childhood adversity and BCEs are not meant to be mutually exclusive. Many adults experienced childhood abuse from a caregiver or witnessed violence between caregivers but also had at least one safe caregiver. Similarly, many adults were neglected in some ways but still had access to close friends, caring teachers, or good neighbors. Indeed, research has consistently found that associations between BCEs and various dimensions of childhood adversity are significantly inversely associated, yet often only modest in magnitude. In other words, BCEs share only some of their variance with childhood adversity, and many individuals experience high levels of both (Han et al., 2023; Narayan et al., 2018).

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Table 2. Frequencies of all BCEs items across six samples

#	Item construct	1. SF Pregnant Individuals ($N = 101$)	2. Denver Pregnant Individuals ($N = 240$)	3. Denver Partners of Pregnant Individuals ($N = 150$)	4. Minneapolis Homeless Parents ($N = 50$)	5. U.S. Young Adults, Pre-Pandemic ($N = 548$)	6. U.S. Young Adults, Pandemic ($N = 1,198$)
1	At least one safe caregiver	90%	97%	92%	94%	90%	88%
2	At least one good friend	87%	93%	87%	86%	91%	92%
3	**Beliefs that provided comfort**	**69%**	**75%**	**73%**	**76%**	**64%**	**69%**
4	**Enjoyment of school**	**67%**	**78%**	**69%**	**68%**	**60%**	**65%**
5	At least one caring teacher	82%	90%	87%	86%	84%	84%
6	**Good neighbors**	**59%**	**77%**	**73%**	**66%**	**66%**	**68%**
7	**A supportive non-caregiver adult**	**78%**	**78%**	**73%**	**68%**	**70%**	**72%**
8	Opportunities to have a good time	86%	92%	94%	80%	93%	91%
9	**Positive self-image or self-esteem**	**67%**	**75%**	**83%**	**64%**	**47%**	**52%**
10	**A predictable home routine (e.g., regular meals and bedtime)**	**81%**	**78%**	**75%**	**68%**	**78%**	**78%**
11	**Acceptance for who you were**					**53%**	**60%**
12	At least one adult who cared about school progress and achievements					91%	89%
13	**The ability to regularly get a good night's sleep**					**78%**	**75%**
14	Access to food that was healthy and nutritious					88%	86%
15	Access to adequate medical care when needed					89%	90%
16	**Fair and just treatment in the family and community**					**70%**	**72%**
17	Adequate law enforcement in the community to feel safe					81%	81%
18	At least one person to teach you to say "no" to negative influences					86%	85%
19	**Regular time outside in sunshine or nature**					**79%**	**77%**
20	Something that you were good at or that made you proud					82%	81%

Note. Bolded items are systematically reported across all samples at rates <80% (with two exceptions: #9 in Sample 3 and #10 in Sample 1).

Here, the focus is on three dimensional forms of childhood adversity that have been documented to have unique and enduring effects on subsequent development: childhood threat and deprivation (which are operationalized along separate dimensions) and childhood maltreatment (which partially overlaps with both threat and deprivation). Maltreatment is included because it has unique properties compared to threat and adversity, such that it often more exclusively pertains to trauma within the caregiving system than threat or deprivation (Cicchetti, 2016; Narayan et al., 2021).

Childhood threat

Threat during childhood is typically operationalized as experiences that may occur both within and outside the family that are characterized by victimization or violence. These experiences involve direct physical harm (i.e., physical or sexual abuse), threats of direct harm to the child (i.e., emotional/verbal abuse), or witnessing of physical harm to others (i.e., exposure to domestic or community violence; Berman et al., 2022; McLaughlin et al., 2014). According to the DP perspective, childhood experiences of threat, including direct abuse of children or observations of violent victimization within the family or from the broader context, could all severely endanger children's safety and well-being (Cicchetti, 2016; Sroufe et al., 2005). All experiences constituting threat involve direct harm to the child, failure to protect a child from harm because the caregiver is themselves endangered (e.g., exposure to domestic violence), or socio-contextual harm because the environment itself is threatening (e.g., exposure to community violence or direct victimization by racism or peer victimization).

Childhood deprivation

Experiences of deprivation involve reduced, limited, or absent input, resources, or basic needs to the developing child (McLaughlin et al., 2014). Deprivation most commonly includes

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childhood neglect and absence of other environmental input (e.g., lack of cognitive stimulation or resources). Caregiver absence or loss has also been included as a form of deprivation (Ellis et al., 2022). In the current study, we include caregiver absence as a form of deprivation in circumstances where the loss is clearly negative to the child even if temporary, such as when a parental figure becomes incarcerated; or when the loss is clearly negative and permanent, such as when a parental figure either dies or permanently abandons the family. This study also included childhood homelessness as a form of concrete loss of one's home.

Research continues to document that experiences of threat versus deprivation show several distinct effects on development across multiple levels of functioning (Carozza et al., 2022; McLaughlin et al., 2014). Distinct effects are evident in developmental processes involving cognitive control, social learning of threat detection, decision making about aversive environmental cues or stimuli, differential rates and acceleration of synaptic pruning and pubertal timing, and differences in amygdala reactivity following experiences of threat versus deprivation (McLaughlin et al., 2021). Research also finds that experiences of threat predict some outcomes (e.g., emotion dysregulation), whereas experiences of deprivation predict others (e.g., inattention to emotions; Greene et al., 2021). Accumulating evidence suggests that childhood threat and deprivation are both highly salient and meaningful dimensions of adversity with robust and unique effects on outcomes (McLaughlin et al., 2021).

Childhood maltreatment

Maltreatment of a child is often considered an adversity so pernicious that it is beyond the range of typical experiences that most children can endure without some risk to their adaptation or well-being (Cicchetti, 2016; Sroufe et al., 2005). Indeed, according to the DP perspective, childhood maltreatment poses severe risks to children's internalized sense of self-worth and capacity for self-regulation across multiple levels of functioning (e.g., emotional, behavioral, physiological, attentional), and it renders individuals vulnerable to severe psychopathology and traumatic stress (Negriff, 2020; Sayyah et al., 2022; Toth & Cicchetti, 2013). This study operationalized maltreatment to include childhood emotional/verbal abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect. Therefore, childhood maltreatment partially overlapped with threat (each included all three forms of abuse), and partially overlapped with deprivation (each included both forms of neglect). However, both threat and deprivation contained other elements that may harm or dispossess the child (e.g., exposure to community violence or homelessness) that unlike childhood maltreatment, may more broadly affect the family or occur within the community.

Empirically, childhood maltreatment predicts several forms of psychopathology. These outcomes include elevated depression, anxiety, and PTSD symptoms and diagnoses, as well as severe externalizing problems characterized by conduct disorder, perpetration of interpersonal violence, and risks for negative or abusive caregiving in the next generation (Cicchetti, 2016; Negriff, 2020; Sayyah et al., 2022). Evidence also suggests that childhood maltreatment may differentially predict outcomes compared to other dimensions of adversity. For example, prospective pathways from childhood maltreatment (including abuse and neglect) to adolescent and adulthood outcomes (e.g., externalizing behavior, intimate partner violence victimization and perpetration) were distinct from pathways from childhood exposure to domestic violence to these same outcomes (Narayan et al., 2013). In another study, childhood abuse (physical, sexual, and emotional) as well as exposure to domestic violence predicted different outcomes in pregnant women than childhood deprivation (Greene et al., 2021). Moreover, another study found that threat specifically characterized by betrayal (i.e., emotional/verbal and physical abuse) was more strongly associated with mental health outcomes than childhood deprivation characterized by lack of caregiver warmth and support (Sosnowski et al, 2023). These findings indicate that maltreatment-specific experiences should be isolated from broader experiences of threat and deprivation because maltreatment uniquely influences long-term outcomes. These three dimensions represent various forms of multisystem adversity, with maltreatment often occurring more specifically within the home or caregiving system, and threat and deprivation potentially occurring within the home as well as within the broader socioecological context.

The current study

The current study examined the direct effects of several dimensions of childhood assets (i.e., BCEs-Revised versus BCEs-Original), and childhood adversities (maltreatment, threat, and deprivation), as well as the interaction between these assets and adversities, on depression, anxiety, and PTSD symptoms in young adulthood. Depression and anxiety are among the most common mental health issues in the general adulthood population and some of the most widely-studied outcomes in the adversity literature (Felitti et al., 1998; Green et al., 2010). PTSD symptoms are prevalent in adults with childhood adversity and are part of the sequelae from childhood adversity to adulthood traumatic stress (Greene et al., 2021; Narayan et al., 2021).

Aligned with the risk and resilience literature, BCEs were first and foremost considered to be promotive factors, which are factors that directly associate with more favorable outcomes (Masten et al., 2023; Sameroff, 2006). Indeed, in the initial psychometric study and many independent studies that followed, higher levels of BCEs-Original directly predicted lower levels of long-term mental health problems and better psychosocial adjustment across college students, young adults, and samples of pregnant individuals, consistent with promotive effects (Doom et al., 2021; Merrick et al., 2019; Narayan et al., 2018, 2023; Nevarez-Brewster et al., 2022). Of note, much of the current research on the BCEs-Original scale has only detected direct, promotive effects of BCEs on long-term outcomes, even while accounting for ACEs. Less research has found evidence for interactive effects of BCEs and childhood adversity, with BCEs as protective factors against adulthood outcomes (Doom et al., 2021; Nevarez-Brewster et al., 2022). Failure to detect protective effects of BCEs partly contradicts theories of risk and resilience, which would expect that many promotive factors (main effects) would also become protective factors (i.e., moderators) when contextual risk is high, thereby buffering effects of childhood adversity on subsequent maladaptation (Masten et al., 2023). However, the lack of evidence for moderating effects of BCEs in the link between childhood adversity and outcomes may be due to the lower variability of some of the original BCEs items and the restricted range of BCEs-Original total scores. To clarify whether improved variability in total BCEs scores may lead to detection of protective effects, the present study also tested the possibility that BCEs-Revised scores may protect against the effects of each adversity dimension on each of the mental health problems.

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Study hypotheses

First, we hypothesized (H1) that mean levels of BCEs-Revised scores would not differ across individuals who identified as racial/ethnic minorities (i.e., Black, Latine, Asian), compared to individuals who identified as White, consistent with previous findings that BCEs-Original scores also did not differ across racial/ethnic groups (Narayan et al., 2018). Second, we hypothesized (H2) that a) higher levels of BCEs-Revised scores would be significantly associated with higher BCEs-Original scores, b) higher levels of BCEs-Revised scores and BCEs-Original scores would both be associated with lower levels of each mental health problem, and c) associations between BCEs-Revised scores and each mental health problem would be stronger in magnitude than associations between BCEs-Original scores and each mental health problem. Third, we hypothesized (H3) that higher levels of BCEs-Revised scores would directly predict lower levels of each mental health problem, reflecting promotive effects, and that higher levels of each type of childhood adversity would predict higher levels of each mental health problem, reflecting risk effects. As an exploratory aim given the limited evidence that BCEs-Original scores interact with adversity to protect against negative outcomes, we tested whether higher levels of BCEs-Revised scores would protect against (interact with) each dimension of childhood adversity to predict each mental health problem, such that for individuals with higher levels of BCEs-Revised scores, associations between adversities and mental health problems would be attenuated.

Method

Participants

Participants were 1,746 young adults ($M = 26.6$ years, $SD = 4.7$, *range* = 19–35 years), who identified their gender as 55.3% female, 42.4% male, and 2.3% gender non-conforming; and their race/ethnicity as 67.0% White, 10.3% Asian, 8.6% Black, 8.4% Latine, 4.4% biracial/multiracial, and 1.3%% other or prefer not to respond. All individuals participated in a larger online survey about childhood experiences and relationships, and young adulthood mental health and behavior either before the COVID-19 pandemic (Table 2, Sample 5 completed surveys between November 12, 2019 and January 19, 2020) or during the COVID-19 pandemic (Table 2, Sample 6 completed surveys between August 18, 2020 and December 1, 2020). For the current study, these two samples were combined to test all current hypotheses with maximum power because data collection protocols were identical. Independent t-tests showed that these samples did not significantly differ from one another on mental health (depression, anxiety, or PTSD symptoms), childhood experiences (BCEs-Revised, BCEs-Original, childhood threat, deprivation, or maltreatment), or demographic characteristics (participant age, gender, or racial/ethnic identity, educational attainment, or childhood income status).

Procedures

All participants were recruited through Prolific-Academic (Pro-A), the online crowd-sourcing platform that produces high-quality social and behavioral empirical data, including instruments that retrospectively assess adults' childhood experiences (Eyal et al., 2021; Green & Douglas, 2018; Peer et al., 2017). Eligibility included being 19 to 35 years old, speaking English fluently, having been born in and currently residing in the U.S, and having a Pro-A approval rating of at least 99%. This approval rating is provided by Pro-A and confirms that participants have successful survey completion and quality ratings that reflect valid, timely, and complete survey submissions. All surveys were sent and received via REDCap, the secure, web-based platform for data collection and management (Harris et al., 2019). Eligible participants received REDCap links to complete online informed consent followed by the one-hour survey protocol of publicly available, well-validated standardized questionnaires. All participants were compensated, debriefed, and provided with links for mental health referrals.

Measures: Dimensions of childhood experiences/independent variables

Benevolent childhood experiences (BCEs)

All 20 BCEs items (hereinafter referred to as the BCEs-20 scale) were developed according to the multisystem resilience literature with the intention for all items to be as applicable as possible to individuals who had grown up in both developing and developed regions of the world.

BCEs-Original. The 10 original items reflect internal and relational security and a positive and predictable quality of life (Table 1) and are summed for a total BCEs-Original score. In many samples, mean levels of BCEs-Original scores tend to be high (≥7 out of 10), consistent with the current sample mean ($M = 7.72$, $SD = 2.14$, range = 1–10).

BCEs-Revised. The 10 items that are least commonly reported (all <80%) on the BCEs-20 scale compose the BCEs-Revised scale (#3, 4, 6, 7, 9, 10, 11, 13, 16, 19; Table 1). Revised items pertain to additional aspects of the multisystem ecology and include access to health-related factors (e.g., good sleep, regular time outdoors), and social justice factors (e.g., perceiving acceptance for one's identity and fair treatment by one's family and community). This study used a total BCEs-Revised dimensional score ($M = 6.98$, $SD = 2.70$, range = 0–10).

Childhood adversity dimensions

Frequencies for all adversities composing childhood maltreatment, threat, and deprivation are tabulated in Table 3.

Childhood maltreatment. Participants retrospectively reported on their childhood maltreatment from the traditional ACEs scale, including any experiences of abuse or neglect from birth to age 18 years (Felitti et al., 1998; see Schmidt et al., 2019 for all item wording). The ACEs scale has high test-retest stability ($r = .79$; Karatekin & Hill, 2019). The maltreatment dimension shows good convergent validity with gold-standard instruments assessing childhood maltreatment, such as the Childhood Trauma Questionnaire (Bernstein et al., 2003; Schmidt et al., 2019). The maltreatment dimension consists of five yes/no items assessing emotional abuse (28.8%), physical abuse (13.0%), sexual abuse (7.3%), emotional neglect (32.4%), and physical neglect (8.1%) that are summed for a total maltreatment score ($M = .91$, $SD = 1.25$, range = 0–5). Approximately 42.8% of the sample reported at least one type of childhood maltreatment.

Childhood threat. Threat from birth to age 18 was operationalized as the three abuse subtypes from the maltreatment dimension (i.e., emotional, physical, and sexual abuse), exposure to domestic violence between parental figures from birth to age 18 [(9.3%), from the traditional ACEs scale (Schmidt et al., 2019)], and exposure to community violence [(19.9%), drawn from one item, "*Between birth to age 18, did you ever experience violence in your community (for example, seeing, hearing, being exposed to, or*

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Table 3. Frequencies of all childhood adversity experiences

	Total Sample ($N = 1,746$)
Emotional abuse	28.8%
Physical abuse	13.0%
Sexual abuse	7.3%
Emotional neglect	32.4%
Physical neglect	8.1%
Exposure to domestic violence	9.3%
Exposure to community violence	19.1%
Homelessness	5.6%
Parental/household member incarceration	8.9%
Parental loss (includes either item below)	17.0%
Death of a parent	5.7%
Parental abandonment	12.1%

being victimized by crime) in the form of gunshots; a robbery, mugging, or attack; or gang violence?]. Positive responses across the three abuse subtypes, and exposure to domestic violence and community violence were summed to yield a total childhood threat score ($M = .79$, $SD = 1.12$, range = 0–5). Approximately 42.1% of the sample reported at least one type of childhood threat.

Childhood deprivation. Deprivation from birth to age 18 was operationalized as the two neglect subtypes from the maltreatment dimension (i.e., emotional and physical neglect), exposure to parental/household member incarceration from birth to age 18 [(8.9%), drawn from the ACEs scale (Schmidt et al., 2019)]; childhood homelessness [(5.6%), drawn from one item, "*From birth to age 18, were you ever homeless (including living on the streets, residing in a shelter, or 'doubling-up' with friends of relatives)?*"]; and either a) death of a parent or b) permanent abandonment by a parent from birth to age 18 years. These latter two experiences (a and b) were each drawn from one item, parental death: "*From birth to age 18, has a parent ever died*" (5.7%); and abandonment: "*From birth to age 18, did a parent ever leave the home or family permanently (other than for a work reason, like deploying to the military)?*" (12.1%). Parental death and abandonment were together operationalized as "parental loss," which was coded as positive if either experience was reported (17.0%). Positive responses across the two neglect subtypes, childhood homelessness, parental/household incarceration, and parental loss were summed to yield a total childhood deprivation score ($M = .73$, $SD = 1.00$, range = 0–5). Approximately 44.8% of the sample reported at least one type of childhood deprivation.

Measures: Young adulthood mental health outcomes/ dependent variables

Depression symptoms. Participants completed the Patient Health Questionnaire (PHQ-9; Spitzer et al., 1999), a nine-item, self-report checklist that uses four-point Likert scales of symptom severity and frequency in the past two weeks (1-"*Not at all*" to 3-"*Nearly every day*"). The PHQ-9 has high internal consistency (α = .86–.89) and excellent test-retest reliability ($r = .84$; Kroenke et al., 2001). While this study used a total symptom score that summed all responses ($M = 8.90$, $SD = 6.80$, range = 0–27, $\alpha = .90$), 40.3% of participants reported clinical depression according to the cutoff ≥10 recommended by developers (Kroenke et al., 2001).

Anxiety symptoms. Participants completed the Generalized Anxiety Disorder scale (GAD-7), a seven-item self-report checklist that uses four-point Likert scales of symptom severity and frequency in the past two weeks (0-"*Not at all*" to 3-"*Nearly every day*"). The GAD-7 has high internal consistency ($\alpha = .93$) and excellent test-retest reliability ($ICC = .83$; Spitzer et al., 2006). While this study used a total symptom score that summed all responses ($M = 7.34$, $SD = 5.92$, range = 0–21, $\alpha = .92$), 31.6% of participants reported clinical levels of anxiety according to the cutoff score ≥10 recommended by the developers (Spitzer et al., 2006).

PTSD symptoms

PTSD symptoms were assessed using the PTSD Checklist for DSM-5 (PCL-5; Weathers et al., 2013), a 20-item, self-report checklist that uses five-point Likert scales of symptom severity and frequency in the past month (0-"*Not at all*" to 4-"*Extremely*"). The PCL-5 has high internal consistency ($\alpha = .94$) and excellent test-retest reliability ($r = .82$; Blevins et al., 2015). While this study used a total symptom score that summed all responses ($M = 22.14$, $SD = 16.42$, range = 0–80, $\alpha = .95$), 24.6% of participants reported clinical PTSD according to the cutoff score ≥33 (National Center for PTSD, 2022), and 47.6% of participants reported either subclinical or clinical PTSD (total scores ≥20; River et al., 2019).

Covariates

Covariates included participants' age, gender identity, educational attainment, and childhood socioeconomic status (SES). Covariates were selected because of their well-established associations with young adults' mental health problems (Sroufe et al., 2005). For educational attainment, participants indicated their completed level on a validated six-point Likert scale ($M = 4.07$, $SD = 1.35$, range = 1–6): "*Less than a high school degree, high school degree or equivalent, some college, associates' degree, bachelors' degree, or other higher degree (including M.A., Ph.D., J.D., etc.")*; Sayyah et al., 2022). For childhood income status ($M = 2.86$, $SD = 0.84$, range = 1–5), participants used a five-point Likert scale following this prompt: "*Thinking back to when you were growing up (birth to age 18), how would you rate your family's income status? (If it changed, please rate how it was for the majority of the time you were growing up.): "Poor, low-income, middle-class, well-to-do, or wealthy"* (Sayyah et al., 2022).

Data analytic plan and missing data

Data analytic plan

Participants' racial/ethnic identity was used in the first hypothesis to test whether mean levels of BCEs-Revised scores differed across the four racial/ethnic groups that had large-enough cell sizes: White (67.0%), Black (8.6%), Latine (8.4%), and Asian (10.3%). An ANOVA test with Bonferroni-corrected p-values for pairwise contrasts was conducted to examine whether mean levels of BCEs-Revised scores differed across individuals who identified as part of thse four racial/ethnic groups. ANOVAs with pairwise contrasts were also conducted to examine whether mean levels of childhood threat, deprivation, and maltreatment, as well as BCEs-Original scores differed across the four racial/ethnic groups. Pairwise contrasts were tested using parametric tests (i.e., Tukey's test) or non-parametric tests (Games-Howell tests) depending on whether each of the dependent variables in the ANOVAs (i.e., the childhood

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experiences) met assumptions of homogeneity of variance of group means.

To test the second hypothesis, bivariate correlations were conducted for both BCEs-Revised total scores and BCEs-Original total scores with all three mental health outcomes. Then, Fisher's *r-to-z* tests were conducted to test whether the strength of the correlations between BCEs-Revised scores with each mental health outcome were significantly stronger in magnitude than the strength of the correlations between BCEs-Original scores and each mental health outcome.

To address the third hypothesis, hierarchical linear regressions were conducted by outcome that included covariates and each adversity in the first step and BCEs-Revised scores in the second step. The third step included an interaction term of adversity by BCEs-Revised to examine the final exploratory study aim of whether higher levels of BCEs-Revised scores protected against (i.e., directly interacted with) effects of each adversity on outcomes. In total, three regressions tested the direct and interactive effects of childhood maltreatment and BCEs-Revised for each outcome, followed by three regressions for childhood threat and BCEs-Revised for each outcome, followed by three regressions for childhood deprivation and BCEs-Revised for each outcome. Regressions were conducted separately by adversity dimension to examine the unique effects of each adversity dimension and BCEs-Revised scores on each outcome and given that childhood maltreatment partially overlapped with both threat and deprivation.

Missing data

Missing data were very minimal across the entire dataset and ranged from 0% (on most covariates, including participant age and gender identity) to 5.4% on BCEs-Original scores and 5.9% on BCEs-Revised scores. See Table 5 for rates of missing data on all study variables. Rates of missing data were the highest (although still very small) on dimensions of childhood experiences because a small subset of participants indicated "prefer not to answer" on individual items that comprised either the BCEs or adversity dimensions. This observation is consistent with trauma research showing that some individuals prefer not to disclose the presence or absence of specific childhood experiences (Schmidt et al., 2019). Missing data across the entire data matrix were only 1.8%, so analyses for missingness were not deemed necessary, and listwise deletion was used for all regressions (Graham, 2009).

For all regressions, influential cases were examined, and cases were considered influential if Cook's d was $\geq 4/n$ (Cook & Weisberg, 1982; Rawlings, 1988). Any influential cases were removed, and then regressions were re-conducted with bootstrapping techniques because many of the study variables were non-normally distributed (e.g., adversity dimensions and mental health outcomes were positively skewed, and BCEs variables were negatively skewed). Bootstrapping was completed with 1,000 draws per regression in SPSS version 28. Findings reported below reflect raw results because removing influential cases and bootstrapping did not change any findings, with the exception of one finding noted below and in Table 7.

Only significant results ($p < .05$), but not marginally significant results ($p < .10$), are reported given that power analyses confirmed that all regressions were adequately powered to detect significant effects. Power analyses in G*Power3 (Faul et al., 2007) were conducted for the regressions using an alpha of .05, an effect size of .15, and power set at .80 with nine predictors in the final step of all regressions. Power analyses indicated that a sample size of ≥114 was needed to detect significant effects.

Results

Hypothesis (H) 1: Mean differences of racial/ethnic identity by childhood experiences

ANOVA tests (Table 4) revealed that there were no significant mean differences for the four racial/ethnic identity groups across BCEs-Revised or BCEs-Original scores. There were also no significant mean differences for these four groups across overall BCEs-20 scores. Furthermore, there were no significant mean differences across these four groups for childhood maltreatment. However, there were significant mean differences across groups for both childhood threat, $F(3, 1{,}584) = 4.88$, $p = .002$; and childhood deprivation, $F(3, 1{,}587) = 5.93$, $p < .001$. Follow-up parametric post-hoc contrasts for homogeneous means revealed that for threat, there were no significantly different contrasts after applying the Bonferroni correction (see Table 4). However, non-parametric pairwise contrasts for non-homogeneous means for childhood deprivation revealed that individuals who identified as Asian reported significantly lower mean levels of deprivation than individuals who identified as White, Black, and Latine (but there with no significant mean differences among these three groups; Table 4).

H2: Correlations between BCEs-Revised, BCEs-Original, and mental health problems

BCEs-Revised and BCEs-Original scores were strongly associated ($r = .92$, $p < .001$; see Table 5). However Fisher's *r*-to-*z* tests revealed that inverse associations between BCEs-Revised scores and all three mental health outcomes were significantly stronger than associations between BCEs-Original scores and all three outcomes: BCEs-Revised and depression symptoms, $r = -.510$, $p < .001$ versus BCEs-Original and depression symptoms: $r = -.453$, $p < .001$, $z = -2.11$, significant two-tailed difference: $p = .035$; BCEs-Revised and anxiety symptoms, $r = -.435$, $p < .001$ versus BCEs-Original and anxiety symptoms, $r = -.373$, $p < .001$, $z = -2.12$, significant two-tailed difference $p = .034$; and BCEs-Revised and PTSD symptoms $r = -.513$, $p < .001$ versus BCEs-Original and PTSD symptoms: $r = -.441$, $p < .001$, $z = -2.67$, significant two-tailed difference $p = .008$.

We also examined whether correlations between adversities and mental health outcomes differed in magnitude depending on adversity dimension. Indeed, Fisher's *r-to-z* tests revealed that childhood maltreatment showed a) significantly stronger associations with all three outcomes compared to childhood threat and b) significantly stronger associations with PTSD symptoms (but not depression or anxiety symptoms) compared to childhood deprivation. More specifically, the correlation between maltreatment and depression symptoms, $r = .411$, $p < .001$, was significantly stronger than the correlation between threat and depressive symptoms, $r = .338$, $p < .001$, $z = 2.44$, significant two-tailed difference $p = .015$. However, the correlation between maltreatment and depression symptoms was not significantly different than the correlation between deprivation and depression symptoms, $r = .356$, $p < .001$, $z = 1.86$, significant two-tailed difference $p = .063$. Additionally, the correlation between maltreatment and anxiety symptoms, $r = .373$, $p < .001$, was significantly stronger than the correlation between threat and anxiety symptoms: $r = .299$, $p < .001$, $z = 2.41$, significant two-tailed difference

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Table 4. One-way ANOVA for associations of childhood experience dimensions with racial/ethnic identity (M, SD by group)

	1. White ($n = 1,170$)	2. Asian ($n = 180$)	3. Black ($n = 151$)	4. Latine ($n = 146$)	*F*-value	*p*-value	Sign. contrasts ($p < .008$)
BCEs-Revised	6.97 (2.72)	7.35 (2.50)	7.26 (2.66)	6.62 (2.81)	2.34	.071	NA
BCEs-Original	7.72 (2.15)	7.96 (2.10)	7.96 (2.02)	7.40 (2.25)	2.27	.079	NA
Threat	0.74 (1.11)	0.64 (1.00)	1.01 (1.12)	0.96 (1.19)	4.88	.002	n.s.
Deprivation	0.71 (1.00)	0.48 (.70)	0.91 (1.04)	0.83 (1.08)	5.93	<.001	2 vs 1, 3, and 4
Maltreatment	0.88 (1.26)	0.75 (1.15)	1.02 (1.19)	0.94 (1.28)	1.32	.267	NA

$p = .016$. However, the correlation between maltreatment and anxiety symptoms was not significantly different than the correlation between deprivation and anxiety symptoms, $r = .330$, $p < .001$, $z = 1.42$, significant two-tailed difference $p = .156$. Lastly, the correlation between maltreatment and PTSD symptoms, $r = .481$, $p < .001$, was significantly stronger than the correlation between threat and PTSD symptoms, $r = .403$, $p < .001$, $z = 2.81$, significant two-tailed difference $p = .003$; and the correlation between maltreatment and PTSD symptoms was also significantly stronger than the correlation between deprivation and PTSD symptoms, $r = .423$, $p < .001$, $z = 2.11$, significant two-tailed difference $p = .035$. However, Fisher's *r-to-z* tests indicated that associations between threat and all three mental health outcomes versus deprivation and all three respective outcomes were comparable in magnitude (i.e., not significantly different).

H3: Promotive effects of BCEs-revised and risk effects of adversities

Findings were consistent across all regression analyses and suggested that after controlling for covariates, higher levels of each of the three adversities significantly predicted higher levels of each of the mental health problems ($p < .001$ for all main effects of all adversities across all models; Tables 6–8), consistent with a direct risk effect of all adversities on all mental health problems. Moreover, across all regression analyses, higher levels of BCEs-Revised significantly predicted lower levels of each mental health problem, after accounting for each adversity ($p < .001$ for all main effects of BCEs-Revised across all models, Tables 6–8) consistent with direct, promotive effects of BCEs-Revised for all mental health problems.

Exploratory aim: Protective effects of BCEs-Revised against adversities on mental health problems

Only two of the nine regressions of adversity by BCEs-Revised showed significant moderating effects of BCEs after removing any influential cases and bootstrapping effects (see Tables 6–7). Specifically, there was a significant interaction of childhood maltreatment by BCEs-Revised for PTSD symptoms ($\beta = .08$, $p < .001$), in addition to main effects of maltreatment ($\beta = .31$, $p < .001$) and BCEs-Revised ($\beta = -.35$, $p < .001$). This model accounted for 31.9% of the variance (adjusted R^2) in PTSD symptoms. There was also a significant interaction of childhood deprivation by BCEs-Revised for PTSD symptoms ($\beta = .05$, $p = .035$), in addition to main effects of deprivation ($\beta = .22$, $p < .001$) and BCEs-Revised ($\beta = -.40$, $p < .001$). This model accounted for 29.6% of the variance (adjusted R^2) in PTSD symptoms. [There was also a significant interaction of childhood threat by BCEs-Revised for PTSD symptoms ($\beta = .06$, $p = .009$), in addition to main effects of threat ($\beta = .24$, $p < .001$) and BCEs-Revised ($\beta = -.41$, $p < .001$), but this interaction effect was driven by a subset of influential cases, so it is not discussed further.]

The two interactions that held after removing influential cases and bootstrapping effects (i.e., maltreatment by BCEs-Revised and deprivation × BCEs-Revised for PTSD symptoms) were further probed to examine simple slopes of PTSD symptoms by each adversity dimension at different levels of BCEs-Revised. These results showed very similar patterns for childhood maltreatment versus deprivation (see Figure 1). Specifically, at all levels of BCEs-Revised (i.e., −1 SD below the mean, at the mean, and at 1 SD above the mean), there was a significant positive association between higher levels of adversity and higher levels of PTSD symptoms, with the interaction evident in non-parallel lines of each of the three simple slopes. More specifically, in the case of both interactions, individuals higher on standardized levels of BCEs-Revised showed lower levels of PTSD symptoms than individuals at lower standardized levels of BCEs-Revised (consistent with promotive effects of BCEs-Revised), but the former group of individuals (1 SD above the mean on BCEs-Revised) showed a slightly stronger association (steeper simple slope) of each adversity (maltreatment and deprivation) and PTSD symptoms. These findings are inconsistent with resilience theory that would expect that compared to individuals lower on BCEs, individuals higher on BCEs should show a weaker (not stronger) association between adversity and PTSD symptoms, so these interaction effects were further explored in two ways.

Replication of main and moderating effects with BCEs-Original

First, all regressions were reconducted with BCEs-Original in place of BCEs-Revised to examine whether direct and interaction effects showed consistent associations and patterns across both dimensions of BCEs. Indeed, after controlling for covariates, all regressions showed direct risk effects of each adversity dimension on each mental health problem, and direct promotive effects of BCEs-Original for each mental health problem. After removing influential cases and bootstrapping, BCEs-Original also significantly moderated the associations between maltreatment and PTSD symptoms and deprivation and PTSD symptoms, consistent with the interactions of BCEs-Revised above. The simple slopes of both interactions revealed the same patterns as those found with BCEs-Revised: For individuals ≥1 SD above the mean on BCEs-Original, there was a steeper association between maltreatment and PTSD symptoms than for individuals at the mean or at ≤1 SD below the mean of BCEs-Original.

Person-oriented cluster analyses of adversity and BCEs for PTSD symptoms

To further clarify these interaction findings, as a final test we conducted person-centered analyses to understand whether

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Table 5. Bivariate correlations and descriptive statistics

Childhood Experience Dimensions	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. BCEs-Revised	–														
2. BCEs-Original	.92**	–													
3. Childhood maltreatment	−.58**	−.53**	–												
4. Childhood threat	−.47**	−.44**	.86**	–											
5. Childhood deprivation	−.53**	−.50**	.73**	.58**	–										
Mental Health Outcomes															
6. Depression symptoms	−.51**	−.45**	.41**	.34**	.36**	–									
7. Anxiety symptoms	−.44**	−.37**	.37**	.30**	.33**	.78**	–								
8. PTSD symptoms	−.51**	−.44**	.48**	.40**	.42**	.76**	.74**	–							
Covariates															
9. Pandemic sample (yes)	.06*	.05*	−.04	−.04	−.04	−.01	−.02	−.03	–						
10. Female gender identity	−.06*	−.03	.13**	.07**	.11**	.11**	.16**	.10**	.03	–					
11. Male gender identity	.08**	.04	−.15**	−.08**	−.13**	−.13**	−.18**	−.12**	−.03	−.95**	–				
12. Gender non-conforming identity	−.08**	−.05	.05*	.02	.06*	.07**	.06*	−.09**	.01	−.17**	−.13**	–			
13. Participant age	.01	−.01	.03	.06*	.04	−.09**	−.06*	−.08**	−.07**	.00	.02	−.05*	–		
14. Educational attainment	.26**	.25**	−.18**	−.18**	−.20**	−.24**	−.16**	−.18**	.05*	.07**	−.06*	−.02	.37**	–	
15. Childhood income status	.28**	.28**	−.33**	−.34**	−.38**	−.19**	−.17**	−.18**	.03	.02	−.01	−.01	−.07**	.20**	–
Descriptive Statistics															
Mean (or % if ordinal variable)	6.98	7.72	0.91	0.79	0.73	8.90	7.34	22.14	68.6%	55.3%	42.4%	2.3%	26.6	4.07	2.86
Standard deviation	2.70	2.14	1.25	1.12	1.00	6.80	5.92	16.42	NA	NA	NA	NA	4.7	1.35	0.80
Sample range	0–10	1–10	0–5	0–5	0–5	0–27	0–21	0–80	NA	NA	NA	NA	19–35	1–6	1–5
% Missing data	5.9%	5.4%	3.6%	3.6%	3.7%	1.7%	0.6%	2.2%	0%	0%	0%	0%	0.2%	0.1%	0%

*$p < .05$, **$p < .01$.

Table 6. Linear regressions of all three mental health problems on BCEs-Revised, childhood maltreatment, and covariates

	Depression				Anxiety				PTSD			
	B	SE	ß	*p*-value	*B*	SE	ß	*p*-value	*B*	SE	ß	*p*-value
Step 1: Covariates and Maltreatment	$R^2 = .21$, $F = 59.23$**, $\Delta R^2 = .21$**				$R^2 = .16$, $F = 44.54$**, $\Delta R^2 = .16$**				$R^2 = .24$, $F = 74.09$**, $\Delta R^2 = .24$**			
Pandemic sample	0.16	0.33	.01	.637	0.01	0.29	.00	.980	−0.15	0.77	.00	.851
Male gender	−1.12	0.32	−.08	<.001	−1.52	0.28	−.13	<.001	−1.67	0.74	−.05	.024
Gender non-conforming	1.52	1.01	.03	.133	0.84	0.90	.02	.349	5.87	2.37	.05	.013
Age	−0.03	0.04	−.02	.341	−0.04	0.03	−.03	.207	−0.18	0.08	−.05	.034
Educational attainment	−0.87	0.13	−.17	<.001	−0.37	0.11	−.08	.001	−1.02	0.30	−.08	<.001
Childhood income status	−0.36	0.20	−.04	.080	−0.35	0.18	−.05	.050	−0.23	0.48	−.01	.637
Childhood maltreatment	2.37	0.17	.35	<.001	1.87	0.15	.32	<.001	7.32	0.39	.45	<.001
Step 2: BCEs-Revised	$R^2 = .30$, $F = 84.34$**, $\Delta R^2 = .09$**				$R^2 = .23$, $F = 58.48$**, $\Delta R^2 = .07$**				$R^2 = .32$, $F = 93.94$**, $\Delta R^2 = .08$**			
Pandemic sample	0.25	0.31	.02	.429	0.09	0.28	.01	.743	0.09	0.73	.00	.906
Male gender	−1.05	0.30	−.08	<.001	−1.48	0.27	−.12	<.001	−1.55	0.70	−.05	.028
Non-conforming gender	0.78	0.95	.02	.410	0.32	0.86	.01	.713	4.28	2.26	.04	.058
Age	−0.05	0.03	−.03	.151	−0.05	0.03	−.04	.096	−0.21	0.08	−.06	.008
Educational attainment	−0.57	0.12	−.11	<.001	−0.15	0.11	−.03	.171	−0.38	0.29	−.03	.185
Childhood income status	−0.10	0.19	−.01	.589	−0.16	0.17	−.02	.345	0.35	0.45	.02	.446
Childhood maltreatment	1.03	0.18	.15	<.001	0.90	0.16	.15	<.001	4.39	0.43	.27	<.001
BCEs-Revised	−2.59	0.18	−.38	<.001	−1.87	0.16	−.32	<.001	−5.64	0.43	−.34	<.001
Step 3: Maltreatment × BCEs-Revised	$R^2 = .30$, $F = 75.30$**, $\Delta R^2 = .00$				$R^2 = .23$, $F = 52.25$**, $\Delta R^2 = .00$				$R^2 = .32$, $F = 85.29$**, $\Delta R^2 = .00$			
Pandemic sample	0.28	0.31	.02	.377	0.12	0.28	.01	.678	0.24	0.73	.01	.744
Male gender	−1.03	0.30	−.07	<.001	−1.46	0.27	−.12	<.001	−1.42	0.70	−.04	.043
Non-conforming gender	0.78	0.95	.02	.411	0.32	0.86	.01	.715	4.27	2.25	.04	.058
Age	−0.05	0.03	−.03	.161	−0.05	0.03	−.04	.104	−0.20	0.08	−.06	.011
Educational attainment	−0.58	0.12	−.11	<.001	−0.16	0.11	−.04	.151	−0.42	0.29	−.03	.140
Childhood income status	−0.09	0.19	−.01	.633	−0.15	0.17	−.02	.377	0.41	0.45	.02	.363
Childhood maltreatment	1.17	0.20	.17	<.001	1.01	0.18	.17	<.001	5.07	0.47	.31	<.001
BCEs-Revised	−2.61	0.18	−.38	<.001	−1.89	0.16	−.32	<.001	−5.77	0.43	−.35	<.001
Maltreatment × BCEs-Revised	0.23	0.15	.04	.120	0.20	0.13	.04	.146	1.17	0.35	.08	<.001

*$p < .05$, **$p < .01$.

associations between maltreatment and PTSD symptoms by BCEs-Revised may be nonlinear and more nuanced in nature. Person-oriented analyses are used in the developmental psychopathology literature to understand whether subgroups of individuals have unique profiles of risk and promotive factors that together differentially predict outcomes, in addition to sample-wide linear effects of independent variables on outcomes (Bergman & Magnusson, 1997; Narayan, Labella et al., 2017).

A person-oriented cluster analysis was conducted to examine whether there was meaningful distinction between subgroups of individuals for PTSD symptoms depending on subgroups' unique combinations of childhood maltreatment and BCEs-Revised. BCEs-Revised was selected as the predictor given that it showed significantly stronger associations than BCEs-Original with PTSD symptoms. Childhood maltreatment was selected as the adversity predictor given that it was significant in the interaction with BCEs-Revised and PTSD symptoms, and it also showed significantly stronger associations with PTSD symptoms than deprivation and threat.

A final notable reason for focusing on maltreatment as the adversity predictor in the cluster analysis was because when current depression symptoms were controlled (i.e., added as a final step) in the two regressions with significant interactions for PTSD symptoms, only the interaction of maltreatment by BCEs-Revised, but not the interaction of deprivation by BCEs-revised held. This final analysis that accounted for current depression was done to account for the possibility that participants' current mental states might influence the associations between their retrospectively reported childhood experiences and their current PTSD symptoms (Reuben et al., 2016). Finally, PTSD symptoms were selected as the dependent variable in the cluster analysis because it was the only outcome that was significant in interaction tests involving BCEs-Revised.

A two-step cluster analysis was conducted for childhood maltreatment and BCEs-Revised, with both variables added as continuous predictors to determine cluster membership. The two-step approach first a) places all cases into preliminary clusters that minimize distance between cases that have similar

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Table 7. Linear regressions of all three mental health problems on BCEs-Revised, childhood threat, and covariates

	Depression				Anxiety				PTSD			
	B	SE	ß	*p*-value	*B*	SE	ß	*p*-value	*B*	SE	ß	*p*-value
Step 1: Covariates and Threat	$R^2 = .17$, $F = 45.38$**, $\Delta R^2 = .17$**				$R^2 = .13$, $F = 33.72$**, $\Delta R^2 = .13$**				$R^2 = .19$, $F = 53.98$**, $\Delta R^2 = .19$**			
Pandemic sample	0.06	0.34	.00	.860	−0.09	0.30	−.01	.763	−0.51	0.80	−.01	.525
Male gender	−1.56	0.32	−.11	<.001	−1.91	0.28	−.16	<.001	−3.08	0.76	−.09	<.001
Gender non-conforming	1.91	1.03	.04	.065	1.15	0.92	.03	.209	7.04	2.45	.07	.004
Age	−0.04	0.04	−.03	.323	−0.04	0.03	−.03	.255	−0.18	0.09	−.05	.036
Educational attainment	−0.94	0.13	−.19	<.001	−0.43	0.12	−.10	<.001	−1.18	0.31	−.10	<.001
Childhood income status	−0.52	0.21	−.06	.014	−0.48	0.19	−.07	.010	−0.57	0.50	−.03	.247
Childhood threat	1.82	0.17	.27	<.001	1.42	0.15	.24	<.001	5.99	0.40	.37	<.001
Step 2: BCEs-Revised	$R^2 = .29$, $F = 82.11$**, $\Delta R^2 = .12$**				$R^2 = .22$, $F = 56.62$**, $\Delta R^2 = .09$**				$R^2 = .31$, $F = 89.95$**, $\Delta R^2 = .12$**			
Pandemic sample	0.20	0.31	.01	.519	0.04	0.28	.00	.894	−0.11	0.74	.00	.878
Male gender	−1.23	0.30	−.09	<.001	−1.66	0.27	−.14	<.001	−2.30	0.70	−.07	.001
Non-conforming gender	0.86	0.96	.02	.368	0.38	0.87	0.01	.659	4.61	2.27	.04	.042
Age	−0.05	0.03	−.03	.138	−0.05	0.03	−.04	.112	−0.22	0.08	−.06	.007
Educational attainment	−0.58	0.12	−.11	<.001	−0.16	0.11	−.04	.160	−0.32	0.29	−.03	.267
Childhood income status	−0.13	0.20	−.02	.508	−0.19	0.18	−.03	.288	0.35	0.46	.02	.444
Childhood threat	0.73	0.17	.12	<.001	0.61	0.15	.10	<.001	3.45	0.40	.21	<.001
BCEs-Revised	−2.83	0.17	−.41	<.001	−2.09	0.15	−.36	<.001	−6.59	0.40	−.40	<.001
Step 3: Threat × BCEs-Revised	$R^2 = .29$, $F = 73.42$**, $\Delta R^2 = .00$				$R^2 = .22$, $F = 50.42$**, $\Delta R^2 = .00$				$R^2 = .31$, $F = 81.00$**, $\Delta R^2 = .00$			
Pandemic sample	0.22	0.31	.02	.474	0.05	0.28	.00	.864	−0.03	0.74	.00	.969
Male gender	−1.19	0.30	−.09	<.001	−1.65	0.27	−.14	<.001	−2.20	0.70	−.07	.002
Non-conforming gender	0.88	0.96	.02	.357	0.39	0.87	.01	.651	4.68	2.27	.04	.039
Age	−0.05	0.03	−.03	.150	−0.05	0.03	−.04	.117	−0.21	0.08	−.06	.008
Educational attainment	−0.59	0.12	−.12	<.001	−0.16	0.11	−.04	.146	−0.36	0.29	−.03	.215
Childhood income status	−0.12	0.20	−.01	.556	−0.18	0.18	−.03	.307	0.40	0.46	.02	.381
Childhood threat	0.87	0.19	.13	<.001	0.68	0.17	.12	<.001	3.94	0.44	.24	<.001
BCEs-Revised	−2.85	0.17	−.42	<.001	−2.10	0.15	−.36	<.001	−6.70	0.40	−.41	<.001
Threat × BCEs-Revised	0.24	0.14	.04	.083	0.12	0.13	.02	.348	0.87	0.33	.06	.009†

Note. † The interaction of threat by BCEs-Revised did not hold when influential cases were removed. *$p < .05$, **$p < .01$.

combinations of predictors, and then b) uses hierarchical clustering methods to determine how many subgroups are distinct from each other and best fit the data. The log-likelihood procedure and the silhouette measure of cohesion and separation were used to create the final cluster solution, with a fit threshold of ≥.50 considered adequate for within-group similarity (cohesion) and between-group difference (separation; Norusis, 2005-2012). The number of clusters was not specified as these analyses were exploratory.

Childhood maltreatment and BCEs-Revised clusters

The final cluster solution showed five clusters (Table 9) and good fit with the data (average silhouette = .60), with no cases excluded as outliers. Both predictors had equal and maximal importance (1.00) in the final cluster solution, which was composed of five groups with the following characteristics: Cluster 1 = "*Very High Maltreatment, Low BCEs-Revised*," Cluster 2 = "*High Maltreatment, Low BCEs-Revised*," Cluster 3 = "*High Maltreatment, High BCEs-Revised*," Cluster 4 = "*No Maltreatment, Moderate BCEs-Revised*," and Cluster 5 = "*No Maltreatment, High BCEs-Revised*." ANOVA tests were then conducted with cluster membership as the independent variable and maltreatment and BCEs-Revised as the dependent variables. There was a significant effect of cluster membership on maltreatment, $F(4, 1{,}620) = 2{,}193.13$, $p < .001$. Follow-up tests with Games-Howell pairwise contrasts, given that cluster group means did not meet homogeneity of variance assumptions, revealed that after Bonferroni corrections ($\alpha = .05/10 = .005$), every pairwise cluster differed from every other cluster on mean levels of childhood maltreatment (Table 9). Similarly, there was also a significant effect of cluster membership on BCEs-Revised, $F(4, 1{,}620) = 1{,}696.32$, $p < .001$. Follow-up tests with Games–Howell pairwise contrasts and Bonferroni corrections ($\alpha' = .05/10 = .005$) also revealed that every pairwise cluster differed from every other cluster on mean level of BCEs-Revised (Table 9). Finally, an

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Table 8. Linear regressions of all three mental health problems on BCEs-Revised, childhood deprivation, and covariates

	Depression				Anxiety				PTSD			
	B	SE	ß	*p*-value	*B*	SE	ß	*p*-value	*B*	SE	ß	*p*-value
Step 1: Covariates and Deprivation	$R^2 = .17$, $F = 45.93$**, $\Delta R^2 = .17$**				$R^2 = .14$, $F = 35.67$**, $\Delta R^2 = .14$**				$R^2 = .19$, $F = 53.83$**, $\Delta R^2 = .19$**			
Pandemic sample	0.16	0.34	.01	.646	0.01	0.30	.00	.975	−0.22	0.80	−.01	.787
Male gender	−1.34	0.32	−.10	<.001	−1.70	0.28	−.14	<.001	−2.35	0.76	−.07	.002
Gender non-conforming	1.58	1.03	.04	.128	0.87	0.91	.02	.341	6.00	2.46	.06	.015
Age	−0.03	0.04	−.02	.364	−0.04	0.03	−.03	.204	−0.19	0.09	−.05	.031
Educational attainment	−0.93	0.13	−.18	<.001	−0.40	0.11	−.09	<.001	−1.11	0.31	−.09	<.001
Childhood income status	−0.41	0.21	−.05	.055	−0.37	0.19	−.05	.047	−0.28	0.50	−.01	.579
Childhood deprivation	1.93	0.18	.28	<.001	1.57	0.15	.27	<.001	6.20	0.41	.38	<.001
Step 2: BCEs-Revised	$R^2 = .29$, $F = 81.08$**, $\Delta R^2 = .12$**				$R^2 = .22$, $F = 56.57$**, $\Delta R^2 = .08$**				$R^2 = .30$, $F = 85.31$**, $\Delta R^2 = .11$**			
Pandemic sample	0.28	0.31	.02	.378	0.11	0.28	.01	.698	0.08	0.74	.00	.912
Male gender	−1.16	0.30	−.08	<.001	−1.57	0.27	−.13	<.001	−1.96	0.71	−.06	.006
Non-conforming gender	0.76	0.96	.02	.429	0.28	0.87	.01	.752	4.13	2.29	.04	.071
Age	−0.05	0.03	−.03	.178	−0.05	0.03	−.04	.096	−0.22	0.08	−.06	.007
Educational attainment	−0.58	0.12	−.11	<.001	−0.14	0.11	−.03	.197	−0.32	0.29	−.03	.265
Childhood income status	−0.16	0.20	−.02	.416	−0.19	0.18	−.03	.291	0.29	0.47	.01	.533
Childhood deprivation	0.61	0.18	.09	<.001	0.61	0.16	.10	<.001	3.20	0.43	.19	<.001
BCEs-Revised	−2.86	0.17	−.42	<.001	−2.07	0.16	−.35	<.001	−6.49	0.41	−.40	<.001
Step 3: Deprivation × BCEs-Revised	$R^2 = .29$, $F = 73.31$**, $\Delta R^2 = .00$				$R^2 = .22$, $F = 50.36$**, $\Delta R^2 = .00$				$R^2 = .30$, $F = 76.49$**, $\Delta R^2 = .00$			
Pandemic sample	0.29	0.31	.02	.358	0.12	0.28	.01	.679	0.13	0.74	.00	.859
Male gender	−1.13	0.30	−.08	<.001	−1.55	0.27	−.13	<.001	−1.86	0.71	−.06	.009
Non-conforming gender	0.76	0.96	.02	.430	0.27	0.87	.01	.753	4.12	2.29	.04	.072
Age	−0.05	0.03	−.03	.167	−0.05	0.03	−.04	.093	−0.22	0.08	−.06	.006
Educational attainment	−0.58	0.12	−.11	<.001	−0.14	0.11	−.03	.202	−0.32	0.29	−.03	.279
Childhood income status	−0.16	0.20	−.02	.407	−0.19	0.18	−.03	.289	0.29	0.47	.01	.539
Childhood deprivation	0.72	0.20	.10	<.001	0.68	0.18	.12	<.001	3.62	0.47	.22	<.001
BCEs-Revised	−2.88	0.17	−.42	<.001	−2.08	0.16	−.35	<.001	−6.57	0.41	−.40	<.001
Deprivation × BCEs-Revised	0.20	0.15	.03	.178	0.12	0.14	.02	.383	0.76	0.36	.05	.035

*$p < .05$, **$p < .01$.

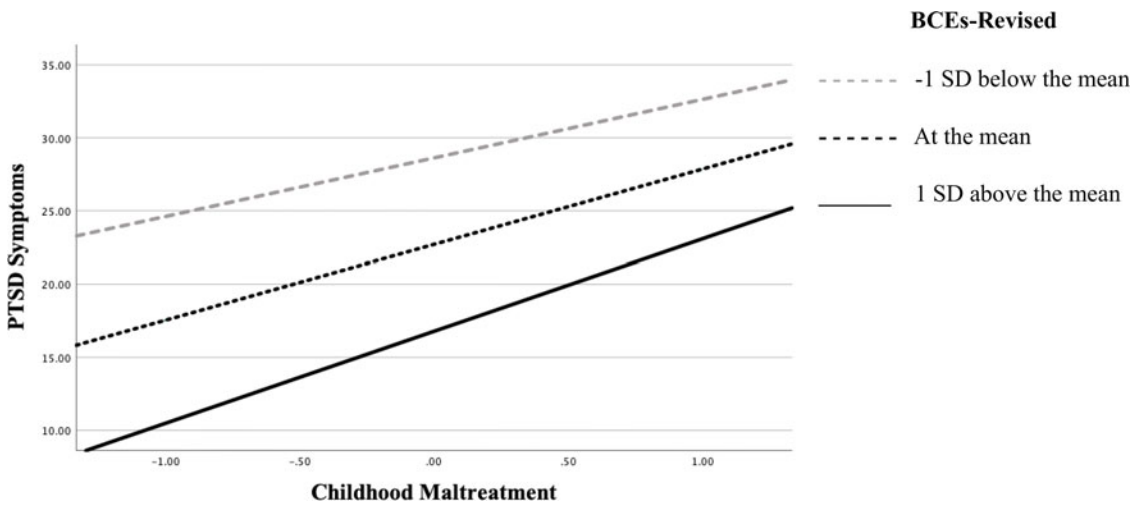


Figure 1. Simple slopes of PTSD symptoms on maltreatment on all levels of BCEs-Revised. Note. At all levels of BCEs-Revised (i.e., −1 SD below the mean, at the mean, and at 1 SD above the mean), there was a significant positive association between higher levels of childhood maltreatment and higher levels of PTSD symptoms, with the interaction evident in non-parallel lines of each of these three simple slopes. The simple slopes of PTSD symptoms on childhood deprivation at all levels of BCEs-Revised showed identical patterns so are not depicted separately.

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Table 9. One-way ANOVA for associations of BCEs-Revised (BCEs-R), maltreatment, and PTSD symptoms by clusters (M, SD by group)

	Cluster Group					
	1	2	3	4	5	
Maltreatment level	**Very High Maltx**	**High Maltx**	**High Maltx**	**No Maltx**	**No Maltx**	**Sign.**
BCEs-R level	**Low BCEs-R**	**Low BCEs-R**	**High BCEs-R**	**Moderate BCEs-R**	**High BCEs-R**	**Contrast**
Sample size of cluster (n)	**(*n* = 222)**	**(*n* = 265)**	**(*n* = 250)**	**(*n* = 360)**	**(*n* = 524)**	***p* < .005**
Childhood maltreatment	3.32 (.80)	1.32 (.63)	1.56 (.78)	.00 (.00)	.00 (.00)	All
BCEs-Revised	3.14 (1.79)	4.14 (1.41)	8.40 (1.12)	6.75 (1.29)	9.59 (.49)	All
PTSD symptoms	37.18 (16.91)	30.77 (15.89)	23.40 (15.09)*	19.28 (13.26)*	12.47 (11.26)	All

Note. Maltx = maltreatment. *p = .005.

ANOVA test was conducted with PTSD symptoms as the dependent variable. There was a significant effect of cluster membership on PTSD symptoms, $F(4, 1{,}616) = 156.38$, $p < .001$. Follow-up tests with Games–Howell pairwise contrasts and Bonferroni corrections ($\alpha' = .05/10 = .005$) also revealed that every pairwise cluster differed from every other cluster on mean level of PTSD symptoms (with the exception that Clusters 3 and 4 differed at $p = .005$; Table 9).

Furthermore, this person-oriented cluster analysis revealed nuanced, nonlinear associations between maltreatment, BCEs-Revised, and PTSD symptoms. Compared to individuals in Cluster 3 ("*High Maltreatment, High BCEs-Revised*"), individuals in Cluster 4 ("*No Maltreatment, Moderate BCEs-Revised*") reported significantly lower levels of BCEs-Revised ($M = 6.75$), but also significantly lower levels of PTSD symptoms ($M = 19.28$). However, individuals in Cluster 3 reported significantly higher levels of BCEs-Revised ($M = 8.40$) but also significantly higher levels of PTSD symptoms ($M = 23.40$). Cluster 3's profile of higher BCEs-Revised yet higher PTSD symptoms was likely explained by the observation that Cluster 3 also reported significantly higher levels of maltreatment ($M = 1.56$) than individuals in Cluster 4 ($M = 0.00$ for maltreatment). This pattern suggests that the unique level of maltreatment and level of BCEs-Revised are what together confer risk for PTSD symptoms.

A similar observation was also evident when comparing Clusters 2 ("*High Maltreatment, Low BCEs-Revised*") and Cluster 3 ("*High Maltreatment, High BCEs-Revised*"). These clusters both had high levels of maltreatment (Cluster 2 $M = 1.32$, Cluster 3 $M = 1.56$), but Cluster 3 had high BCEs-Revised ($M = 8.40$) compared to Cluster 2, who had very low BCEs-Revised ($M = 4.14$). However, even though Cluster 3 had significantly higher maltreatment than Cluster 2, Cluster 2 had significantly higher PTSD symptoms than Cluster 3. This was likely explained by the observation that Cluster 3 had much higher levels of BCEs-Revised, which helped to offset the effects of maltreatment on PTSD symptoms for Cluster 3, compared to Cluster 2.

Notably, when this cluster analysis was repeated with BCEs-Original instead of BCEs-Revised as the predictor along with childhood maltreatment, results showed less differentiation of clusters. That final cluster solution showed good fit with the data (average silhouette = .60), but only three clusters instead of five. This suggests less differentiation of within-sample groups, likely due to lower variability of BCEs-Original scores.

Discussion

Findings point to numerous unique advantages of using specific dimensions of childhood experiences to operationalize risk, promotive, and protective factors for several young adulthood mental health problems. Broadly, both dimensions of BCEs showed favorable effects on mental health, and all three forms of adversity were directly associated with poorer mental health. Many nuances emerged, however, that pointed to protective and person-oriented processes at play in the pathways between childhood adversity, BCEs, and mental health problems.

Generalizability of the BCEs-Revised Scale and other childhood experience dimensions

The first hypothesis was supported such that there were no significant mean differences in overall BCEs-Revised scores across individuals who identified as White, Asian, Black, or Latine. This finding tentatively suggests that individuals who identify as one of

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these three racial or ethnic minorities are unlikely to report different levels of overall BCEs-Revised compared to individuals who identify as White. This finding is promising because one of the primary goals of developing additional BCEs items was to include more experiences that may be generalizable across individuals of diverse identities and broadly relevant to most adults around the world. In the present study, mean levels of BCEs-Original scores also did not differ across the four racial/ethnic identity groups, nor did mean levels of BCEs-20 scores. These results provide preliminary support for generalizability of all versions of the BCEs scales (BCEs-Revised, BCEs-Original, BCEs-20) across individuals who identify as White, Asian, Black, or Latine, replicating original findings supporting generalizability of the BCEs-Original scale in the first psychometric study (Narayan et al., 2018). An important caveat, however, is that the present study only included participants who were born and currently lived in the U.S and spoke English. Therefore, given that there was socio-demographic homogeneity in U.S. nationality across the sample, despite some participant differences in racial or ethnic identity, it remains unclear if the BCEs-Revised scale has comparable utility in samples from other countries. Additional research on the BCEs-Revised scale is needed with individuals from other countries who have many different racial and ethnic identities and do not speak English.

Of note, both BCEs-Original and BCEs-Revised total scores were minimally but significantly correlated with participants' reported childhood income status ($r = .28$ for both BCEs dimensions), which indicates that BCEs and income status share approximately 7.8% (r^2) of their variance. Although all BCEs items were developed with the intention to be independent of socioeconomic status in the family of origin, it is likely the case that higher childhood socioeconomic strain does affect the presence of PCEs, just as socioeconomic strain may increase the odds of childhood adversities (Narayan, Kalstabakken et al., 2017; Sroufe et al., 2005). Indeed, all three dimensions of childhood adversity were significantly but also only modestly inversely associated with childhood income status ($r = -.33$ to $-.38$). These associations are consistent with the literature that poverty and trauma co-occur, and also that many individuals who are not impoverished also experience childhood adversity, as was found in the original ACE studies (Felitti et al., 1998).

Bivariate results also revealed that mean levels of childhood maltreatment did not differ across the four racial/ethnic groups, but mean levels of both childhood threat and childhood deprivation did differ across groups. While post-hoc tests showed no significant pairwise differences in childhood threat across racial/ethnic groups after corrected contrasts, post-hoc tests showed that individuals who identified as Asian reported significantly lower levels of childhood deprivation compared to individuals who identified as White, Black, or Latine. Taken together, these results support the long-standing findings in the literature that race/ethnicity is not in itself significantly associated with childhood maltreatment. Rather, harmful societal factors that disproportionately affect minoritized families, such as poverty, oppression, and reduced opportunities often co-occur with maltreatment, making the connection between maltreatment and socioeconomic disparity a reality (Cicchetti, 2016; Sroufe et al., 2005). By contrast, the findings that childhood deprivation differed across racial/ethnic group suggests that diverse individuals may differentially experience this dimension of adversity. This difference should be further examined in samples with higher representation of individuals from diverse backgrounds.

Associations between BCEs-Revised versus BCEs-Original with mental health problems

Findings supported the second hypothesis that correlations between BCEs-Revised and all three mental health problems were significantly stronger in magnitude than correlations between BCEs-Original and all mental health problems. The revised set of BCEs composed of all 10 of the less-commonly-reported items may together explain slightly more variance in mental health problems than the original set of BCEs. This finding aligns with this study's primary goal of developing additional BCEs that were not only more comprehensive in capturing multisystem resilience but that also had more variability and less susceptibility to ceiling effects of total BCEs scores. Both BCEs-Revised and BCEs-Original showed significant associations with all mental health outcomes, supporting the predictive validity of both sets of items.

Additional bivariate findings showed that certain childhood adversities were more strongly associated with outcomes than other childhood adversities. For instance, compared to childhood threat, childhood maltreatment was more strongly associated with all three mental health problems. This finding suggests that experiences of abuse and neglect together, as opposed to abuse and broader forms of threat (exposure to domestic or community violence) but not neglect, may reflect a slightly more potent dimension of risk for young adulthood depression, anxiety, and PTSD symptoms. Additionally, compared to childhood deprivation, childhood maltreatment was more strongly associated with PTSD symptoms (but not with depression or anxiety symptoms). Taken together, these findings support a particularly strong association between childhood maltreatment and adulthood PTSD symptoms, compared to both other dimensions of childhood adversity and PTSD symptoms, and to childhood maltreatment and depression or anxiety symptoms. This strong association echoes the long-standing literature linking this dimension of childhood trauma to subsequent traumatic stress (Narayan et al., 2021).

Risk, promotive, and protective effects of childhood experiences on adulthood mental health problems

Finding supported the third hypothesis that higher levels of BCEs-Revised showed direct promotive effects for lower levels of each of the three metal health problems. This finding is consistent with much of the literature on BCEs and broader measurement of PCEs that together find direct associations between higher levels of positive child experiences and better adulthood adjustment (Bethell et al., 2019; Doom et al., 2021; Merrick et al., 2019; Morris et al., 2021; Narayan et al., 2018; Nevarez-Brewster et al., 2022). Regressions that further tested these associations with BCEs-Original substituted for BCEs-Revised showed identical patterns of promotive effects for mental health outcomes, regardless of which dimension of BCEs was used. Both dimensions of BCEs are likely to be useful in empirical research on promotive effects of BCEs for better developmental outcomes.

Findings also supported direct risk effects of each of the three dimensions of childhood adversity on each of the three mental health problems. Higher levels of childhood maltreatment, deprivation, and threat each significantly predicted higher levels of young adulthood depression, anxiety, and PTSD symptoms. These findings are consistent with the well-established literature on the robust effects of maltreatment on long-term mental health problems, as well as the more recent literature in the past decade on childhood threat and deprivation as specific dimensions of

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childhood adversity that also portend long-term risk to mental health (McLaughlin et al., 2021; Smith & Pollak, 2021; Toth & Cicchetti, 2013). Findings also extend these literatures, as well as the broader literature on childhood adversity and ACEs (e.g., CDC, 2022; Felitti et al., 1998), which often do not include adulthood PTSD symptoms as an important sequela following childhood trauma (Narayan et al., 2021). All three dimensions of childhood adversity were directly harmful for all three aspects of young adulthood mental health.

Protective effects of BCEs-Revised in the context of childhood adversity

Findings that examined moderation of BCEs-Revised by each dimension of childhood adversity for each mental health outcome were somewhat contrary to expected protective effects. More specifically, BCEs-Revised only moderated the association between childhood maltreatment and PTSD symptoms. This was the only interaction that held after removing any influential cases and bootstrapping effects, as well as after controlling for current depression symptoms to account for potential inflations between retrospectively-reported childhood experiences and contemporaneous reports of mental health (Reuben et al., 2016). When the simple slopes of this interaction were further explored, analyses showed that associations between childhood maltreatment and PTSD symptoms were the steepest for individuals at high levels of BCEs-Revised (compared to individuals at low or moderate levels of BCEs-Revised). Follow-up regression analyses that substituted BCEs-Original for BCEs-Revised in the interaction between maltreatment and PTSD symptoms showed the same unexpected simple slope patterns.

Person-oriented findings

Findings from the cluster analysis clarified the unexpected simple slope patterns by revealing five distinct subgroups of participants that uniquely clustered on their profiles of BCEs-Revised and childhood maltreatment. Each of these five groups all had significantly different mean levels of PTSD symptoms from one another, even after corrections were applied to account for multiple testing. Unsurprisingly, the group with the highest levels of PTSD symptoms compared to any other group had very high levels of childhood maltreatment and low levels of BCEs-Revised (Cluster 1 – "*Very High Maltreatment, Low BCEs-Revised*"). Also unsurprisingly, the group with the lowest levels of PTSD symptoms compared to any other group had very high levels of BCEs-Revised and no childhood maltreatment (Cluster 5 – *"No Maltreatment, High BCEs-Revised*"). The three other groups, however, had unique and nonlinear combinations of BCEs-Revised and maltreatment that together accounted for their levels of PTSD symptoms. For example, even though Cluster 2 ("*High Maltreatment, Low BCEs-Revised*") had significantly lower levels of maltreatment than Cluster 3 ("*High Maltreatment, High BCEs-Revised*"), Cluster 2 had significantly higher levels of PTSD symptoms than Cluster 3, likely because Cluster 2 also had significantly lower levels of BCEs-Revised than Cluster 3. Moreover, Cluster 4 ("*No Maltreatment, Moderate BCEs-Revised*") had no maltreatment but only moderate levels of BCEs-Revised (approximately the mean of BCEs-Revised across the entire sample) but significantly lower levels of PTSD symptoms than Cluster 3, which had significantly higher levels of BCEs-Revised than Cluster 4 but also significantly higher levels of maltreatment. These findings suggested that the extent of BCEs-Revised and maltreatment co-occurred in unique ways across groups of individuals, and the unique combination of BCEs-Revised and maltreatment together related to differential risk for PTSD symptoms. This was also evident in the observation that groups of individuals with significantly higher BCEs-Revised scores (mean of 8.40; Cluster 3) than individuals with moderate BCEs-Revised scores (mean of 6.75; Cluster 4) still had significantly higher PTSD symptoms (that surpassed the cutoff for subthreshold PTSD; River et al., 2019), because the former group (Cluster 3) had high maltreatment compared to the latter group (Cluster 4), who had no maltreatment. However, this latter group of individuals from Cluster 4 with moderate BCEs-Revised scores still had higher PTSD symptoms (almost at the subclinical threshold) despite having no maltreatment, compared to individuals who had high BCEs-Revised scores (mean of 9.59; Cluster 5) and also no maltreatment. In other words, neither Cluster 4 nor Cluster 5 had any maltreatment, but Cluster 4 had significantly higher levels of PTSD symptoms than Cluster 5.

These findings underscore that PTSD symptoms are in part dependent on the level of BCEs-Revised, regardless of the presence of maltreatment symptoms. A childhood that lacked resources may be a separate but equally-important predictor of adulthood PTSD symptoms as a childhood characterized by maltreatment. Research that considers the co-occurrence of BCEs-Revised and maltreatment together – and the likely possibility than many individuals have some amount of each – may most optimally inform understanding of risk for mental health problems as well strategies to identify those at lower versus higher risk based on the extent of their BCEs.

Strengths and limitations

The first aforementioned strength of this study is that it expanded upon the widely-used original BCEs scale by adding 10 more items, four of which were less commonly reported. The full BCEs scale now includes 20 items (the BCEs-20 scale), half of which are less commonly reported. The second strength is that these 20 items also reflect a more comprehensive set of favorable childhood assets, resources, and relationships across multiple systems of resilience (e.g., home versus school versus community; interpersonal resources within the social ecology versus natural resources from the environmental ecology) than the original 10-item BCEs scale. Current evidence showed that none of the three BCEs scales (BCEs-Original, BCEs-Revised, or full BCEs-20 scale) had significant mean differences across individuals who identified as White, Asian, Black, or Latine. Each version may be useful with diverse individuals, although future efforts should test and compare all versions in other minority groups and countries.

An additional strength was that all three dimensions of adversity and their respective components reflected actual *experiences* of harm (e.g., direct victimization, concrete loss of a basic need, clear absence of a caregiver) that were likely clearly negative at the time they occurred, rather than *exposures* that may have implied risk but less clearly constituted direct or immediate harm to the child. (For example, exposure to a caregiver with mental illness or substance use may constitute distal harm; and separation or divorce of primary caregivers may actually be beneficial if it reduces interparental conflict.) Adversity researchers have recommended differentiating experiences that likely directly inflict harm on children from exposures that may or may not

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indirectly engender harm (McLaughlin et al., 2021). These adversities together reflected multisystem risk, ranging from traumatic experiences often circumscribed within the caregiving system (e.g., maltreatment) to broader risks within the social ecology (exposure to community violence as a form of threat) or risks that constituted loss of structural resources within the physical ecology (homelessness as a form of deprivation).

A final methodological strength was that main and interaction effects of childhood adversity dimensions and BCEs-Revised underwent several tests to confirm their robustness, including tests of influential cases for all interactions, bootstrapping of all regressions, and finally, regression analyses that controlled for current depression symptoms (that also examined influential cases and used bootstrapping). These additional tests were conducted to align with recommendations that corrections for potential inflations be used when testing associations between retrospectively reported childhood experiences and contemporaneous mental health problems (Reuben et al., 2016). Effects of maltreatment and BCEs-Revised, including their interaction, on PTSD symptoms remained significant, even when accounting for current depressive symptoms.

In terms of limitations, the present sample only included individuals who were born in and currently lived in the U.S. Thus, any findings about generalizability across racial/ethnic groups only pertain to individuals from the U.S. Moreover, this study drew all participants from a large survey panel. While Pro-A has a strong reputation for yielding high-quality social and behavioral data (Eyal et al., 2021; Peer et al., 2017), all findings are limited to young adults who had access to the internet and a history of participating in online surveys for income. Although variability in child experience dimensions and mental health outcomes was good, with many participants reporting surprisingly high levels of childhood adversity and clinical levels of mental health problems, all findings should be replicated in other large and diverse samples. This study also had very few participants who identified as gender non-conforming. Future studies should examine the BCEs-Revised scale in individuals who identify as sexual and gender minorities.

Another limitation is that this study did not measure effects of childhood unpredictability, which is a conceptually-distinct dimension of childhood adversity. Unpredictability, defined as instability or unreliability in environmental circumstances, typically includes changes in childhood caregivers (e.g., parental figures coming and going), instability of basic needs (e.g., food insecurity), changes in the condition of the home or neighborhood, multiple moves, or fluctuations in amount or source of household income. Unpredictability is differentiated from harshness, which typically encompasses both threat-based experiences that are harsh (e.g., abuse) and deprivation-based experiences that are harsh (e.g., neglect). Unpredictability has important and distinct effects from harshness on development via uniquely influencing life course history strategies of prioritizing current rather than future reproductive costs and benefits (Ellis et al., 2022). However, given that unpredictability is more difficult to measure and quantify (Berman et al., 2022), it was not included in the present study.

Implications for research and practice

BCEs-Revised versus BCEs-Original in research

This study has several implications for future use of the BCEs scale in research and clinical practice. First and foremost, findings demonstrate the strong psychometric properties of several different versions of the BCEs scale. While BCEs-Revised scores showed significantly stronger associations than BCEs-Original scores with depression, anxiety, and PTSD symptoms, these differences were small in magnitude. Second, both BCEs-Revised and BCEs-Original scores showed significant promotive effects for lower levels of all three mental health problems, even after accounting for all covariates and each of the adversities.

One advantage of the BCEs-Revised scale in research is that it may be less susceptible than the BCEs-Original scale to ceiling effects of total BCE scores, since all 10 items on the BCEs-Revised scale are less commonly reported across many samples. Additionally, when examined in person-oriented analyses along with maltreatment, profiles of individuals who clustered based on similar levels of BCEs-Revised and maltreatment showed more variability (i.e., a higher number of clusters, five total) than profiles of individuals who clustered based on similar levels of BCEs-Original and childhood maltreatment (a lower number of clusters, three total). The items and total scores on the BCEs-Revised Scale seem to have greater variability than items and total scores on the BCEs-Original scale.

The BCEs-Original and BCEs-20 scales in clinical practice

Although the BCEs-Revised scale may have slightly higher utility in research that seeks to achieve more item and total score variability, the BCEs-Original scale and the BCEs-20 scale have several advantages for use in screening efforts, clinical practice, and community mental health. Providers working with traumatized parents may find both the BCEs-Original and BCEs-20 scales to be particularly useful in helping parents to identify childhood assets and strengths that can be leveraged in parenting programs to promote the intergenerational transmission of BCEs (Merrick & Narayan, 2020; Narayan et al., 2021). Many providers express hesitancy to administer instruments that elicit stress from clients, so providers can be confident that both the BCEs-Original and BCEs-20 scales have many items that most adults have experienced so will endorse affirmatively. Provider-initiated conversations about how adults can then leverage the BCEs they had (or wished they had had) into opportunities to recreate BCEs in their children (or create them for the first time) could help to promote resilience in families across generations (Narayan et al., 2019).

Variable-oriented versus person-oriented methods

Variable-oriented regression analyses and person-oriented cluster analyses both supported that the BCEs-Revised set of experiences may be a mechanism that influences associations between maltreatment and PTSD symptoms. Person-oriented cluster analyses further clarified the unique interplay of childhood maltreatment and BCEs-Revised for PTSD symptoms across subgroups that otherwise would not have been as clearly illuminated with variable-oriented linear regressions alone. Higher levels of BCEs-Revised may begin to offset the effects of childhood maltreatment and portend differential risk for PTSD, but the level of PTSD symptoms likely also stems from the extensiveness of the maltreatment. The non-linear pattern of interplay between maltreatment and BCEs-Revised for PTSD symptoms that was evident only from the cluster analysis underscores the importance of using person-oriented methods to understand how different levels of PCEs may interact with different levels of childhood adversity to relate to mental health

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outcomes. These non-linear patterns may also explain why most of the variable-oriented research on interactions of childhood adversity by BCEs (and PCEs more broadly) for mental health problems has not found significant moderating effects (e.g., Doom et al., 2021; Han et al., 2023; Nevarez-Brewster et al., 2022).

Conclusions

This study introduced a revised dimension of BCEs and a novel extension of the BCEs-Original scale (the BCEs-20 scale) that together offer up more variability and comprehensiveness for multisystem resilience than the BCEs-Original scale. The BCEs-Revised scale may have unique advantages in research, but the BCEs-Original and BCEs-20 scales may have specific benefits in clinical practice and community mental health. Both BCEs dimensions and all three adversity dimensions had direct effects on young adulthood mental health problems. However, findings support childhood maltreatment as an especially harmful form of adversity for PTSD symptoms specifically. Findings also provide unique insights into the interplay of childhood maltreatment and BCEs-Revised and the relationships of both with PTSD symptoms.

Overall, this study replicated patterns that are becoming increasingly evident across the childhood adversity and resilience literatures. PCEs and childhood adversities are not mutually exclusive and instead, co-occur in unique ways for individuals, many of whom have experienced high levels of both. Research and clinical efforts that aim to understand the equally important roles of childhood adversity and PCEs on long-term health and well-being by employing both person-oriented as well as variable-oriented methods will be best situated to optimally promote individual and family resilience and prevent childhood trauma over time and across generations.

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Competing interest. The authors report no conflicts of interest.

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