ADVERSE CHILDHOOD EXPERIENCES (ACES) SCREENING IMPLEMENTATION IN INTEGRATED PRIMARY CARE: A MIXED-METHODS PILOT STUDY

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ABSTRACT

For over two decades, adverse childhood experiences (ACEs) have been identified as a significant risk factor for multiple chronic physical and mental health conditions. Accordingly, ACEs are now highlighted as a public health concern requiring screening and intervention efforts in pediatric and family medicine settings. The benefits of ACEs screening in healthcare settings include the identification of clinically relevant social risk factors, such as history of trauma exposure and other chronic stressors. However, various patient, provider, and healthcare organizational factors create barriers to the uptake of routine ACEs screening practices, and few models of ACEs screening implementation are described in the extant literature.

In the current study, we piloted an educational intervention to increase routine ACEs screening by primary care providers at a university-affiliated integrated primary care clinic. Intervention methods focused on the use of behavioral health consultants to complete ACEs education sessions with primary care providers within a Primary Care Behavioral Health (PCBH) model. Emphasis was placed on the targeted reduction of providers' self-reported barriers to completing routine ACEs screening with their adult primary care patients. Using a rapid-cycle

quality improvement approach, we also incorporated provider feedback into study materials and processes, while addressing relevant environmental/organizational barriers to screening over a 12-month study period.

The results of this study suggest that primary care providers view it as appropriate to complete ACEs screening with their adult primary care patients; however, they consistently report time constraints as a barrier to ACEs screening. Our findings also suggest that providers are comfortable with patient-initiated discussions of ACEs and trauma history, but relatively less comfortable with provider-initiated screenings. Providers endorsed mixed responses about the clinical utility of ACEs screening. Preliminary data reflect that didactic educational interventions are helpful for reducing primary care providers' self-reported barriers to ACEs screening. Our results also suggest that increasing providers' knowledge of ACEs, comfort with ACEs screening, and confidence with incorporating ACEs screening results into treatment planning may offset other screening barriers related to time constraints during patient encounters and perceptions that ACEs-related health concerns do not benefit from medical interventions.

Due to the low observed changes in primary care providers' ACEs screening frequency throughout our 12-month study period, we review appropriate recommendations from the implementation science literature to help guide future ACEs and trauma screening efforts in healthcare settings. We emphasize the need for flexibility for implementation strategies in the primary care setting, as well as the importance of data collection systems that allow for rapid and continuous data monitoring to measure progress towards organizational screening goals. We also highlight the need for improved clinical guidelines to inform ACEs screening, prevention, and intervention practices in healthcare settings, as providers will likely continue to question the clinical utility of ACEs screening without clearer recommendations for patient care.

Adverse Childhood Experiences (ACEs) Screening Implementation in Integrated Primary Care: A Mixed-Methods Pilot Study

A Dissertation

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DEDICATION

To my father,

For enduring unthinkable trauma,
bearing all of its sinister and insidious marks,
and offering his scars to others as the evidence of hope.

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Introduction

Over the last two decades, adverse childhood experiences (ACEs) have been linked to various chronic physical and mental health concerns (Felitti et al., 1998) and have become an important target for population health efforts. The Adverse Childhood Experiences Questionnaire (ACE-Q) used by Felitti and colleagues (1998) in their landmark study assesses 10 items related to childhood abuse/neglect and household dysfunction. From a theoretical perspective, experiences of childhood trauma and adversity are considered chronic stressors that interfere with normative developmental processes, causing disruption to both neurobiological functioning and healthy coping behaviors (Shonkoff et al., 2012). As a downstream consequence of these influences, ACEs have been associated with higher rates of childhood health concerns (Oh et al., 2018; Purewal et al., 2016), chronic disease prevalence in adulthood (Campbell et al., 2016; Felitti et al., 1998) and young adulthood (Sonu et al., 2019), and increased rates of mortality (Brown et al., 2009).

In a broader sense, the connection between ACEs and poorer health outcomes reflects the need for a biopsychosocial model of health (Engel, 1977), such that social risk factors must be effectively identified and addressed in healthcare settings. In the primary care setting, social determinants of health have been recognized as an essential component of treatment, with recently updated clinical practice recommendations related to screening and team-based care (American Academy of Family Physicians, 2018). However, healthcare providers face numerous barriers that prevent the uptake of a biopsychosocial model. For instance, Kusnanto and colleagues (2018) highlight that the primary care setting continues to be predominantly influenced by a biomedical model that does not incentivize providers for addressing social risk factors in routine clinical care. Nonetheless, given the relationship between ACEs, chronic

disease development (Sonu et al., 2019), and increased healthcare utilization (Kalmakis et al., 2018; Anda et al., 2008), primary care providers may face increasing pressures to address social risk factors related to patients' trauma and adversity histories.

Despite the known impact of trauma and adversity on patient health, ACEs-related screening, prevention, and intervention practices remain in the early stages of development. While ACEs screening appears to be expanding in pediatric healthcare settings, screening among adult primary care patients has been met with numerous challenges. Prominent barriers include the lack of multidisciplinary ACEs education and training, provider concerns about ACEs screening feasibility due to time constraints, and the lack of guidelines related to trauma/adversity screening and intervention (Kalmakis et al., 2017; Weinreb et al., 2010). Due to these barriers, novel methodologies are needed to demonstrate effective implementation models of ACEs screening with both healthcare providers and organizations. Due to the nuances of each healthcare setting, screening implementation may be optimized through the application of quality improvement methods using a Plan, Do, Study, Act (PDSA) framework, which allows for continuous adjustments to the demands of a respective clinical setting.

Using behavioral health consultants within a Primary Care Behavioral Health (PCBH) model, our 12-month pilot study focused on increasing ACEs education among primary care providers, while concurrently addressing relevant environmental/organizational barriers to ACEs screening implementation. Provider education specifically sought to reduce providers' barriers to ACEs screening (i.e., low ACEs knowledge, low ACEs screening comfort, low perceived feasibility of ACEs screening, low perceived clinical utility of ACEs screening). Education materials included an overview of ACEs and trauma-informed care, discussion of ACEs-related health conditions, identification of key barriers to ACEs screening, guidance about screening

measure selection, examples of provider screening scripts, steps for charting and documentation, and examples of appropriate prevention and intervention strategies based on the existing ACEs literature (e.g., referrals to behavioral health services, addressing health risk behaviors, efforts related to chronic disease prevention). Pre/post surveys were used to assess provider's self-reported barriers to ACEs screening, and providers' qualitative feedback was gathered and incorporated into study materials and processes. Monthly ACEs screening rates were monitored at our university-affiliated integrated primary care clinic to assess potential changes in ACEs screening frequency throughout our study period.

The results of our mixed-methods pilot study address common healthcare provider and organizational barriers to ACEs screening implementation. Study methods may act as a replicable model for ACEs and trauma screening within a Primary Care Behavioral Health (PCBH) framework. In our Discussion section, we provide a comprehensive review of the challenges that future ACEs and trauma screening implementation studies will likely face, and we make recommendations about potential ways to improve the effectiveness of future ACEs/trauma screening implementation efforts in healthcare settings.

Literature Review

Adverse Childhood Experiences (ACEs)

Adverse childhood experiences were first conceptualized approximately two decades ago following a landmark study through Kaiser Permanente that demonstrated a dose-response relationship between ACEs and various physical and mental health issues (Felitti et al., 1998). To better understand the influence of early life chronic stressors on health, the authors embedded the Adverse Childhood Experiences Questionnaire (ACE-Q) within a larger public health survey, and their findings identified associations between ACEs and many of the leading causes of death among adults in the US. The ACE-Q includes ten items that elicit yes/no responses to five factors related to childhood maltreatment (e.g., physical abuse, emotional abuse, sexual abuse, physical neglect, emotional neglect) and five factors related to household dysfunction (e.g., parental mental illness, domestic violence, relative incarceration, substance abuse, divorce). The authors' findings highlight how traumatic events and chronic environmental stressors contribute to significant vulnerabilities for various health concerns across the lifespan.

Since the original conceptualization of ACEs, which emphasized stressors within the household environment, additional ACEs items have been proposed due to their influence on disease risk across the lifespan. Thus, community influences (e.g., violence, food scarcity, poor housing quality, discrimination, substandard schools) and environmental influences (e.g., natural disasters, climate crises, pandemics) have been highlighted as social determinants of health that can also have a notable adverse impact on an individual's development and health outcomes. Taken together, each of these items help to identify sources of chronic stressors to be targeted through prevention and early intervention efforts across household, school, healthcare, and community settings (Bethell et al., 2017).

Chronic Disease Risk and Health Outcomes

Felitti and colleagues (1998) found that the association between ACEs and poorer health outcomes was most notable for individuals that reported a history of four or more items of childhood abuse and household dysfunction on the ACE-Q. Initial results showed that a history of ≥ 4 ACEs yielded a 4-12 fold increase in behavioral health risks such as alcohol and other drug use, depression, suicide attempts, and interpersonal violence. Additionally, health risks were 2-4 times higher for smoking, risky sexual behavior, sexually transmitted diseases and poor self-rated health; risks nearly doubled for physical inactivity and severe obesity. More recent research has re-affirmed the use of four ACEs as a clinical cutoff score (Alhowaymel et al., 2023).

The increased health risks for individuals with a history of ACEs is seen most clearly through an increased prevalence of chronic health conditions in adulthood. Felitti and colleagues (1998) found that the presence of more types of ACEs was associated with an increased prevalence of ischemic heart disease, chronic lung disease, cancer, and liver disease. Importantly, such findings have been widely replicated. A more recent study found that higher ACE scores increased risk for diabetes, coronary artery disease, myocardial infarction, stroke, and depression (Campbell et al., 2016). When controlling for demographic variables in a US sample, there was a dose-response relationship between ACE scores and health outcomes including fair/poor general health, frequent mental distress, asthma, diabetes, coronary heart disease, stroke, myocardial infarction, and disability (Gilbert et al., 2015). Similar findings have also been observed in populations outside of the US. In a nationally representative sample of Irish adults, childhood adversity was associated with earlier onset of cardiovascular and pulmonary diseases, as well as psychiatric disorders (McCrory et al., 2015). Due to a variety of

poor health outcomes, increased mortality rates have been observed in individuals with elevated ACE scores – specifically, those with six or more ACEs were found to die, on average, 20 years earlier than individuals who reported no history of ACEs (Brown et al., 2009).

The influence of ACEs on health outcomes has more recently been applied to childhood, adolescent, and younger adult samples. In a recent systematic review of health concerns in pediatric samples, ACEs were found to be associated with delays in cognitive development, asthma, infection, somatic complaints, and sleep disruption (Oh et al., 2018). Additionally, through ACEs screening in a pediatric integrated primary care setting, Purewal and colleagues (2016) identified numerous health-related concerns associated with ACEs including weight gain/loss, failure to thrive, enuresis, encopresis, constipation, hair loss, poor control of chronic disease (e.g. asthma, diabetes), developmental regression, school failure or absenteeism, aggression, poor impulse control, frequent crying, restricted affect or numbing, unexplained somatic complaints (e.g., headache or abdominal pain), depression, anxiety, and interpersonal conflict. Another study found that chronic disease rates were already elevated among young adults with a history of ACEs relative to those with no history of ACEs (Sonu et al., 2019). Therefore, early prevention and intervention methods are needed throughout childhood, adolescence, and early adulthood, as these may reduce risk for the development of downstream chronic health conditions.

Ecobiodevelopmental Model

Due to the significant influence of ACEs on pediatric health, the American Academy of Pediatrics have advocated for the use of an ecobiodevelopmental (EBD) framework to explain the process by which early adversity contributes to a series of developmental difficulties throughout the lifespan (Shonkoff, 2012). This model, developed by Shonkoff (2010), describes

how early life adversities contribute to chronic (i.e., toxic) stress, characterized by the prolonged activation of the body's physiological stress response system (e.g., hypothalamic-pituitary-adrenal pathway). Subsequently, prolonged stress activation influences alterations in brain circuitry, organ development, and metabolic systems during key periods of development.

Further, Shonkoff (2010) discusses how these changes contribute to disrupted neurodevelopment in the amygdala, hippocampus, and prefrontal cortex, whereby toxic stress has a negative influence on learning, memory, and aspects of executing functioning. The EBD framework postulates that disrupted neurodevelopment has negative influences on social, emotional, and cognitive functioning; then, these impairments contribute to the adoption of health risk behaviors, with the result of higher rates of disease, disability, social problems, and mortality (Shonkoff et al., 2012). Due to disparities in health and developmental outcomes for individuals with a history of elevated ACEs, widespread screening, prevention, and intervention strategies are needed.

ACEs as a Public Health Concern

In more recent years, ACEs research has played an increasing role in public health policy and healthcare legislation. In a policy statement from the American Academy of Pediatrics (AAP), the authors urge primary care pediatricians to increasingly screen for experiences of childhood adversity, and the AAP notes how interventions to address chronic/toxic stress can reduce altered neurodevelopment and disease risk in adulthood (Shonkoff et al., 2012). To date, ACEs screening efforts have been most pronounced in the pediatric primary care setting. Between 2018 and 2020, at six different clinics within the Kaiser Permanente Southern California healthcare system, ACEs screening was completed with 7,056 pediatric patients (ages 3-13) during well-child visits (DiGangi & Negriff, 2020).

Due to the expansion of ACEs screening recommendations, state and local healthcare initiatives have been implemented to address ACE-related health disparities. Perhaps most notably, the ACEs Aware Initiative was implemented through California's Department of Health Care Services, which includes a statewide effort to increase trauma-informed care through provider training. As a result of this initiative, California's Medicaid system (Medi-Cal) developed a payment system for ACEs screening by reimbursing providers $29 per screening (California Department of Health Care Services, 2021).

Although California has led the way in ACEs-related policy changes, other states have also recognized ACEs screening, prevention, and intervention as an important component of population-based healthcare. For instance, in the most recent edition of North Carolina's population health initiatives – *Healthy North Carolina 2030: A Path Towards Health* – the state identified ACEs as an important indicator of health pertaining to social and economic factors in communities throughout the state (North Carolina Institute of Medicine, 2020). The initiative focuses on trauma-informed practices with children in medical and educational settings, as well as interventions to support families and children in ways that foster resilience.

Applications of ACEs Screening in Clinical Practice

While ACEs screening and intervention practices are recommended among pediatric patient populations, healthcare policies have not yet recommended routine ACEs screening within adult patient populations. Nonetheless, ACEs screening may play an important role in trauma-informed care practices with adults. Felitti (2009) postulates that ACEs influence adult health through two primary pathways – chronic stress leading to inflammatory responses and coping through poor health behaviors – highlighting another avenue for ACEs-related clinical recommendations. Additionally, a leading ACEs advocacy organization highlights three areas in

which ACEs screening can benefit adult patient populations: improvements for clinical assessment, patient education, and treatment planning for chronic health conditions; the increased ability to identify behavioral pathways that influence ACEs-related health conditions; and the opportunity to validate and empower patients, while supporting improvements to patients' family health (ACEs Aware, 2021).

Beyond these suggested targets for clinical practice, ACEs screening, prevention, and intervention efforts with adult patients have the potential to significantly reduce the burden of healthcare utilization related to chronic diseases across the lifespan. As noted above, ACEs scores are positively associated with higher rates of nearly all the leading causes of death in the US (Felitti et al., 1998), and ACE scores ≥ 6 are associated with premature mortality by 20 years (Brown et al., 2009). In the primary care setting, adult patients with chronic health conditions reported higher rates of ACEs compared to those without chronic health conditions and demonstrated a higher number of clinic visits over a 12-month period (Kalmakis et al., 2018). Therefore, ACEs screening may allow providers to identify patients with higher chronic disease risk and the potential for higher service utilization, whereby early intervention practices may reduce erroneous healthcare services.

The benefits of ACEs screening with adult patients may be most effective when applied to young adult populations with lower rates of chronic disease than older adult population groups. In hair cortisol samples of healthy college students (ages 18-24), students who reported ≥ 4 ACEs already demonstrated chronic stress activation through HPA dysregulation (Kalmakis et al., 2015). Another study among college students found that ACEs were positively associated with BMI, symptoms of depression and ADHD, and the use of cigarettes, alcohol, and marijuana, while ACEs were negatively associated with sleep and fruit/vegetable intake (Windle

et al., 2018). Additional findings have demonstrated that young adult participants (ages 18-34) with ≥ 4 ACEs have significantly higher rates of chronic diseases (e.g., cardiovascular disease, COPD, diabetes/prediabetes, cancer) compared to those with no ACEs (Sonu et al., 2019). However, compared to participants in the middle and older adulthood strata (ages 35-54, ages 55 and older, respectively), the authors found that young adult participants had the lowest prevalence of chronic diseases. Taken together, these findings demonstrate that various ACE-related physical and mental health concerns are likely present in adolescence and young adulthood, and that appropriate interventions may prevent downstream chronic disease development.

Risks, Benefits, and Future Directions of ACEs Screening in Primary Care

Benefits of ACEs Screening in Primary Care

The primary care setting provides an ideal location for ACEs screening. Due to associations between elevated ACE scores and various chronic health conditions, initial prevention and intervention practices are likely needed in primary care. Similarly, ACEs are associated with multiple health risk behaviors, whereby appropriate interventions may be able to prevent or delay chronic disease development. Of relevance for primary care providers, data gathered from adult respondents across five states on the 2011 Behavioral Risk Factor Surveillance System indicated that ACE scores of ≥ 4 are associated with binge drinking, heavy drinking, smoking, risky HIV behavior, diabetes, myocardial infarction, coronary heart disease, stroke, depression, disability caused by health, and use of special equipment because of disability (Campbell et al., 2016). Various other studies have also found associations between ACEs and obesity (Dube et al., 2010), chronic pulmonary disease and healthcare utilization (Anda et al., 2008), and attempted suicide (Dube et al., 2001). Due to the wide range of ACE-related health

concerns, Kalmakis and colleagues (2015) recommend routine ACEs assessment by nurse practitioners with adult primary care patients.

Trauma-Informed Primary Care

Harris and Fallot (2001) are perhaps most widely recognized for advocating for a global shift towards trauma-informed care throughout the healthcare system. As such, they emphasize the negative influence of trauma on various aspects of health, and the increased vulnerability for health risks among those with trauma histories. Their model emphasizes the importance of five core values throughout the entire treatment process: safety, trust, empowerment, choice, and collaboration. While some primary and secondary prevention efforts exist at the family and community level to reduce instances of childhood maltreatment (e.g., Circle of Security, Positive Parenting Program, Psychological First Aid), Oral and colleagues (2016) advocate for trauma-informed healthcare practices as a form of tertiary prevention, and for the identification of elevated health risks through ACEs screening.

Trauma-informed care practices have also been applied more specifically to the primary care setting. For instance, Roberts and colleagues (2019) propose a model of trauma-informed primary care (TIPC) that is largely centered around ACEs screening rather; they suggest benefits of this screening method compared to using a more restrictive conceptualization of trauma as defined by DSM-5-TR criteria (i.e., actual or threatened death, serious injury, or sexual violence) (American Psychiatric Association, 2022). Accordingly, the authors identify opportunities to apply trauma-informed care principles in primary care through screening and trauma recognition, affirmation of the health effects of trauma, patient-centered communication and care, emphasis on emotional safety and avoiding triggers, and knowledge of helpful treatment for trauma patients.

While the research evidence for trauma-informed care practices is wanting, some benefits have been demonstrated in the primary care setting. For instance, following an intervention that utilized continuing medical education (CME) training sessions to further educate medical providers about communication styles, primary care patients rated their medical providers significantly higher in patient-centeredness, such as having respect for patient autonomy and collaboration (Green et al., 2016). Additionally, in one pilot program, medical residents received five 60-minute didactic trainings in trauma-informed care, participated in brief group discussions, and were provided with optional clinical observation and feedback. Participating providers reported increased knowledge and use of trauma-informed care practices, as well as benefitting from engaging in skills-based experiential education (Shamaskin-Garroway et al., 2020). Despite these initial research efforts regarding trauma-informed care practices in healthcare settings, much remains unknown about the clinical utility of ACEs screening on patient care and health outcomes.

Risks of ACEs Screening in Primary Care

Although ACEs-related health concerns are well-documented, the potential risks of ACEs screening are not yet fully known. As noted above, trauma-informed healthcare practices are relatively young, and primary care providers may not possess the education or training needed to appropriately screen for ACEs. Further, the ACEs research literature provides little evidence about the use of patients' ACE scores to effectively guide treatment planning and improve patient outcomes. Accordingly, clinical applications of ACEs screening and health intervention must only be implemented after careful consideration of these risks and benefits.

Concerning screening risks, Finkelhor (2018) highlights key reasons why universal ACEs screening may be inappropriate. These include the lack of identified interventions for individuals

who endorse childhood adversity, the potential for negative outcomes related to screening (e.g., patient discomfort, stigma), the potential for increased costs (e.g., overtreatment, unnecessary referrals), and the uncertainties related to screening for past experiences rather than current symptomology. Anda and colleagues (2020) also voice concerns about the inability of ACEs screening to identify the frequency, chronicity, or intensity of exposure to various adversities, and accordingly, the potential for ACE scores to be inappropriately applied to treatment algorithms without justification. When screening with pediatric patients, further logistical issues may arise. Most notably, providers may be hesitant to ask questions that would require mandatory reporting due to instances of abuse/neglect, and likely have concerns about the subsequent effects on parent-clinician rapport. Nonetheless, there still appears to be a strong rational for ACEs screening among pediatric patient populations, including the ability to intervene upon environmental risk factors and thereby limit the potential influence of certain chronic stressors on health and development.

In addition to these screening risks, there are still many questions and doubts about the benefits of retrospectively surveying for ACEs within adult patient populations. In their review of the current evidence related to ACEs screening, Ford and colleagues (2019) conclude that much is still unknown about the application of widespread ACEs screening, and the authors call for wariness regarding universal screening practices. In particular, the authors highlight four areas that must be further explored in future research on ACEs screening: universal screening, service user acceptability, practitioner feasibility/acceptability, and level of ACEs awareness within a healthcare organization. Importantly, the authors highlight that a major limitation of the current literature is the lack of clarity about how the results of ACEs screening should inform

care. Given these concerns, universal ACEs screening should only be adopted once there is a deeper understanding of the potential benefits of ACEs screening on adult patient care.

Future Directions for ACEs Screening in Primary Care

Although experiences of childhood adversity are known to influence one's health across the lifespan, ACEs are not routinely screened for in the primary care setting. One study found that the greatest barriers to screening for childhood abuse among adult primary care patients included time constraints, limitted ability to provide counsel to patients, and unclear screening recommendations for primary care (Weinreb et al., 2010). However, the authors found that primary care physicians were more likely to screen for abuse histories if they had higher confidence in their screening abilities, perceived that it was their role to screen, or were knowledgeable about the high prevalence of abuse history among their patients. Further, 40% of primary care physician survey respondents reported that they had never received formal training on screening adult patients for childhood abuse histories, which likely contributed to lower screening trends. Similar to these findings, in a survey of ACEs screening barriers among nurse practitioners, Kalmakis and colleagues (2017) found that provider knowledge, time, and comfort level emerged as the greatest barriers to implementing routine ACEs screening in primary care.

While the exact benefits of ACEs screening are still unknown, Gillespie (2019) provides several screening recommendations. Importantly, he emphasizes the need to use the most appropriate ACEs assessment tool based on the screening setting. For instance, certain screening tools may require patients to endorse specific ACE items, while other screening measures may allow for less patient disclosure by simply recording a total ACE score (0-10). In primary care settings, the author contends that universal screening should be used to initiate a conversation about toxic stress and identify patients with higher disease risk, and should not be used

diagnostically or to force patient disclosure. Concerning screening feasibility, the author recommends that providers use concise questioning rather than a lengthy interview to follow up about items endorsed on an ACEs screening measure (e.g., "Do any of these experiences still bother you now?"). Finally, Gillespie (2019) discusses the potential for routine ACEs screening to further expand trauma-informed care and to reduce mental health stigma by normalizing experiences of trauma among medical patients.

Although the literature on ACEs screening remains limited, the findings of several implementation studies are optimistic for the expansion of screening efforts. For instance, Glowa and colleagues (2016) address some of these concerns in a feasibility study with patients at a primary care clinic. Their findings suggest that primary care physicians can complete ACEs screening efficiently (e.g., visit length increased, on average, by ≤ 5 minutes), while also gaining new insight into patient care. Of note, the authors' methodology included a pre-visit screening measure; thus, patient-provider discussion of ACEs was abbreviated. Nonetheless, clinicians perceived greater benefits from discussing ACEs-related issues with patients with a positive screening result (i.e., ACE score ≥ 4), suggesting that providers may perceive a greater influence of higher ACEs scores on considerations for patient care. In addition to provider receptivity to ACEs screening, patient acceptability for ACEs screening has also been demonstrated, in that pregnant mothers reported high comfort with completing an ACE questionnaire and discussing their results with their medical provider during a prenatal care visit (Flanagan et al., 2018).

Due to the remaining uncertainties about the risks and benefits of ACEs screening with adult primary care patients, few implementation models of ACEs screening exist. Kalmakis and colleagues (2017) provide what is perhaps the most comprehensive model of ACEs screening with adult primary care patients. In their study, nurse practitioner students completed ACEs

screening with consenting primary care clinic patients ages 21 and older. Prior to ACEs screening, student clinicians attended two educational sessions about ACEs-related health concerns, trauma-informed care, and mock interviews with an ACEs assessment interview protocol. The interview protocol included sample phrasing for student clinicians to provide patients with information about the reasons for ACEs screening. Student clinicians were also trained to communicate in a clear, concise, and nonjudgmental manner, and to respond to patient disclosures with compassion. Following ACEs screening interviews, patients with a reported history of ACEs were also given the option of speaking with a counseling professional or the supervising nurse practitioner.

Using a mixed-methods approach, the authors collected data from multiple sources. The interviewing nurse practitioner students completed a brief post-interview survey after each screening encounter, and the five survey items included questions about the providers' screening comfort, screening confidence, length of time to complete screening, and treatment plans for follow-up; this methodology is described by Kalmakis and colleagues (2017). Among the authors' findings, interviewing nurse practitioner students reported feeling very comfortable and very confident during screening, and reported an average screen time of 8.5 minutes (range = 3 to 20 minutes; positive correlation between ACE score and screen time). Approximately one third of patients were referred to the clinic nurse practitioner for follow up, were determined not to need follow up, or declined follow up, respectively. Additionally, the authors analyzed associations between patients' ACE scores and a self-reported list of chronic health conditions. Results aligned with the existing ACEs literature, such that patients with higher ACE scores also reported a greater number of chronic health conditions and clinic visits over the past year

(Kalmakis et al., 2018). The authors advocate for future efforts to develop feasible ACEs interventions for the primary care setting.

Primary Care Behavioral Health (PCBH) Model

Given the broad influence of childhood trauma and adversity on chronic physical and mental health conditions across the lifespan, the integrated primary care setting is an ideal setting for ACEs screening and trauma-informed care interventions. To our knowledge, this has only been explored with one pediatric patient population (Purewal et al., 2016).

The Primary Care Behavioral Health (PCBH) model has been used to reduce barriers to behavioral health services, in which behavioral health consultants are embedded in multidisciplinary treatment teams in the primary care setting. The acronym GATHER has been used to identify the main components and benefits of the PCBH model: Generalist approach, Accessibility, Team-based, High productivity, Educator, and Routine (Robinson & Reiter, 2016). Due to these factors, integrated behavioral health professionals can contribute to patient care delivery, care coordination, and mental health education for both primary care patients and providers.

In addition to these more general roles, behavioral health consultants (BHCs) are uniquely positioned to implement trauma-informed care practices and address various physical and mental health concerns related to ACEs. Behavioral health consultants receive routine training in the assessment and intervention of factors related to traumatic events and chronic stressors, and can also advocate for necessary behavioral health services within multidisciplinary primary care treatment teams. As part of the PCBH model, the BHC role allows for brief consultation and behavioral intervention with patients in the medical clinic exam room, which

can reduce medical providers' time spent with patients and increase clinical efficiency (Robinson & Reiter, 2016).

The PCBH model has also demonstrated improved outcomes for various ACEs-related health concerns with primary care patients, including anxiety, depression, posttraumatic stress disorder (PTSD), tobacco use, insomnia, and weight change (Reiter et al., 2018). Further, BHCs can help to reduce patient distress, which is associated with higher healthcare utilization and care-seeking behaviors (Vogel et al., 2017). Of note, positive associations have been demonstrated between patient distress and history of ACEs (Koball et al., 2019; Kalmakis et al., 2018). Taken together, the use of BHCs within a PCBH model to address ACEs-related health concerns may facilitate necessary access to behavioral health services and reduce erroneous medical visits and procedures.

Methods

Overview

The purpose of this study was to pilot a model of ACEs screening implementation within a Primary Care Behavioral Health (PCBH) framework. Similar to a previous study of ACEs screening implementation (Kalmakis et al., 2017), our intervention utilized didactic education sessions about trauma-informed care, ACEs, and ACEs-related health concerns. The current study was developed to be implemented with primary care providers in a university-affiliated integrated primary care setting, East Carolina University Family Medicine (ECUFM), over a 12-month study period.

We sought to assess several outcomes over the course of this study. Changes in monthly ACEs screening rates were monitored through chart reviews of electronic health records. Primary care providers were invited to complete Pre- and Post-Study Surveys to measure their self-reported barriers to ACEs screening at the beginning and end of our study period. The Pre/Post-Study Surveys were also used to evaluate potential changes in the providers' frequency of ACEs screening and ACEs-related health prevention/intervention efforts. Throughout our study, we sought to address providers' commonly reported ACEs screening barriers through didactic ACEs education sessions. Pre- and Post-Education Surveys were administered before and after each didactic session to measure the influence of our ACEs education intervention on potential reductions in providers' barriers to ACEs screening. After each ACEs education session, we elicited qualitative feedback from attendees regarding ways to improve ACEs screening implementation efforts at ECUFM. Although we initially intended to complete key informant interviews with behavioral health consultants to evaluate the appropriateness of ACEs

screening as a referral source to integrated behavioral health services, this aim was ultimately not addressed due to the time constraints of our study timeline.

Using a PCBH model, education sessions were delivered by a behavioral health consultant (BHC), and didactic presentations provided an overview of trauma-informed care and ACEs, ACEs-related health concerns across the lifespan, key barriers to ACEs screening, and materials to facilitate ACEs screening implementation at ECUFM (e.g., guidance on screening measure selection, examples of provider screening scripts, steps for charting and documentation, examples of recommended prevention and intervention strategies). Presentation slides can be viewed in Appendix A. Primary care providers were encouraged to routinely complete ACEs screening with their adult patients and offer integrated behavioral health consultations or referrals for patients who endorsed a positive ACEs screening result (i.e., ACE-Q $\geq$ 4).

Aims and Hypotheses

Aim 1

To increase ACEs screening rates with adult patients at an integrated primary care clinic.

Hypothesis 1

Through consistent didactic ACEs education sessions led by behavioral health consultants at an integrated primary care clinic, and by addressing relevant environmental/organizational ACEs screening barriers, monthly ACEs screening rates at adult patient Establish Care visits will increase from 0% to 5% from 09/01/2021 to 08/31/2022.

Aim 2

To evaluate the influence of didactic ACEs education sessions and increased access to ACEs education and screening materials over a 12-month study period on primary care

providers' attitudes and behaviors related to ACEs screening and ACEs-related health interventions.

Hypothesis 2

Based on responses to a Pre/Post-Study Survey, following a 12-month study period, primary care providers will endorse reduced barriers to ACEs screening, increased frequency of ACEs screening, and increased use of ACEs-related health prevention/intervention strategies among their adult primary care patients.

Aim 3

To evaluate the effectiveness of a didactic ACEs education session on reducing primary care providers' barriers to ACEs screening with adult primary care patients.

Hypothesis 3

Based on responses to a Pre/Post-Education Survey, following a didactic ACEs education session, primary care providers will endorse increased ACEs knowledge, increased ACEs screening confidence, increased feasibility of ACEs screening, and increased clinical utility of ACEs screening.

Aim 4

Using a Primary Care Behavioral Health (PCBH) model, to evaluate behavioral health consultant (BHC) attitudes about the use of adult primary care patients' ACE scores as a referral source to integrated behavioral health services.

Hypothesis 4

Upon thematic analysis of key informant interviews with behavioral health consultants, responses will support the use of ACEs screening responses as an appropriate source of patient

referrals to integrated behavioral health services, will support the use of ACEs screening responses as a tool for guiding behavioral health assessment and treatment, and will demonstrate overall patient receptivity to integrated behavioral health services following a positive ACEs screening result.

Measures, Data Collection, and Analysis

ACEs Screening Rates

To measure our primary aim – the change in ACEs screening rates during adult patients' initial visits at an integrated primary care clinic – we monitored electronic health records via Epic. Retrospective chart reviews were completed using the East Carolina University Business Intelligence Center (EBIC) billing software, whereby Establish Care visits were identified using Current Procedural Terminology (CPT) codes for new patient encounters (e.g., 99202, 99203, 99204, 99205). Billing reports included collection of patient's medical record number (MRN), appointment date, provider name, and date of birth. This data was then exported to a Microsoft Excel spreadsheet and securely saved on a university departmental drive. Subsequently, study members used patient MRNs, appointment dates, and provider names to complete retrospective chart reviews, which assessed whether providers completed ACEs screenings during each patient encounter (Yes/No). This method was used to calculate monthly ACEs screening rates based on the proportion of new patient visits during which ACEs screening was completed.

Based on our initial assessment of new patient visits at our clinic over the previous year (i.e., 249 clinic days), we estimated that approximately 160 Establish Care visits would take place each month. Therefore, to reach our targeted ACEs screening rate of 5% by the end of August 2022, we estimated that ACEs screening would need to be completed with eight new

clinic patients per month. We initially determined to monitor monthly screening rates to inform subsequent stages of our 12-month study period.

Due to a low observation of ACEs screening throughout the initial months of the study, we expanded the scope of our chart reviews to additionally identify instances in which trauma screening was completed at Establish Care visits. For the purposes of this study, we dichotomously defined trauma screening (Yes/No) as a primary care provider's documentation of a patient's exposure to a traumatic event, per PTSD criterion A of the DSM-5-TR (American Psychiatric Association, 2022), or new diagnosis of PTSD. We contend that trauma screening could be considered a proxy measure for ACEs screening due to our collective aims of increasing provider and organizational uptake of trauma-informed care practices.

Pre/Post-Study Survey

The Pre/Post-Study Survey was developed to be administered to all ECUFM primary care providers at the beginning and end of our intervention period. Our pre/post survey methodology was intended to assess overall changes in providers' attitudes and behaviors related to ACEs screening and ACEs-related health prevention/intervention practices with adult patients.

The survey is separated into two parts. Part 1 includes eight items, each of which were designed to evaluate commonly endorsed barriers to ACEs screening by primary care providers: low ACEs knowledge, low ACEs screening comfort, low perceived feasibility of ACEs screening, and low perceived clinical utility of ACEs screening. These constructs are derived from previous ACEs and trauma screening research (Kalmakis et al., 2017; Weinreb et al., 2010). Two survey items are reverse scored to reduce the risk of a positive response bias among respondents. Survey items were collaboratively developed and reviewed by study members, which includes two clinical faculty members at ECUFM. Survey responses are recorded on a 7-

item Likert scale (i.e., Strongly Disagree, Moderately Disagree, Slightly Disagree, Neither Agree nor Disagree, Slightly Agree, Moderately Agree, Strongly Agree).

Part 2 of the survey includes six additional items and were developed to assess the number of ACEs screenings completed by primary care providers with their adult patients over the previous 12 months. Survey items were also developed to assess the number of times providers had initiated health prevention/intervention efforts due to a patient's ACEs score over the previous 12 months. Further, Part 2 survey items were designed to identify the number of times providers submitted referrals to integrated behavioral health services based on a patient's ACE score, and to identify the number of times health conditions were addressed based on a patient's ACE score. Accordingly, the Pre/Post-Study Survey was used to evaluate changes in ACEs screening and ACEs-related health prevention/intervention efforts over the 12-month study period. The Pre/Post-Study Survey can be viewed in Appendix A.

Using a departmental email list, all primary care providers at ECUFM were invited to complete the Pre/Post-Study Survey at the beginning and end of the 12-month intervention period. Providers were given access to the surveys through a Qualtrics survey link, and providers were told that their participation would be used to guide QI efforts related to clinical education, training, and practice. To ensure that survey responses remain confidential, providers were asked to create a unique identification code using their street address number and month of birth (e.g., 816July). After completing intervention tasks, the Post-Study Survey was administered to providers.

Once both Pre- and Post-Study Surveys were completed, we sought to analyze the difference in providers' mean scores for each survey item between Time 1 (Pre-Study Survey) and Time 2 (Post-Study Survey). We initially planned to analyze scores with a repeated-

measures ANOVA. Using G*Power, a statistical power analysis program, an *a priori* power analysis of a repeated-measures, within-factor ANOVA indicated that a sample of 54 participants would allow us to detect a medium effect ($f = 0.25$, $\alpha = 0.05$, $1 - \beta = 0.95$, Critical $f = 4.02$, $Df = 53$). Although we received adequate participation on the Pre-Study Survey ($n = 48$), we were ultimately unable to complete this analysis plan due to low participation on the Post-Study Survey ($n = 6$). Therefore, survey responses were analyzed using measures of central tendency and through qualitative analysis of response trends.

Pre/Post-Education Survey

The Pre/Post-Education Survey was developed to be administered to primary care providers before and after each didactic ACEs education session. The survey follows the same format as Part 1 of the Pre/Post-Study Survey and was designed to evaluate potential changes in providers' self-reported barriers to ACEs screening following a didactic ACEs education session. As noted above, the survey includes eight items related to four prominent barriers to ACEs screening endorsed by primary care providers (e.g., low ACEs knowledge, low ACEs screening comfort, low perceived feasibility of ACEs screening, and low perceived clinical utility of ACEs screening). The Pre/Post-Education Survey can be viewed in Appendix A.

Pre-Education Surveys were administered on paper forms at the start of each didactic ACEs education sessions. In the weeks following each education session, attendees were invited via email to complete the Post-Study Survey using a Qualtrics link. Participating providers were asked to create an anonymous identifiable code by recording their street address number and birthday month (e.g., 816July) so that Pre/Post-Education Survey responses could be matched for data analysis. Once all survey responses were entered into Qualtrics, data was exported to IBM SPSS Statistics software for analysis.

We initially planned to analyze the difference in mean survey item scores for primary care providers between Time 1 (Pre-Education Survey) and Time 2 (Post-Education Survey). Our analysis plan was to complete a dependent sample (i.e., paired) *t*-test to determine if the Pre- and Post-Education Survey group means were statistically different. An *a priori* power analysis was completed in G*Power, which indicated that a sample of 36 participants would allow us to detect a medium effect (Cohen's $d = 0.5$, $\alpha = 0.10$, $1 - \beta = 0.90$, Critical $t = 1.69$, $Df = 35$). However, we did not achieve our anticipated sample size of 25-50 participants and were unable to complete this analysis plan. Therefore, instead of comparing mean item scores between pre/post surveys, matched survey responses ($n = 3$) were analyzed qualitatively for response trends.

We matched three Pre- and Post-Education Survey responses using the unique identification code used by primary care providers during survey completion (i.e., 807August, 832 July, 124December). To assess providers' overall endorsement of screening barriers, responses to the eight survey items were quantified using a Total Score ranging from 8 to 56, with lower scores reflecting greater self-reported barriers to ACEs screening. Each item was scored on a scale of 1-7 to represent the Likert scale that was used on the survey (i.e., 1-Strongly Disagree, 2-Moderately Disagree, 3-Slightly Disagree, 4-Neither Agree nor Disagree, 5-Slightly Agree, 6-Moderately Agree, 7-Strongly Agree). Two of the eight survey items, Question 3 and Question 5, were reverse scored. This methodology is used solely for the purpose of examining qualitative trends.

Qualitative Feedback Questionnaire for Primary Care Providers

The Qualitative Feedback Questionnaire was developed as a quality improvement (QI) tool to help study members elicit primary care providers' feedback about ACEs screening

implementation efforts at ECUFM. Provider feedback was gathered at the conclusion of each didactic ACEs education session. The Qualitative Feedback Questionnaire includes three semi-structured questions, which were developed to prompt discussion about the degrees to which primary care providers viewed ACEs screening as feasible, advantageous, and disadvantageous pertaining to behavioral health services for adult primary care patients. Questions on the Qualitative Feedback Questionnaire were largely based on the barriers to ACEs screening assessed for on the Pre/Post-Study Surveys and Pre/Post-Education Surveys and were developed to gather additional qualitative feedback from providers. Accordingly, provider feedback was meant to add convergent and discriminant validity to data collected on the Pre/Post-Study Surveys and Pre/Post-Education Surveys. This mixed-methods approach is based on the methodological recommendations of Campbell and Fiske (1959). The Qualitative Feedback Questionnaire can be viewed in Appendix A.

Due to time constraints during didactic ACEs education sessions, items on the Qualitative Feedback Questionnaire were not comprehensively discussed with primary care providers during didactic ACEs education sessions. While we had initially allocated 15 minutes for discussion of questionnaire items, we ultimately did not have sufficient time during our scheduled timeslot to allow for this. Instead, we gathered providers' general qualitative feedback about their degree of receptivity to ACEs screening implementation efforts at ECUFM.

Although provider feedback was initially intended to be used for QI purposes (e.g., incorporating feedback into study materials and processes), we applied methods of thematic analysis to evaluate providers' qualitative feedback during didactic ACEs education sessions. These methods are discussed further below, as our initial thematic analysis plan pertained to key informant interviews with behavioral health consultants. Of note, qualitative feedback from

primary care providers was not audio recorded, transcribed, or coded, which is the planned analysis methodology detailed below for key informant interviews. Instead, response trends were identified relative to *a priori* themes pertaining to providers' barriers to ACEs screening.

Key Informant Interview Questionnaire for Behavioral Health Consultants

The Key Informant Interview Questionnaire was developed as a tool to evaluate behavioral health consultant (BHC) attitudes regarding the feasibility and utility of using ACEs screening to initiate patient referrals to behavioral health consultation and additional treatment. The Key Informant Interview Questionnaire combines structured and semi-structured question formats, and items were intended to gather BHC feedback about clinical consultation, assessment, and intervention experiences in which patients were referred to behavioral health services following a positive ACEs screening result. Of note, the recommendations for ACEs screening and subsequent behavioral health referrals discussed in the current study are based on recommendations from previous research on ACEs screening implementation in the primary care setting (Kalmakis et al., 2018; Purewal et al., 2016), and are guided by evidence of the increased risk for depression and suicide attempts (among various other behavioral health concerns) for individuals with elevated ACE scores (Felitti et al., 1998).

Due to the time constraints of our study timeline, we did not complete our data collection and analysis plan for this aim. Given the lack of observed referrals to integrated behavioral health services by primary care providers due to an adult patient's positive ACEs screening result, we determined that key informant interviews with behavioral health consultants to evaluate the use of ACEs screening as a referral source would likely not be appropriate at this time. Nonetheless, we have retained our analysis plan below as we believe that it may have relevance for future studies that seek to evaluate the feasibility and utility of ACEs screening as a

referral source to integrated behavioral health services. Additionally, our analysis plan for key informant interviews was loosely used to guide our thematic analysis of primary care providers' qualitative feedback during didactic ACEs education sessions.

Key informant interviews are a qualitative research methodology that has been recommended for use in the primary care setting (Marshall, 1996; Gilchrist, 1992). This ethnographic strategy holds the key advantage of being time-efficient and gathering data from a select one or few group representatives rather than sampling numerous individuals within a target population (Marshall, 1996). Concerning key informant interviews, several guidelines have been proposed. For instance, selected key informants should be an experienced member of the targeted group of interest that demonstrates adequate knowledge, impartiality, willingness to participate, and ability to effectively communicate about matters in a way that represents the overall opinions of a group (Tremblay, 1957). Some have advocated for the use of multiple key informants with the aim of capturing a wide range of views (Burgess, 2002).

To accommodate these recommendations, we intended to complete key informant interviews with two to four behavioral health consultants at ECUFM at the end of our intervention period. According to our planned methods, key informants were to be collaboratively chosen by study members and the behavioral health team. Ideal key informants would have accumulated sufficient experience with patient referrals initiated by positive ACEs screenings and would be able to represent the collective opinions of the behavioral health team. Based on the recommendations of Onwuegbuzie and Leech (2007), this method of non-random sampling is warranted given the intention to maximize our understanding of ACEs screening implementation through a Primary Care Behavioral Health (PCBH) model, which requires selection of the most appropriate BHCs.

To reduce the potential for interpretation bias in our thematic analysis plan, we developed the Key Informant Interview Questionnaire so that response themes could be determined *a priori*. This is consistent with recommendations for achieving adequate saturation in qualitative data (Saunders et al., 2018). Accordingly, our intention for using the key informant interview method was to answer a particular set of questions regarding the receptivity, feasibility, and utility using adult patients' positive ACEs screening results (i.e., ACE-Q total score of ≥ 4) as a source of referral to integrated behavioral health services. Therefore, we sought to answer three main questions through thematic analysis of interview responses.

Question 1: Are patients who are referred due to ACEs screening receptive to behavioral health treatment? Concerning this question, we believe it is important to know whether patients are generally open or guarded to discussion of adverse childhood experiences following a referral to integrated behavioral health services. Similarly, we were interested in knowing how patients respond to psychoeducation about the influence of ACEs and trauma on various health conditions. Patients may be reluctant to share personal experiences and/or express confusion as to the nature of their visit with a BHC. Therefore, it is necessary to develop greater insight into whether patients have predominantly positive, negative, or mixed experiences with ACEs-related referrals to behavioral health services. Although our questionnaire is for BHCs and is not intended to be administered to patients, we believe that BHCs could provide helpful insights into patient experiences.

Question 2: Are ACE scores an appropriate source for referral to behavioral health services? It is important to explore whether BHCs believe that behavioral health services are necessary for patients who have a positive ACEs screening result. For instance, patients who are necessary for treatment would likely demonstrate current symptom distress related to psychiatric

conditions (e.g., depression, anxiety, PTSD) or present with active health concerns that could benefit from behavioral and/or psychotherapeutic interventions (e.g., chronic pain/somatic complaints, sleep difficulties, weight management, alcohol/substance use). In contrast, patient referrals following ACEs screening may appear unnecessary, such that patients demonstrate few or no current symptoms and therefore behavioral health treatment is not appropriate. Thus, it is important to gather BHC feedback about the perceived advantages and disadvantages of using ACEs screening to initiate patient referrals.

Question 3: Are ACE scores a useful tool for guiding behavioral health assessment and treatment? Similar to Question 2, it is important to know if BHCs perceive patients' ACE scores as helpful information for developing their case formulations and treatment plans. For instance, knowledge of patients' ACE scores could potentially inform the administration of certain assessment measures or identification of relevant treatment targets and interventions (e.g., stress management and coping, emotion dysregulation, mindfulness-based approaches). However, BHCs may also find that ACE scores provide irrelevant information, or information that does not contribute to effective assessment and treatment. If positive ACEs screening results are to be used as a justification for behavioral health consultation and referral, they must be well-received by BHCs and demonstrate a necessary function within the consultation, assessment, and treatment processes.

Our thematic analysis plan was guided by the recommended steps for qualitative analysis in the family medicine setting (Babchuk, 2019). These include: 1) the assembly of data for analysis, 2) refamiliarization with the data, 3) completion of initial coding procedures, 4) generation of categories and assignment of category codes, 5) generation of themes from categories, 6) implementation of validation strategies, 7) interpretation and report of findings

based on participant responses, 8) interpretation and report of findings based on the literature, 9) creation of visual representations of data and findings, and 10) identification of strengths, limitations, and suggestions for future research.

To comply with these recommendations, we intended to complete several tasks. First, we planned to record interviews electronically. Audio data would then be transcribed, and all key informant interviews would be independently reviewed by two study members for proper validation. During data coding, each interview statement that favors the use of positive ACEs screenings as a referral source (i.e., demonstrates patient receptivity to ACEs screening and intervention, appropriateness for behavioral health consultation and referral due to ACE scores, and ACE score utility for case formulation and treatment planning) would be coded with a 1, while interview statements that do not favor the use of ACE scores for behavioral health referrals would be coded with a 2; statements that appear neutral and cannot be clearly separated using this dichotomy would be coded with a 3. Then, coded statements would be categorized based on their relevance to analysis Questions 1, 2, or 3, as described above. During this step, other potential categories would be created inductively based on responses that are not conveyed though these three questions.

Once relevant statements have been appropriately coded and categorized, themes would be generated from the data. To review themes quantitatively, study members would determine whether the proportion of total responses supports or refutes Questions 1, 2, and 3, respectively. Using these proportions, study members would determine whether each key informant interview expresses an overall perspective that supports or refutes ACEs screening as a justification for integrated behavioral health services. Thematic analysis should highlight the collective attitudes of BHCs in a given setting.

Adverse Childhood Experiences Questionnaire (ACE-Q)

Although study members did not conduct ACEs screening with patients, and ACEs screening measure selection was ultimately left to the discretion of each provider, a review of the Adverse Childhood Experiences Questionnaire (ACE-Q) is warranted. The ACE-Q was initially implemented by Felitti and colleagues (1998) and was developed as an epidemiological measure to better understand the relationship between early psychosocial stress and subsequent health outcomes. The questionnaire includes ten self-report items concerning childhood abuse/neglect and household dysfunction, such that total scores are quantified as the cumulative number of endorsed responses. Accordingly, each participant's ACE-Q score will fall between 0 and 10, with higher scores representing more adversity experiences. Extensive research has confirmed a positive dose-response relationship between ACE scores and poorer health outcomes (Campbell et al., 2016; Gilbert et al., 2015; Felitti et al., 1998). An ACE-Q score of four or higher has been shown to yield the strongest associations with various aspects of poorer health; therefore, a total score of four has been recommended as a clinical cutoff point (Alhowaymel et al., 2023; Felitti et al., 1998).

The ACE-Q has also demonstrated adequate psychometric properties. A study of test-retest reliability found that weighted kappa coefficients for ACE scores at two measurement points were acceptable (Cohen's $\kappa = .64$). Reliability statistics for survey items is as follows: emotional abuse ($\kappa = .66$), physical abuse ($\kappa = .63$), sexual abuse ($\kappa = .69$), household substance abuse ($\kappa = .75$), household mental illness ($\kappa = .51$), mother treated violently ($\kappa = .78$), parental separation ($\kappa = .86$), and household member incarceration ($\kappa = .46$) (Dube et al., 2004). In a sample of college athletes, analysis of test-retest reliability was also found to be acceptable ($r = .71$), and a higher stability coefficient was found among items concerning household dysfunction

(r = .65) compared to items of abuse and neglect (r = .52) (Zanotti et al., 2018). Interrelatedness between questionnaire items has also been identified, such that the endorsement of one ACE-Q item increases the odds for endorsing additional items. In one large public health sample (n = 8,629), 87% of the respondents who endorsed one ACE-Q item endorsed at least one additional item (Dong et al., 2004). In the same study, the adjusted odds of endorsing additional ACE-Q items increased significantly as the reported number of ACEs increased, suggesting a coherence within the overall ACEs construct.

Some limitations to ACEs screening have also been noted. Foremost, ACE-Q responses do not allow for self-report about the frequency, intensity, or chronicity of each experience, respectively, which limits the clinical utility of using an ACE score to guide treatment planning (Anda et al., 2020). Response inaccuracies may also be influenced by factors such as time lapse since adverse events, response bias due to subject sensitivity, and potential memory impairments (e.g., related to significantly stressful or traumatic events). Similarly, there is potential for underestimations and underreporting of instances of abuse among questionnaire respondents (Dube et al., 2004). For the purposes of our study, an adapted version of the ACE-Q (Adverse Childhood Experience Questionnaire for Adults) was recommended to primary care providers, which allows patients to report a total ACE score (0-10) without requiring self-disclosure of specific ACE items.

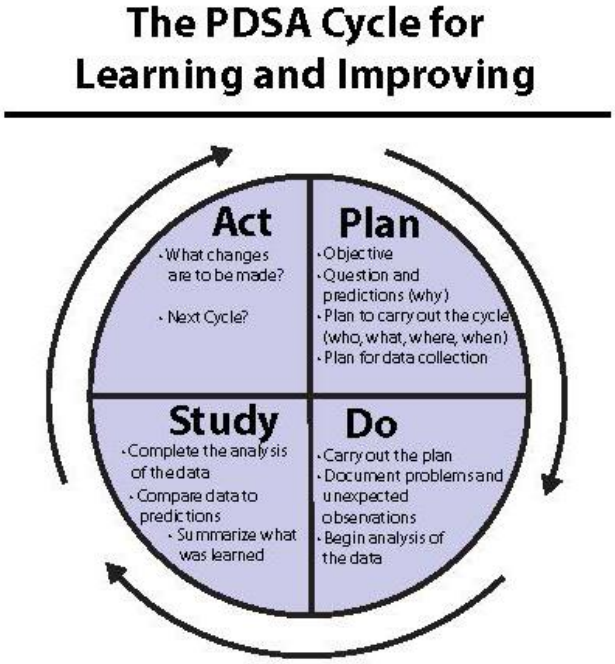
Plan-Do-Study-Act (PDSA) Cycles

The methods for this study followed the Model for Improvement, which was developed by the Associates in Process Improvement and has been widely disseminated by the Institute for Healthcare Improvement (IHI). This model emphasizes the utility of successive quality improvement cycles, known as Plan-Do-Study-Act (PDSA) cycles, to facilitate QI goals in

healthcare settings (IHI, 2021). This approach allowed study staff to work towards the gradual implementation of ACEs screening at our university-affiliated integrated primary care clinic while flexibly adapting to the dynamic and nuanced demands of this setting. Therefore, we sought to achieve our study aims through several PDSA cycles over the course of our 12-month study period.

Figure 1

IHI Model for Improvement



Note. Taken from the Institute of Healthcare Improvement (IHI, 2021)

The current study took place at East Carolina University Family Medicine (ECUFM) from August 2021 to September 2022, and an overview of our study methods is presented below through a description of five PDSA cycles. Completed intervention activities can be compared to our projected timeline of PDSA cycles and associated intervention tasks (see Appendix A). Findings are discussed briefly here and in greater detail in the Results section.

PDSA Cycle 1

The first PDSA Cycle was completed throughout August and September 2021. Consistent with our implementation plan, our first PDSA cycle was used to determine baseline ACEs screening rates at Establish Care visits, administer the Pre-Study Survey, and complete our first didactic ACEs education session for primary care providers. Upon retrospective chart review, ACEs and trauma screening appeared to take place at 0 of 139 Establish Care visits for the month of August 2021. On 09/24/2021, primary care providers at ECU Family Medicine were sent an invitation via a departmental email list to participate in the Pre-Study Survey. This initial email yielded 25 survey responses.

The first ACEs education session was presented at a regularly scheduled Advanced Practice Providers (APP) Grand Rounds on 09/14/2021. Education materials included an overview of ACEs and trauma-informed care, discussion of ACEs-related health conditions, identification of key barriers to ACEs screening, guidance about screening measure selection, examples of provider screening scripts, steps for charting and documentation, and examples of appropriate prevention and intervention strategies based on the existing ACEs literature (e.g., referrals to behavioral health services, addressing health risk behaviors, efforts related to chronic disease prevention); presentation slides can be viewed in Appendix A. One out of five total physician extenders attended this session, and we speculate that high clinical demands and turnover rates among physician extenders at this time contributed to lower attendance.

PDSA Cycle 2

The second PDSA cycle took place from September to November 2021, and was used for continued monitoring of monthly ACEs screening rates, continued administration of the Pre-Study Survey, and presentation of the second ACEs education session. We did not detect an

increase in monthly ACEs screening rates over this period. The second ACEs education session was held during a regularly scheduled academic timeslot on 11/04/2021, and approximately 40 attendees were present. To maximize participation on the Pre-Study Survey, attendees were asked to complete a printed version of the survey, which yielded responses from 22 medical residents, 6 medical students, and 5 behavioral health consultants. The education session lasted approximately 60 minutes – 45 minutes of which were used for presentation of ACEs-related content via PowerPoint, leaving 15 minutes for feedback based on the Qualitative Feedback Questionnaire. Attendees were provided with copies of the Provider Script, which was developed as an intervention tool to facilitate ACEs screening during patient encounters (see Appendix A).

Providers' qualitative feedback generally highlighted concerns about the low feasibility and clinical utility of ACEs screening with their adult patients. In addition to concerns about time constraints during patient encounters, one provider voiced the concern that too many patients would screen positive during ACEs screening, and therefore ACEs screening would not have adequate clinical relevance. These responses were used to inform changes to study materials and processes in subsequent PDSA cycles. Responses are also discussed further in the Results section below.

PDSA Cycle 3

The third PDSA Cycle took place from November 2021 to March 2022. This period was used for continued monitoring of monthly ACEs screening rates, application of qualitative feedback gathered from providers during the second ACEs education session, and presentation of the third and final ACEs education session. Consistent with earlier trends, we did not detect an increase in monthly ACEs screening rates during this period. Due to the lack of observed occurrences of monthly ACEs screening rates over our initial six months of chart reviews, we

determined to address potential issues related to data collection methods – this adjustment was consistent with our quality improvement framework of successive PDSA cycles, allowing for flexibility to respond to organizational demands. Accordingly, we developed an ACEs screening template as an Epic SmartPhrase, which was available for use by all providers within the ECU Department of Family Medicine. In addition to facilitating providers' screening efforts, we determined that this would allow us to run EBIC reports that could identify all instances in which the SmartPhrase was used for ACEs screening, which addressed the previous limitation of only being able to observe documentation of ACEs screening at Establish Care visits.

During this cycle we also implemented changes to ACEs education materials based on providers' qualitative feedback. Due to providers' concerns that too many of their patients would screen positive during ACEs screening, we adjusted our education materials to recommend that providers focus screening efforts on emerging adult patients (ages 18-35 years) rather than all adult patients. This recommendation was given to increase the perceived feasibility and utility of ACEs screening for providers, while also aligning with clinical goals pertaining to chronic disease prevention (Sonu et al., 2019). Although previous ACEs screening implementation research found that primary care providers endorse greater benefit to ACEs screening when patients endorsed higher ACE scores (Glowa et al., 2016), this would have been difficult to achieve without universal screening practices. Related to this, we highlight the lack of ACEs-related clinical recommendations as a barrier to ACEs screening implementation in the Discussion section below.

The third ACEs education session was presented at APP Ground Rounds on 03/08/2022, and three physician extenders were in attendance. Of note, attendance was improved compared to our first presentation at APP Grand Rounds during the first PDSA cycle; all three attendees

were recently hired by ECUFM and were not present at the start of our intervention period. Attendees were given access to copies of the Provider Script to facilitate future screening during patient encounters (see Appendix A). Following the ACEs education session, providers were asked questions from the Qualitative Feedback Questionnaire to obtain feedback about topics related to ACEs screening in the primary care setting. Responses reflected general receptivity to ACEs screening, as well as interest in obtaining further ACEs education and screening materials; these were used to inform additional changes to educational materials and intervention processes in subsequent PDSA cycles. Responses are also discussed further in the Results section below.

PDSA Cycle 4

The fourth PDSA Cycle took place from March to June 2022. This cycle was used for the application of provider feedback elicited during the third ACEs education session, dissemination of ACEs education and screening materials, and implementation of an ACEs screening template via Epic SmartPhrase. During the third ACEs education session, physician extenders in attendance endorsed interest in additional ACEs educational materials and in the implementation of an Epic SmartPhrase to facilitate ACEs screening efforts. Accordingly, in the weeks following the third ACEs educational session, physician extenders were provided with additional copies of ACEs educational and screening materials via email (e.g., Provider Script, ACEs Screening Questionnaire for Adults, patient handout about ACEs and stress reduction strategies). Based on their feedback, study members collaborated to develop an Epic SmartPhrase for ACEs screening documentation. During this process, physician extenders who attended the third ACEs education session were invited to provide feedback about the SmartPhrase, although no feedback was received. The SmartPhrase (.ACESSCREENING) was made available to all providers within the

ECUFM on 06/16/2022; all providers were notified via email and provided with ACEs education and screening materials.

PDSA Cycle 5

The fifth and final PDSA Cycle took place from June to September 2022. This cycle was used to administer the Post-Study Survey and collect ACEs screening data from the Epic SmartPhrase. The Post-Study Survey was administered four times via email between June and September 2022 and yielded a total of six responses. Due to low participation on the Post-Study Survey, our planned analyses to compare responses on the Pre- and Post-Study Survey could not be completed. However, Pre/Post-Study Survey results are discussed qualitatively in the Results section below.

Results

ACEs Screening Rates

The first aim of the current study was to increase ACEs screening rates with adult patients at our integrated primary care clinic. Monthly ACEs screening rates were identified through the completion of billing reports and retrospective chart reviews. Accordingly, we captured six months of chart review data for Establish Care visits from 08/01/2021 through 02/28/2022. The report identified 711 total Establish Care visits, with a mean of 118.5 visits per month. Following chart reviews for this initial six-month period, we did not observe documentation of any instances of ACEs screening.

Using an expanded criteria of trauma screening, as described in the Methods section above, retrospective chart reviews were completed for the same six-month period of 08/01/2021 to 02/28/2022. During this time, we observed trauma screening at 19 of the 711 total patient encounters, which equated to 2.7% of total Establish Care visits. Of note, we speculate that brief screening and assessment of patients' trauma histories were likely completed by primary care providers at additional visits without documentation due to unremarkable or negative screening results; however, the rate of observed trauma screening at Establish Care visits (2.7%) was still well below the estimated rate of lifetime traumatic event exposure (89.7%) and posttraumatic stress disorder prevalence (8.3%) in the US adult population (Kilpatrick et al., 2013), as well as the point prevalence of PTSD in the primary care setting (12.5%) observed in a systematic review (Spottswood et al., 2017).

Interestingly, the highest monthly trauma screening rate (5.7%) took place in the same month as our second ACEs education session, which took place on 11/04/2021 and had the highest number of attendees relative to other sessions (approximately 40 attendees;

predominantly medical residents). An overview of monthly ACEs and trauma screening rates is presented in Table 1.

Table 1

Monthly ACEs and Trauma Screening Rates

Chart Review Month	Total Establish Care Visits	ACEs Screening Frequency	Trauma Screening Frequency	Combined Screening Rate
August 2021	139	0	0	0.0%
September 2021	106	0	4	3.8%
October 2021	108	0	3	2.8%
November 2021	88	0	5	5.7%
December 2021	125	0	4	3.2%
January 2022	68	0	1	1.5%
February 2022	77	0	2	2.6%
6 Month Total	711	0	19	2.7%

As detailed in the Methods section above, we discontinued chart reviews of Establish Care visits after February 2022 and implemented an Epic SmartPhrase for ACEs screening documentation. Due to issues related to data access, study members are still in the process of obtaining chart review data from potential uses of this SmartPhrase between 06/16/2022 and 08/31/2022 (the date in which the SmartPhrase became available for departmental use and the end of our 12-month study period, respectively). In light of this limitation, we explore the potential uses of electronic health record templates for future research on ACEs and trauma screening implementation in the Discussion section below.

Pre/Post-Study Surveys

Our second aim was to evaluate the influence of a 12-month educational and organizational intervention on primary care providers' attitudes and behaviors related to ACEs screening and ACEs-related health interventions. Accordingly, we administered the Pre-Study

Survey and Post-Study Survey to measure changes in providers' attitudes and behaviors related to ACEs screening over the course of our intervention.

Pre-Study Survey

The Pre-Study survey yielded 74 total responses which were then reviewed for duplicate responses, faulty/incomplete responses, and responses from participants that were not primary care providers (6 medical students, 5 behavioral health consultants). Therefore, out of approximately 75 primary care providers at ECU Family Medicine, 48 surveys were used for analysis, representing an estimated 68% response rate. The final sample was comprised of 13 faculty physicians, 31 medical residents, and 4 physician extenders (n = 48).

In Part 1 of the Pre-Study Survey, items assessed for four barriers to ACEs screening endorsed by primary care providers at ECU Family Medicine (i.e., low knowledge of ACEs, low ACEs screening comfort, low perceived feasibility of ACEs screening, low perceived clinical utility of ACEs screening). Overall, respondents most frequently endorsed barriers pertaining to low perceived feasibility of ACEs screening. For instance, 33 respondents (69%) indicated that they "disagree" with having adequate time to screen for ACEs and briefly discuss screening results with their adult primary care patients, while 6 respondents (12%) indicated that they "agree;" 9 respondents (19%) indicated that they "neither agree nor disagree." Additionally, 23 respondents (48%) indicated that they "disagree" with being comfortable completing brief ACEs screening with their patients, while 14 respondents (29%) indicated that they "agree;" 11 respondents (23%) indicated that they "neither agree nor disagree."

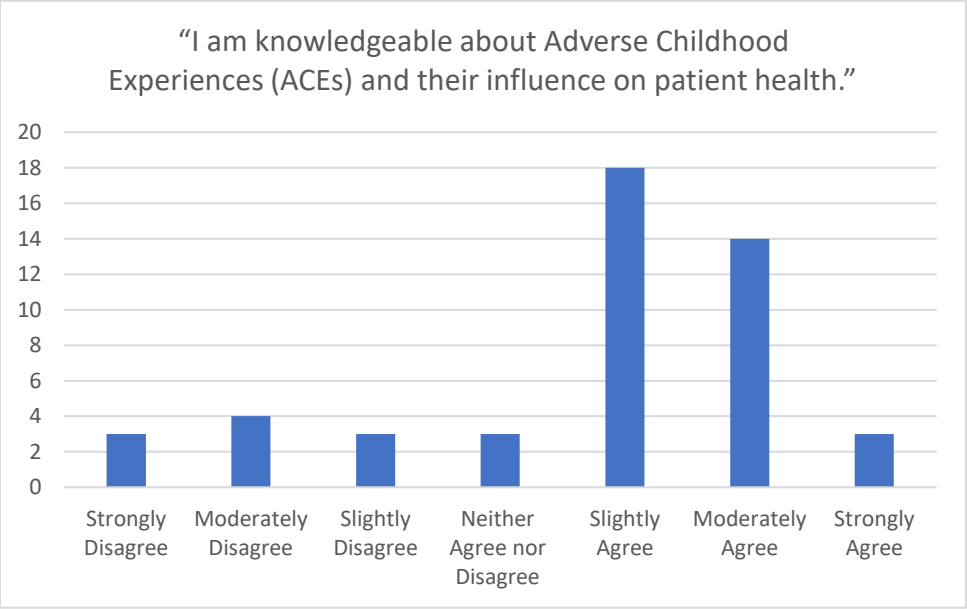
In contrast, responses to other survey items reflected relatively higher knowledge of ACEs and greater clinical utility of ACEs screening. Thirty-five respondents (73%) indicated that they "agree" with being knowledgeable of ACEs and the influence of ACEs on patient

health, while 10 respondents (21%) indicated that they "disagree;" 3 respondents (6%) indicated that they "neither agree nor disagree." Similarly, 31 respondents (65%) indicated that they "agree" that ACEs screening will improve treatment effectiveness and patient outcomes, while only 3 respondents indicated that they (6%) "disagree;" 14 respondents (29%) indicated that they "neither agree nor disagree." Using an independent samples *t*-test, we found that respondents mean scores on these items did not significantly vary by provider type (e.g., faculty physicians [*n*=13], medical residents [*n*=31]).

An overview of providers' responses is presented below in Figures 2 through 5. Of note, median (rather than mean) responses are used throughout the reporting of descriptive statistics due to recommendations for nonparametric (e.g., Likert scale) data (Jamieson, 2004).

Figure 2

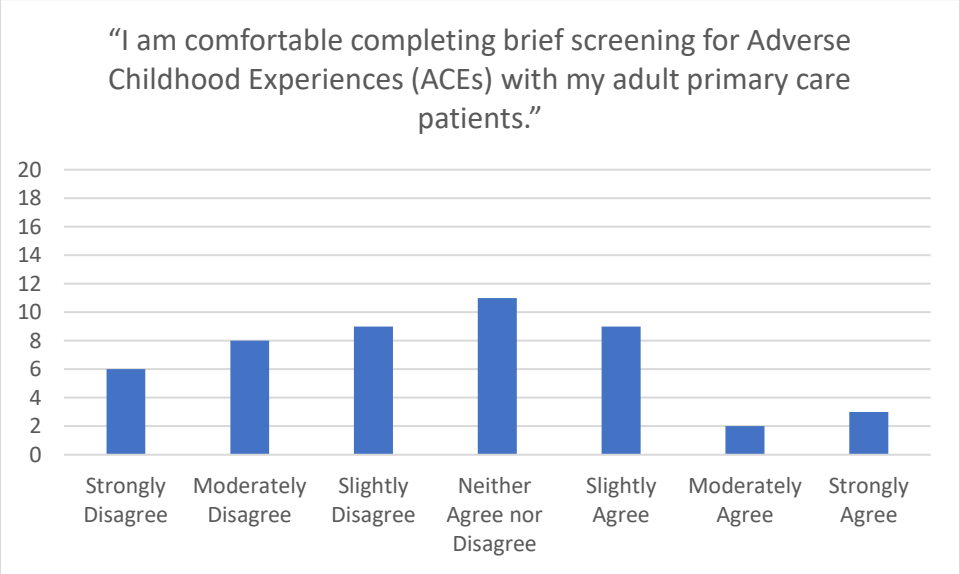
Providers' Self-Reported Knowledge of ACEs



Note. Median = Slightly Agree.

Figure 3

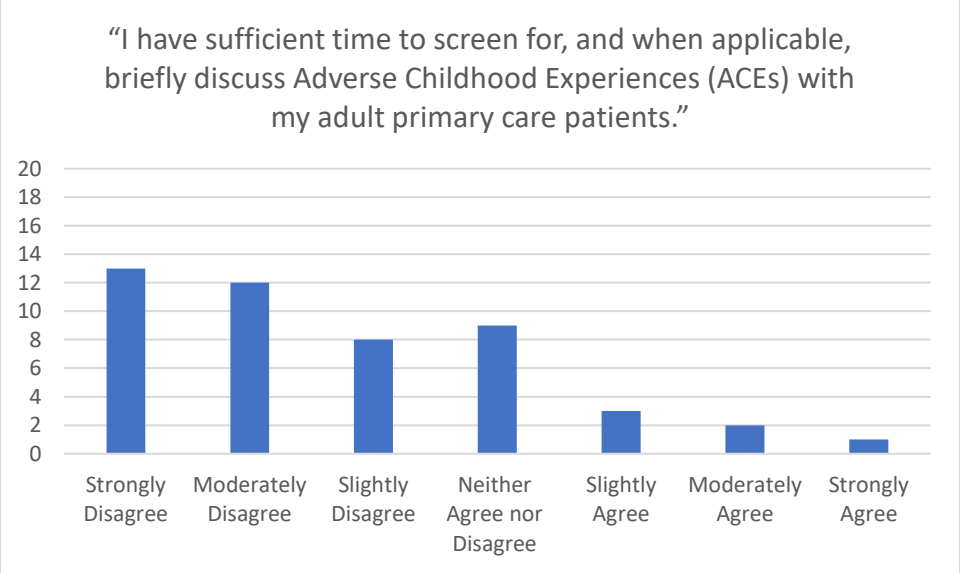
Providers' Self-Reported Comfort with Completing ACEs Screening



Note. Median = Neither Agree nor Disagree.

Figure 4

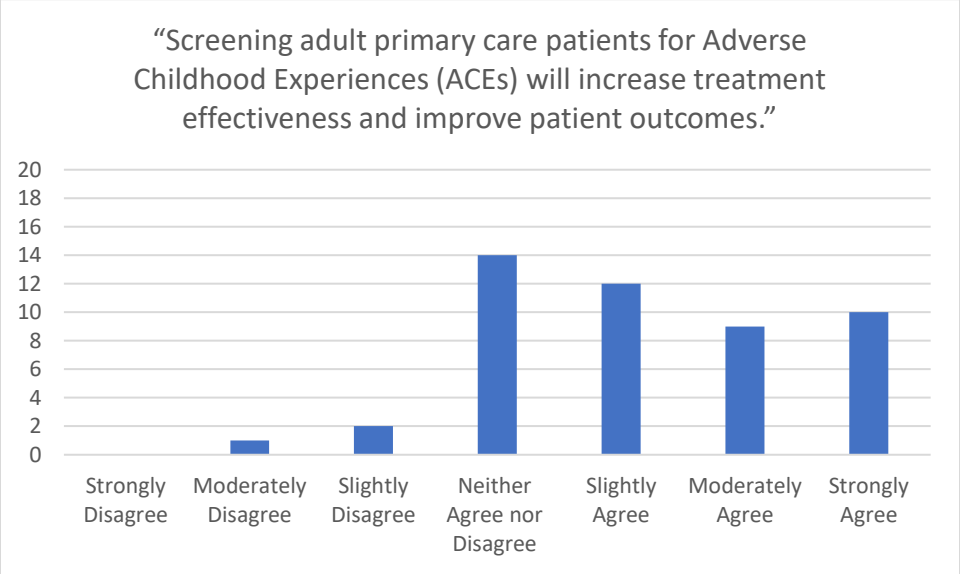
Providers' Perceived Feasibility of Completing ACEs Screening



Note. Median = Moderately Disagree.

Figure 5

Providers' Perceived Clinical Utility of ACEs Screening



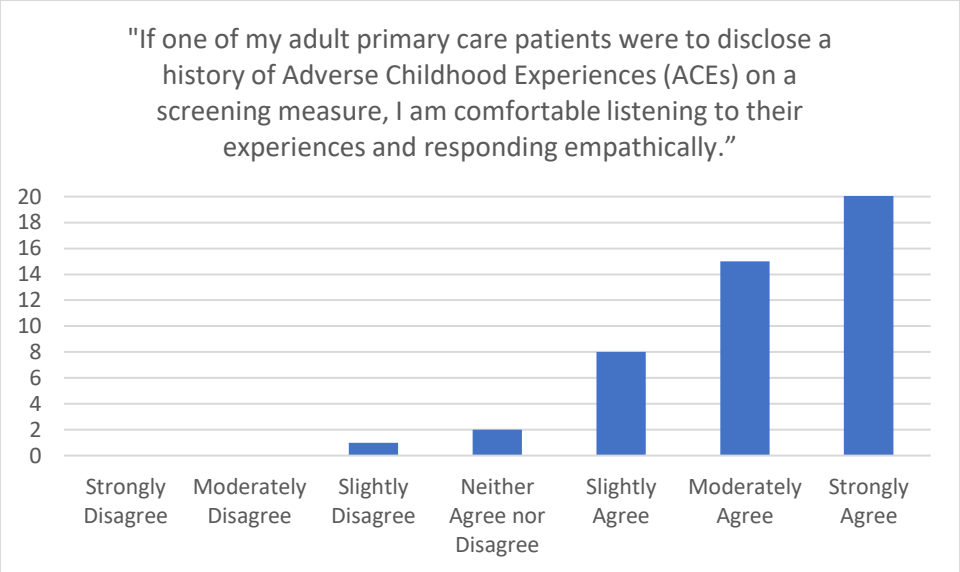
Note. Median = Slightly Agree.

In addition to the survey items discussed above, four additional survey items were included in Part 1 of the Pre-Study Survey to better understand providers' barriers to ACEs screening. On these additional survey items, providers' responses predominantly reflected barriers related to low screening confidence and low perceived screening utility. For instance, 27 respondents (56%) indicated that they "disagree" with feeling confident about their ability to implement appropriate intervention strategies based on a patient's elevated ACE score, 11 respondents (23%) indicated that they "neither agree nor disagree," and 10 respondents (21%) indicated that they "agree." Similarly, 22 respondents (46%) indicated that they "agree" that ACEs-related health concerns are resistant to intervention and cannot be effectively treated, 12 respondents (25%) indicated that they "neither agree nor disagree," and 14 respondents (29%) indicated that they "disagree."

Responses to additional survey items also suggested a degree of receptivity to ACEs screening. Forty-five respondents (94%) indicated that they "agree" with being comfortable listening and responding empathically to patients' reported ACEs, 2 respondents (4%) indicated that they "neither agree nor disagree," and only 1 respondent (2%) indicated that they "disagree." On an additional item related to perceived screening utility, 38 respondents (79%) indicated that they "agree" that ACEs screening should be completed with adult primary care patients (rather than solely with pediatric patients), 7 respondents (15%) indicated that they "neither agree nor disagree," and only 3 respondents (6%) indicated that they "disagree." Using an independent samples *t*-test, we found that respondents mean scores on these items did not significantly vary by provider type (e.g., faculty physicians [*n*=13], medical residents [*n*=31]). An overview of providers' responses to these questions is presented below in Figures 6 through 9.

Figure 6

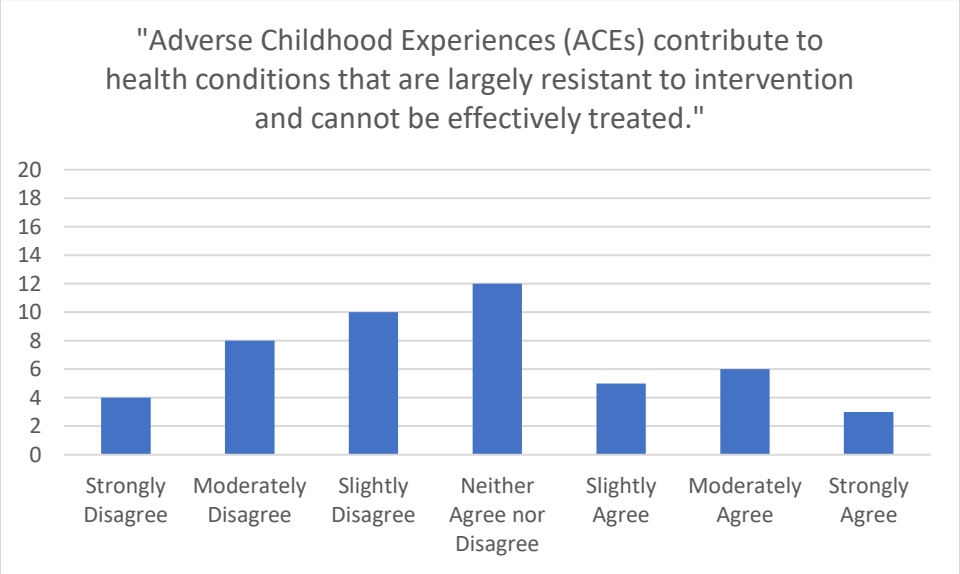
Providers' Self-Reported Comfort with Responding to Patient-Initiated Disclosures of ACEs



Note. Median = Moderately Agree

Figure 7

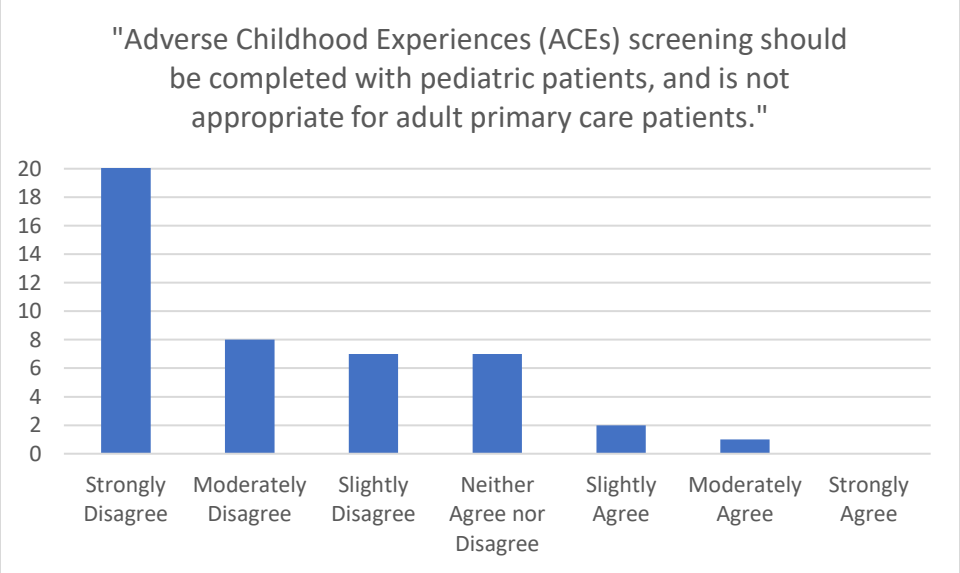
Providers' Perceptions of the Effectiveness of Treating ACEs



Note. Median = Neither Agree nor Disagree

Figure 8

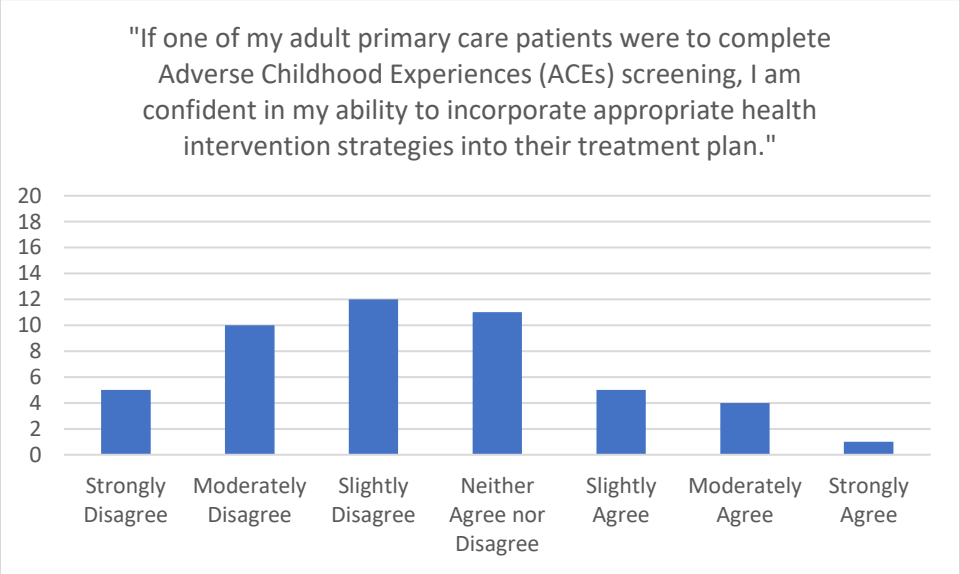
Providers' Perceptions of the Appropriateness of ACEs Screening with Adult Patients



Note. Median = Moderately Disagree

Figure 9

Providers' Confidence with Incorporating ACEs Screening Results into Treatment



Note. Median = Slightly Disagree

To summarize Part 1 results on the Pre-Study Survey, overall responses indicate that primary care providers at our university-affiliated family integrated primary care clinic perceive themselves as having knowledge of the negative influences of ACEs on patient health, agree with the appropriateness of completing ACEs screening with adult primary care patients, feel comfortable listening empathically to patients' reports of adverse childhood experiences, and agree that completing ACEs screening will improve treatment effectiveness and patient outcomes. In contrast, responses indicate that primary care providers are relatively less comfortable with initiating ACEs screening tasks (versus listening to patients' self-initiated disclosures of ACEs) and perceive that they do not have adequate time to complete screening during patient encounters. Responses also indicate that providers are not confident in their ability to effectively incorporate ACEs screening results into treatment planning and are uncertain about whether they will be able to effectively treat the health conditions of patients with an elevated

history of ACEs. We explore potential ways that future ACEs screening implementation research can address these barriers in our Discussion section.

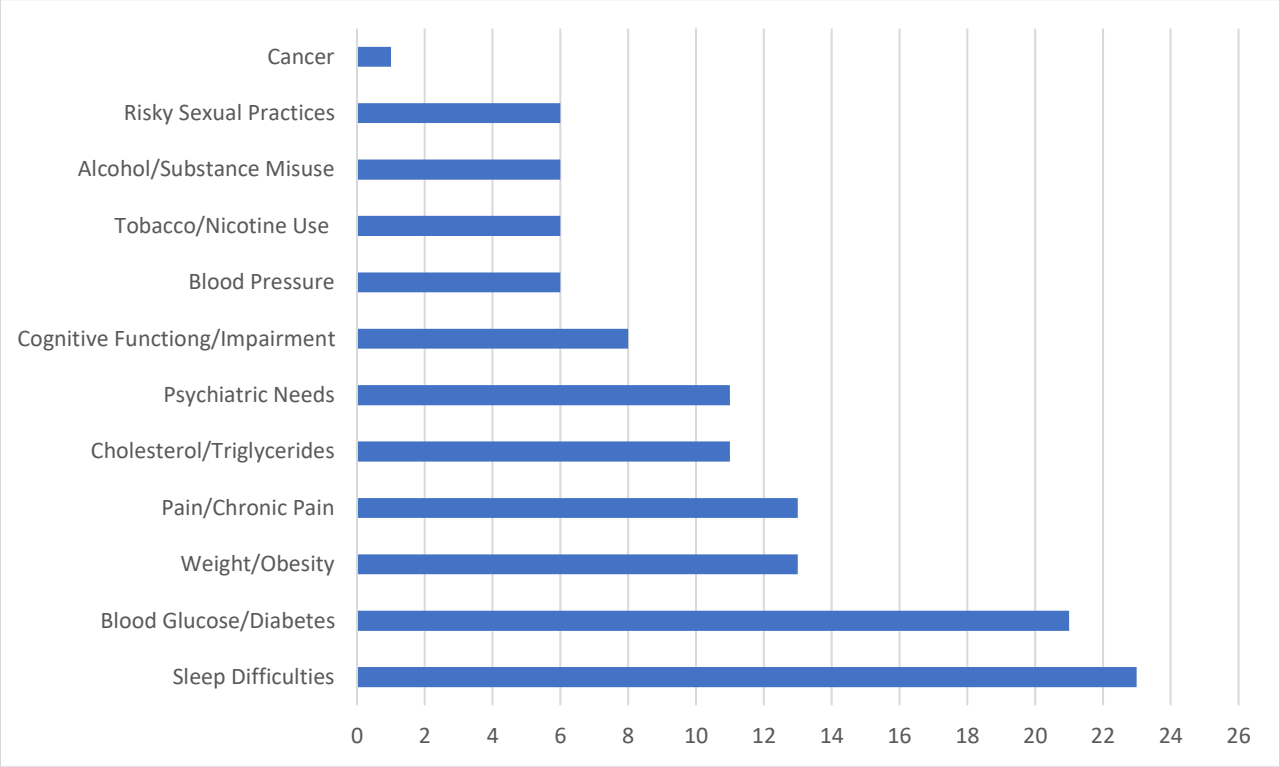
In Part 2 of the Pre-Study Survey, we assessed primary care providers' prior experiences with ACEs education over the previous 12-month period, as well as their clinical integration of ACEs screening and ACEs-related health interventions. Of the 48 providers that completed the Pre-Study Survey, 42 (88%) indicated that they had never attended an ACEs educational session (3 [6%] indicated they had attended an ACEs education session; 3 [6%] did not respond to this survey item); 42 (88%) indicated that they had never completed ACEs screening with a patient (5 [10%] indicated they had done so 1-5 times; 1 [2%] indicated they had done so 11-20 times); 39 (81%) indicated that they had never paged/referred to behavioral health due to a patient's ACE score (5 [10%] indicated they had done so 1-5 times; 2 [4%] indicated they had done so 6-10 times; 1 [2%] indicated they had done so 11-20 times; 1 [2%] indicated they had done so more than 20 times); 45 (94%) indicated that they had never initiated preventative care or early intervention based on a patient's ACE score (2 [4%] indicated they had done so 1-5 times; 1 [2%] indicated they had done so 6-10 times); and 46 (96%) indicated that they had never placed a referral to specialist care due to a patient's ACE score (2 [4%] indicated they had done so 1-5 times).

In Part 2 of the Pre-Study Survey, providers were asked about specific ways that they may have altered patient care or treatment planning due to a patient's ACE score over the previous 12-month period. Due to a patient's ACE score, 3 participants indicated they had increased screening/intervention efforts related to sleep difficulties (2 indicated they had done so 1-5 times; 1 indicated they had done so more than 20 times); 3 participants indicated they had increased screening/intervention efforts related to weight/obesity (2 indicated they had done so

1-5 times; 1 indicated they had done so 11-20 times); 3 participants indicated that they had increased screening/intervention efforts related to pain/chronic pain (2 indicated they had done so 1-5 times; 1 indicated they had done so 11-20 times); 3 participants indicated they had increased screening/intervention efforts related to cognitive impairment/decline (2 participants indicated they had done so 1-5 times; 1 participant indicated they had done so 6-10 times); 1 participant indicated they had increased screening/intervention efforts related to blood glucose/diabetes (the participant indicated they had done so more than 20 times); 1 participant indicated they had increased screening/intervention efforts related to cholesterol/triglycerides (the participant indicated they had done so 11-20 times); 1 participant indicated they had increased screening/intervention efforts related to psychiatric care (the participant indicated they had done so 11-20 times); 1 participant indicated they had increased screening/intervention efforts related to tobacco/nicotine use (the participant indicated they had done so 6-10 times); 1 participant indicated they had increased screening/intervention efforts related to alcohol/substance use (the participant indicated they had done so 6-10 times); 1 participant indicated they had increased screening/intervention efforts related to risky sexual behaviors (the participant indicated they had done so 6-10 times); 1 participant indicated they had increased screening/intervention efforts related to blood pressure (the participant indicated they had done so 6-10 times); and 1 participant indicated they had increased screening/intervention efforts related to cancer (the participant indicated they had done so 1-5 times). An overview of providers' responses to these questions is presented below in Figure 10.

Figure 10

12-Month Prevalence of ACEs-Related Screening and Intervention Tasks



Note. Primary care providers were asked how many times within the past 12 months they had altered a patient's treatment plan (i.e., increased screening or intervention efforts) due to a patient's ACE score. They were given a set of response options (i.e., 0 times, 1-5 times, 6-10 times, 11-20 times, more than 20 times) for the list of health concerns in the above figure. The quantities used in the figure were derived by summing providers' responses (n = 48) using the lowest number from each response set (i.e., 0, 1, 6, 11, and 21, respectively).

To summarize Part 2 results on the Pre-Study Survey, the majority of respondents (88%) indicated that they had not attended an ACEs education session, or completed ACEs screening with their adult primary care patients, within the prior 12 months; an even greater majority of providers indicated that they had not initiated preventative or early intervention efforts (94%) or referred a patient to specialist care (96%) based on a patient's ACE score. Out of all screening,

prevention, and intervention efforts that were assessed, the greatest number providers (19%) reported that they had referred at least one patient to integrated behavioral health services due to a patient's ACE score. For providers who endorsed making changes to patient care or treatment planning (i.e., increased screening/intervention efforts) based on a patient's ACE score, respondents most frequently endorsed making treatment changes related to sleep difficulties and blood glucose/diabetes relative to the other categories of health concerns that were assessed; however, these responses were based on a small subset of providers.

Post-Study Survey

As discussed above in the Methods section, we did not have sufficient statistical power to complete our initial analysis plan for this aim (i.e., repeated measures, within-factor ANOVA). Despite persistent efforts to elicit providers' participation on the Post-Study Survey, only nine responses were obtained; after eliminating duplicate and incomplete responses, six responses were retained for analysis (n = 6), with a sample including four faculty physicians and two medical residents. Therefore, in lieu of statistical analysis, responses to the Post-Study Survey were analyzed for measures of central tendency and reviewed for qualitative trends. Study members acknowledge the notable limitations that this imposes on the interpretation of survey results.

Regarding Part 1 survey items, which assessed for provider's self-reported barriers to ACEs screening (i.e., low ACEs knowledge, low ACEs screening comfort, low perceived feasibility of ACEs screening, low perceived clinical utility of ACEs screening), responses appeared mostly unchanged relative to responses on the Pre-Study Survey. Consistent with responses to the Pre-Study Survey, most respondents agreed with statements that they were knowledgeable of ACEs and their impact on patients' health (*median* = moderately agree), that

ACEs screening should be completed with adult primary care patients (*median* = strongly agree), and that ACEs screening improves treatment effectiveness and patient outcomes (*median* = moderately agree). Also consistent with responses to the Pre-Study Survey, most respondents disagreed with statements about having sufficient time to briefly screen for and discuss ACEs with their adult primary care patients (*median* = slightly disagree). Once again, responses reflected uncertainty about whether ACEs-related health concerns can benefit from clinical intervention (*median* = neither agree nor disagree). Respondents also endorsed uncertainty about their comfort with initiating ACEs screening with their adult primary care patients (*median* = neither agree nor disagree), although they once again agreed with feeling comfortable listening and responding empathically to ACEs-related self-disclosures that were initiated by their patients (*median* = strongly agree).

While most Part 1 responses were consistent between the Pre- and Post-Study Surveys, we observed a difference in response trends for one of the eight survey items. Although many respondents on the Pre-Study Survey expressed uncertainty about their confidence with incorporating ACEs screening results into treatment planning (*median* = neither agree nor disagree), most respondents on the Post-Study Survey agreed with feeling confident in this area (*median* = moderately agree). However, this difference should be interpreted with caution due to the low response rate on the Post-Study Survey and the potential for responses to be influenced by respondents' self-selection bias (i.e., a higher response rate among providers with more knowledge of ACEs and trauma-informed care relative to other providers). A comparison of median survey item scores on the Pre- and Post-Study Surveys is presented in Table 2.

Table 2

Pre/Post Comparison of Providers' Self-Reported Barriers to ACEs Screening

Pre/Post Survey	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Question 8
Pre	Slightly Agree	Neither Agree nor Disagree	Neither Agree nor Disagree	Moderately Disagree	Moderately Disagree	Slightly Agree	Slightly Disagree	Moderately Agree
Post	Moderately Agree	Neither Agree nor Disagree	Slightly Disagree	Slightly Disagree	Strongly Disagree	Moderately Agree	Moderately Agree	Strongly Agree

Note. The table represents median responses to Part 1 items on the Pre-Study Survey (n = 48) and Post-Study Survey (n = 6).

Part 2 response trends on the Post-Study Survey were also largely unchanged from responses on the Pre-Study Survey. When assessed for their experiences with ACEs education over the previous 12 months, one respondent indicated that they had attended an ACEs education session, while four indicated that they had not; 1 response was missing. Regarding providers' clinical integration of ACEs-related information over the previous 12 months, four respondents indicated that they had never completed ACEs screening with a patient (one respondent indicated they had done so 1-5 times, one respondent indicated they had done so 6-10 times), five respondents indicated that they had never paged/referred to behavioral health due to a patient's ACE score (one respondent indicated they had done so 1-5 times), five respondents indicated that they had never initiated preventative care or early intervention based on a patient's ACE score (one indicated they had done so 6-10 times), and all six respondents indicated they had never placed a referral to specialist care due to a patient's ACE score.

Consistent with the format of the Pre-Study Survey, on Part 2 of the Post-Study Survey, participants were asked about specific ways in which they may have altered patient care due to a patient's ACE score over the previous 12-month period. Due to a patient's ACE score, 2

participants indicated they had increased screening/intervention efforts related to sleep difficulties 1-5 times; 2 participants indicated they had increased screening/intervention efforts related to weight/obesity 1-5 times; 2 participants indicated they had increased screening/intervention efforts related to psychiatric care 1-5 times, 1 participant indicated that they had increased screening/intervention efforts related to pain/chronic pain 1-5 times; 1 participant indicated they had increased screening/intervention efforts related to cognitive impairment/decline 1-5 times; 1 participant indicated they had increased screening/intervention efforts related to blood glucose/diabetes 1-5 times; 1 participant indicated they had increased screening/intervention efforts related to alcohol/substance use 1-5 times; 1 participant indicated they had increased screening/intervention efforts related to tobacco/nicotine use 1-5 times; and 1 participant indicated they had increased screening/intervention efforts related to environmental risk/domestic violence 1-5 times. All six respondents denied increasing screening/intervention efforts for blood pressure, cholesterol/triglycerides, cancer, and risky sexual behaviors.

Despite low participation on the Post-Study Survey, a few trends were observed upon review and comparison of provider responses. On Part 2 of the Post-Study Survey, the one participant that indicated they had attended an ACEs education session at ECUFM within the past 12 months was a faculty physician who also endorsed the highest frequency of ACEs screening completion (6-10 times), the highest frequency of referring a patient to behavioral health services due to an elevated ACE score (1-5 times), the highest frequency of utilizing ACEs screening to initiate prevention/early intervention strategies (6-10 times), and the highest frequency of implementing screening/intervention efforts across various health conditions (7 health conditions, 1-5 times, respectively).

When looking at this participant's responses to survey items related to ACEs screening barriers, relative to other providers' responses, this participant endorsed the highest knowledge of ACEs (Question 1), the highest comfort with initiating ACEs screening (Question 2), the highest comfort with listening and responding to patient-initiated discussion of ACEs (Question 8), and the highest confidence with incorporating appropriate health intervention strategies into patients' treatment plans based on ACEs screening results (Question 7). However, this participant's responses also reflected perceived barriers of not having sufficient time to complete screening (Question 4), uncertainty about the appropriateness of ACEs screening with adult versus pediatric patients (Question 5), and uncertainty about the effectiveness of ACEs-related health interventions on patient outcomes (Question 3, Question 6). Taken together, this may suggest that certain provider characteristics (e.g., knowledge of ACEs, comfort with completing ACEs screening, confidence with implementing appropriate ACEs-related health intervention strategies) may help to offset the influence of other perceived barriers to ACEs screening (e.g., time constraints, perceptions that ACEs-related health concerns will not benefit from medical intervention). We explore this idea further in the Discussion section.

Pre/Post-Education Surveys

Our third aim was to evaluate the effectiveness of didactic ACEs education sessions on reducing primary care providers' barriers to ACEs screening with adult primary care patients. The Pre- and Post-Education Surveys were administered before and after each of the three ACEs education sessions throughout the course of our 12-month study period.

We obtained 26 valid responses to the Pre-Education Survey throughout the three ACEs education sessions that were completed over the course of our intervention (one completed on 09/23/2021 by a physician extender; 22 completed on 11/04/2021 by medical residents; three

completed on 03/08/2022 by physician extenders). In comparison, we obtained only three valid responses to the Post-Education Survey following each of the three ACEs education sessions (one completed on 09/24/2021 by a physician extender; two completed on 12/16/2021 by medical residents). Due to the low response rate on the Post-Education Survey and insufficient statistical power to complete planned analysis (i.e., paired *t*-tests to analyze changes in survey item mean scores), an alternative analysis plan was utilized to better understand potential data trends for both individual survey items and overall endorsement of ACEs screening barriers.

As detailed above in our Methods section, the Pre/Post-Education Surveys of three respondents were matched using their unique identification codes. Following this alternative analysis method, we observed an increase in Total Scores for all three of the matched responses on the Pre- and Post-Education Surveys, suggesting an overall decrease in providers' self-reported barriers to ACEs screening between Time 1 and Time 2. Each of the three providers' responses increased – from 35/56 to 39/56 (832July), 30/56 to 37/56 (807August), and 55/56 to 56/56 (124December), respectively. Regarding individual survey items, providers' responses indicated a change in various barriers to ACEs screening between Time 1 and Time 2. On the Post-Education Survey, we observed the greatest decrease in ACEs screening barriers for Question 1 (807August), Question 2 (807August), and Question 7 (832July). An overview of providers' responses is presented below in Table 3.

Table 3

Providers' Matched Responses to Pre- and Post-Education Surveys

Participant	Pre/Post Survey	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Total Score
832Jul	Pre	7	5	1	1	1	7	1*	6	35/56
	Post	6	5	1	3	1	6	6*	5	39/56
807Aug	Pre	1*	1*	4	2	7	4	4	7	30/56
	Post	5*	7*	2	1	6	6	3	7	36/56
124Dec	Pre	7	7	7	7	7	7	6	7	55/56
	Post	7	7	7	7	7	7	7	7	56/56

[a]Question 3 and Question 5 are reverse scored.

*Notable changes between pre and post periods

Qualitative Feedback

Although we did not initially plan to complete qualitative analysis of provider feedback gathered during ACEs education sessions, and primarily sought to use provider feedback to inform study materials and processes, we present the results of a brief thematic analysis of provider feedback. As discussed in our analysis plan for key informant interviews with behavioral health consultants, we applied qualitative analysis principles discussed by Saunders and colleagues (2018) regarding the *a priori* selection of relevant themes (i.e., providers' self-reported barriers to ACEs screening) with the goal of reaching saturation through a deductive, rather than inductive, analysis approach.

As noted above in the Methods section, due to time constraints at each ACEs education session, items from the Qualitative Feedback Questionnaire were not comprehensively discussed with primary care providers in attendance. Instead, general provider feedback was gathered at each of the three didactic ACEs education sessions over the course of our 12-month study period. Our thematic analysis predominantly focuses on feedback from medical residents at the second ACEs education session.

At the conclusion of the second ACEs education session, medical residents endorsed various concerns about completing routine ACEs screening with adult primary care patients. Consistent with these *a priori* themes, provider feedback included concerns that initiating ACEs screening could contribute to patient discomfort and potential re-traumatization, concerns about the lack of clinical utility of ACEs screening (e.g., "all of my patients will screen positive"), concerns about clinic workflow (e.g., whether to screen before, during, or after patient encounters; when to review screening results with patients), and concerns about the burden of universal screening (e.g., disagreement with completing ACEs screening at all Establish Care visits). Additionally, due to heightened ongoing patient-care demands related to the COVID-19 pandemic at the time of this ACEs education session (11/04/2021), providers voiced a higher prevalence of work-related exhaustion/burnout, and a reduced capacity to take on the added requirements of ACEs screening.

In comparison, the feedback gathered from physician extenders at the first and third ACEs education sessions generally represented a receptivity to the need for ACEs screening and subsequent clinical interventions. For example, physician extenders at the third ACEs education session requested access to screening materials (i.e., provider screening scripts, ACEs screening tools) and endorsed interest in the implementation of an Epic SmartPhrase to facilitate ACEs screening and documentation. We speculate that this trend may reflect a higher perceived importance of ACEs screening among physician extenders (e.g., nurse practitioners, physician assistants) compared to physicians. However, differences may also reflect the much smaller group sizes observed at education sessions with physician extenders (first ACEs education session: 1 attendee; third ACEs education session: 3 attendees) versus our education sessions with medical residents (second ACEs education session: 22 attendees). Further, we speculate that

differences in the training curricula of physicians and physician extenders could potentially contribute to varying degrees of receptivity to ACEs screening in primary care. Future ACEs screening implementation research may wish to evaluate these trends.

Key Informant Interview Questionnaire

Our fourth and final aim was to evaluate behavioral health consultant (BHC) attitudes about the use of adult primary care patients' ACE scores as a referral source to integrated behavioral health services. Due to the various competing demands of study tasks, and given our intervention focus of reducing primary care providers' barriers to ACEs screening implementation, we did not complete proposed key informant interviews with behavioral health consultants (BHCs) and related thematic analysis.

We initially planned to select two to four key informants from the group of behavioral health consultants at our integrated primary care clinic to evaluate their experiences with patients who had been referred to behavioral health services following a positive ACEs screening result. However, due to the absence of observed ACEs screening at Establish Care visits during chart reviews, we determined that there was likely an insufficient number of ACEs-related referrals to meaningfully evaluate the utility of using ACEs screening as a referral source to integrated behavioral health services. Within our QI framework of influencing provider and organizational changes throughout successive PDSA cycles, we propose that the incorporation of behavioral health consultant feedback would likely be more important during subsequent PDSA cycles, although this extends beyond the timeline for the present study. However, the proposed use of thematic analysis for key informant interviews (described above in the Methods section) was incorporated into the qualitative analysis of feedback received from providers at didactic ACEs education sessions.

Discussion

The implementation of adverse childhood experiences (ACEs) screening in healthcare settings is a complex issue that requires a deep understanding of various intersecting patient, provider, and organizational factors. Simply put, if ACEs screening cannot be completed in a way that improves patients' quality of care and subsequent health outcomes, it should not be completed at all. However, given the extensive known impact of ACEs on patient health and well-being (Felitti et al., 1998), chronic disease development (Sonu et al., 2019; Campbell et al., 2016) and mortality (Brown et al., 2009), we contend that efforts must be made to effectively implement ACEs screening.

The authors of the present study align with a trauma-informed primary care (TIPC) framework, which emphasizes the need for trauma screening and recognition to facilitate appropriate patient care and treatment planning while fostering patient-centeredness, safety, and trust (Roberts et al., 2019). Combined with a population health framework, we contend that trauma-informed care practices should prioritize the identification of patients with the highest degrees of risk so that prevention and intervention strategies can be employed to mitigate those risks.

Contributions of the Present Study

In the present study we describe our intervention efforts to reduce primary care providers' barriers to ACEs screening (i.e., low ACEs knowledge, low ACEs screening comfort, low perceived feasibility of ACEs screening, low perceived clinical utility of ACEs screening), while addressing other potentially significant environmental/organizational factors that may contribute to providers' overall receptivity to and implementation of ACEs screening (e.g., high-volume patient caseloads, use of electronic health record templates to facilitate screening and

documentation). Future studies of ACEs and trauma screening implementation would likely benefit from similar efforts to address these barriers.

Although our study was completed within a Primary Care Behavioral Health (PCBH) model, with an emphasis on using behavioral health consultants in an integrated primary care setting for the purposes of healthcare provider education and training, we propose that our methods could be replicated by a variety of healthcare professionals and in a variety of healthcare settings. In fact, the present study was largely based on a study of ACEs education, training, and screening implementation completed with nurse practitioners in the primary care setting (Kalmakis et al., 2017). Nonetheless, we propose that the use of behavioral health professionals in a PCBH model may provide ideal opportunities for the ongoing education and training efforts that are required to accomplish sustained of trauma-informed care practices such as ACEs screening. Relative to other providers, behavioral health consultants can quickly respond to mental health concerns that may be identified through ACEs screening while eliminating the need for external referrals. Although we ultimately did not complete our aim of evaluating the use of ACEs screening as a basis for referrals to behavioral health services in the current study, we believe that future implementation studies would benefit from evaluating this approach.

The results of the present study build on previous research of barriers to ACEs and trauma screening in the primary care setting, while identifying additional trends that can inform future trauma-informed care implementation. In a previous study, Kalmakis and colleagues (2017) found that provider knowledge, time, and comfort level were leading barriers to ACEs screening in primary care. In prior research on childhood physical and sexual abuse screening, primary care providers reported barriers such as the limited ability to provide counsel to patients,

as well as unclear abuse screening recommendations in primary care (Weinreb et al., 2010). Consistent with these findings, primary care providers in the present study commonly endorsed time-constraints as a central barrier to ACEs screening with their patients. We consider this consistency to reflect structural barriers in the primary care setting, such that primary care providers experience multiple competing demands during their brief and often infrequent clinical encounters with patients. Therefore, future efforts related to ACEs screening implementation should make every effort to increase screening feasibility issues, which we explore below at length.

Despite barriers related to time constraints and ACEs screening feasibility, our results indicate that primary care providers consider ACEs screening to be appropriate with adult primary care patients. Seventy-three percent of providers "disagreed" with the notion that ACEs screening was not appropriate for adult primary care patients and should only be completed with pediatric patients; only 6% "agreed" with this statement, and 21% indicated they "neither agree nor disagree" (n = 48). This finding has significant implications for future ACEs screening implementation research, as previous clinical applications of ACEs screening have predominantly focused on pediatric patient populations. This may also suggest that primary care providers are receptive to ACEs screening efforts with adult primary care patients so long as other screening barriers are effectively addressed, such as time constraints and providers' discomfort completing ACEs screening with their patients.

The results of our Pre/Post-Study Surveys also highlight a potentially significant nuance to primary providers' level of comfort with ACEs screening. Interestingly, the providers in our study reported high levels of comfort responding to patients' self-initiated reports of adverse childhood experiences. In comparison, providers' responses indicated overall discomfort with

initiating conversations about ACEs through more proactive completion of ACEs screening. When combining this information with the feedback received from providers during didactic ACEs education sessions, we postulate that discomfort with initiating ACEs screening is likely related to providers' concerns about making their patients uncomfortable by asking them to disclose sensitive personal information about their ACEs and trauma histories. Moreover, providers endorsed fears of potentially causing re-traumatization in their patients by asking them about past distressing experiences. This concern about ACEs/trauma screening causing potential harm and reinforcing stigma appears to be a barrier highlighted in various places in the ACEs/trauma literature (Finkelhor, 2018; Wallace et al., 2021). Therefore, future ACEs/trauma screening implementation studies should utilize education and training interventions that effectively address this area of discomfort for healthcare providers. We consider this topic to be a key barrier to the uptake of ACEs and trauma screening in healthcare settings and review the current evidence for patient's receptivity to such screenings more comprehensively below.

Findings from the present study support the continued use of didactic education with healthcare providers in future studies of trauma-informed care implementation. However, our results should be interpreted with caution and are based on individual analysis of the matched responses of three providers, as our low response rate on the Post-Education Surveys did not allow for sufficient pre/post analysis of providers' screening barriers. Nonetheless, preliminary results on our Pre/Post-Education Surveys suggest that didactic ACEs education sessions are helpful for reducing primary care providers' overall barriers to completing routine ACEs screening with their adult patients. We contribute to the low number of ACEs implementation studies that have examined the influence of education and training on reductions in screening barriers for primary care providers (Shamaskin-Garroway et al., 2020; Kalmakis et al., 2017;

Glowa et al., 2016). Future studies should expand on these findings through additional evaluation of healthcare providers' barriers to ACEs screening following education and training interventions.

Concerning our Pre/Post-Education Surveys, preliminary results also suggest that didactic ACEs education interventions may be more likely to increase primary care providers' knowledge of ACEs and comfort with ACEs screening, while barriers related to screening feasibility and utility may be less likely to change. While the results of our Pre/Post-Education Surveys demonstrated increases in providers' ACEs knowledge and screening comfort, we observed relatively less changes in providers' responses on survey items related to ACEs screening feasibility (e.g., perceptions of having insufficient time to complete ACEs screening during patient encounters) and screening utility (e.g., perceptions that ACEs-related health concerns will not benefit from clinical intervention). This trend may have important implications for future studies of ACEs and trauma screening implementation. For instance, the authors of past ACEs screening implementation studies have seemingly attempted to argue that ACEs screening is feasible by highlighting the average time length of screening during patient encounters (Kalmakis et al., 2018; Glowa et al., 2016); however, since time constraints are an inherent part of primary care visits, it is unclear whether such efforts will effectively facilitate increases in ACEs screening.

Upon consideration of this trend, we offer the explanation that the barriers of low ACEs knowledge and low ACEs screening comfort may be more reflective of provider characteristics, while barriers of low ACEs screening feasibility and utility are more reflective of organizational and patient characteristics, respectively. Stated differently, providers may have greater perceived control over their ability to increase their ACEs knowledge and screening comfort through

education and training efforts; in contrast, providers may have less perceived control over changes in environmental/organizational factors (e.g., number of patients seen per day, length of time spent with patients) and patient factors (e.g., treatment adherence, initiating and maintaining lifestyle changes). Although time constraints have been consistently reported as a central barrier to primary care providers' completion of routine ACEs screening (Kalmakis et al., 2017; Weinreb et al., 2010), future ACEs screening implementation studies may want to focus relatively greater attention on interventions that increase providers' knowledge of ACEs, comfort with ACEs screening, and confidence with implementing ACEs-related health prevention and intervention practices.

To further support this perspective, we refer to our evaluation of within-provider response trends on the Post-Study Survey. Namely, we highlight that the provider who reported the highest number of completed ACEs screenings and the highest number of ACEs-related health prevention/intervention strategies over our 12-month study period concurrently endorsed low feasibility and low clinical utility of ACEs screening. For instance, this provider indicated that they "slightly disagree" with having sufficient time to complete ACEs screening, and that they "strongly agree" that ACEs-related health concerns are resistant to clinical intervention and unable to be effectively treated; however, this provider "strongly agreed" with being knowledgeable of ACEs, being comfortable completing ACEs screening, and being confident in their ability to implement necessary prevention/intervention strategies based on a patient's ACEs screening result – this provider endorsed the highest scores on each of these latter three items compared to other respondents.

Therefore, we suggest that primary care providers' self-reported knowledge of ACEs, comfort with completing ACEs screening, and confidence with implementing ACEs-related

health interventions may help to offset barriers related to low perceived screening feasibility and utility. Given the persistent challenge of time constraints during primary care patient encounters, we contend that provider's perceptions of low ACEs screening feasibility are unlikely to change. Although these findings are based on the observation of qualitative trends in our study and should be interpreted cautiously, future ACEs screening implementation research and QI efforts may find value in exploring these concepts further.

The results of the present study also contribute to a small and developing literature regarding ACEs-related health interventions. On the Pre/Post-Study Surveys, 19% of primary care providers indicated that they had referred an adult patient to integrated behavioral health services within the past year due to the patient's ACEs history. Primary care providers in our clinic endorsed that they most frequently implemented prevention and intervention efforts due to a patient's ACE score for health concerns including sleep difficulties, blood glucose/diabetes, weight/obesity, and pain/chronic pain. To a lesser degree, providers also endorsed the use of a patient's ACE score to implement prevention and intervention efforts related to cholesterol/triglycerides, psychiatric needs, cognitive functioning/impairment, blood pressure, tobacco/nicotine use, alcohol/substance misuse, risky sexual practices, and cancer. To our knowledge, this is the first study to evaluate healthcare providers' utilization of patients' ACE scores to inform clinical decision-making.

Given the disproportionately high rates of chronic disease prevalence among younger and older adults with an elevated history of ACEs (Sonu et al., 2019), we suggest that healthcare providers may find value in using positive ACEs screenings to target behavioral risk factors to slow or prevent chronic disease development. Based on the results noted above, it appears that providers may already be doing this by addressing factors like psychiatric concerns, sleep,

weight, pain, and blood glucose, cholesterol, and blood pressure, among others. Further research is sorely needed to understand the various ways in which primary providers can incorporate patients' ACE scores into treatment decisions, and we discuss this below to a greater extent.

To effectively and appropriately increase ACEs screening in healthcare settings, future interventions will likely require consistent and prolonged efforts dedicated to provider education and training while concurrently addressing relevant environmental/organizational barriers. Due to time constraints and various methodological shortcomings of the present study, we subsequently discuss these challenges through an extended literature review to identify relevant recommendations for future ACEs and trauma screening implementation research and QI efforts. Our review focuses predominantly on the implementation science literature with a focus on trauma-informed primary care.

Implementation Science: Trauma-Informed Primary Care

The primary goal of implementation research is to effectively reduce the research-implementation gap, which is generally defined as the years-long delay in the clinical implementation of research findings. In 2006, the National Institute of Health established the Clinical and Translational Science Award (CTSA) program to encourage the increase in biomedical and behavioral research with a focus on the implementation of evidence-based interventions into clinical practice (Liverman et al., 2013).

Due to the inherent need for healthcare provider uptake of relevant implementation goals, Michie et al. (2011) created a framework known as the "behaviour change wheel," whereby the authors identify nine intervention functions used to influence healthcare provider behavior changes: education, persuasion, incentivization, coercion, training, restriction, environmental restructuring, modeling, and enablement. Upon reflection of intervention strategies utilized in the

present study, we predominantly focused on education (e.g., ACEs education sessions), training/modeling (e.g., providing ACEs screening materials and scripts), and enablement (e.g., increasing access to screening materials and scripts, SmartPhrase implementation). However, future studies could potentially strengthen implementation interventions through utilization of other/additional intervention functions.

The primary care setting has been identified as a particularly relevant target for implementation research, as 91% of studies looking at provider-focused behavior change interventions were found to take place in family medicine (Chauhan et al., 2017). Using the framework of the "behaviour change wheel" (Michie et al., 2011), and based on their analysis of 138 systematic reviews dealing with provider-focused behavior changes, Chauhan and colleagues (2017) explored intervention strategies with the greatest effectiveness in the extant literature. Overall, the authors identify education, training, and enablement strategies as having the greatest literature support for influencing effective provider behavior changes. More specifically, they highlight the benefits of multifaceted and interactive continuous education programs, training with audit and feedback, and clinical decision support systems (e.g., use of electronic health records) for improving knowledge, optimizing screening rates, enhancing patient outcomes, and reducing adverse events. The authors also note that environmental restructuring strategies aimed to enhance collaboration within interdisciplinary teams (e.g., physicians, nurses, pharmacists) have demonstrated effectiveness on increasing physicians' adherence to practice guidelines. They report mixed benefits from studies in which providers received direct feedback from patients regarding provider practice changes.

When looking more specifically at trauma-informed care implementation across healthcare settings, additional characteristics of effective organizational interventions have been

identified. In a recent systematic review of trauma-informed care implementation studies, Huo et al. (2023) found that implementation efforts were most successful when including interagency collaboration when outside resources/referrals were necessary, obtaining staff and leadership buy-in, aligning implementation strategies with existing policies and procedures, allocating adequate human and financial resources, allowing flexibility in organizational policies and procedures, providing ongoing and tailored training, allowing for participatory co-design of procedures, and completing ongoing collection and monitoring of data.

While many of these factors were included in the current study (e.g., encouraging referrals to behavioral health when indicated on screening, eliciting provider feedback during education sessions, eliciting provider feedback on screening materials, monitoring screening data throughout intervention), we attribute many of our shortcomings to certain underdeveloped areas. Examples of this include the lack of buy-in from faculty physicians and clinic leadership, lack of continuous education and training with primary care providers, initial lack of flexibility in ACEs screening recommendations, and lack of clear alignment with organizational goals. Below, we provide a thorough evaluation of the key shortcomings of the present study and explore ways in which future research on ACEs and trauma screening implementation can address these challenges.

Shortcomings of the Present Study and Recommendations for Future Directions

Unclear Recommendations for ACEs and Trauma Screening

The current literature on ACEs and trauma screening implantation does not provide conclusive evidence of the potential benefits or appropriateness of completing ACEs/trauma screening in healthcare settings. In the present study, this screening barrier was reflected most clearly in the qualitative feedback given by family medicine residents, which highlighted

providers' concerns about causing patient discomfort and re-traumatization through ACEs screening. While we ultimately support a trauma-informed primary care (TIPC) framework, it is important to acknowledge that not all healthcare patients will be receptive to ACEs/trauma screening efforts. However, we argue that this should not justify the rejection of such screening in healthcare settings but motivate the development of appropriate screening practices.

Evidence within the ACEs literature demonstrates that patients endorse overall receptivity to ACEs screening in women's health (Flanagan et al., 2018) and adult primary care (Goldstein et al., 2017) settings, with 83% and 88% of patients agreeing to complete screening, respectively. Concerning pediatric patients during well-child visits, 81% of parents/guardians reported feeling comfortable after having an ACEs conversation with their primary care provider, during which ACEs history was informally assessed (Bodendorfer et al., 2020). Although most patients agree to complete screening measures of social risk factors, notable subsets of patients continue to endorse concerns related to privacy and stigmatization (Wallace et al., 2021).

Variability in patients' receptivity to ACEs/trauma screening is likely influenced by multiple factors, including the number of screening items, the timing of screening, the perceived applicability of screening on patients' treatment, and the degree of trust and rapport with healthcare providers and institutions. These factors are highly nuanced and based on various patient, provider, and organizational factors, which likely contributes to the lack of evidence-based screening recommendations in the extant literature. While some would conclude that ACEs and trauma screenings should not be administered in healthcare settings (Finkelhor, 2019), we suggest that screening efforts should take place in alignment with trauma-informed care principles by optimizing patient comfort (e.g., normalizing ACEs/trauma screening as routine),

autonomy (e.g., describing ACEs/trauma screening as optional), and privacy (e.g., asking patients to provide their overall ACE score rather than endorsing individual items on an ACEs questionnaire). In addition to these recommendations, primary care providers in the present study were also encouraged to introduce ACEs screening to their patients by acknowledging that ACEs have important influences on both physical and mental health conditions across the lifespan – the authors view this explanation to be another important way to increase patients' comfort with screening efforts by validating the clinical benefits of ACEs and trauma screening.

Taken together, overall adherence to trauma-informed care principles and practices should help to alleviate providers' discomfort with initiating ACEs and trauma screening. Nonetheless, additional efforts to implement education (e.g., discussing the prevalence rates of ACEs, trauma exposure, and PTSD), screening tools (e.g., screening measures, screening scripts, electronic screening templates), and training (e.g., practice administering screening measures and discussing results with patients) will likely play a vital role in reducing screening barriers and increasing healthcare providers' receptivity towards initiating screening with their patients. Of note, Kalmakis and colleagues (2018) found that nurse practitioner students who received trauma-informed care education gained confidence with ACEs screening administration after only two patient interviews. Therefore, we believe that continued screening implementation research and QI efforts will play an essential role in preparing healthcare providers to comfortably and effectively screen for ACEs and trauma history, while minimizing the potential for patient discomfort and harm.

Low Survey Participation Rates among Primary Care Providers

One of the greatest limitations of the present study included our difficulties with obtaining Post-Study Survey participation. Although responses to our Pre-Study Survey

demonstrated a participation rate of approximately 64% among the primary care providers in our clinic, Post-Study Survey participation was approximately 8%. Upon further evaluation of our survey distribution methods, we obtained the highest participation rate when printed copies of the Pre-Study Survey were administered to medical residents during a regularly scheduled academic timeslot. In contrast, repeated efforts to obtain survey participation via email requests yielded a much lower participation rate, and ultimately did not provide adequate statistical power to complete planned analyses of Pre/Post-Study Survey mean item scores.

In a similarly designed study, Jyung and colleagues (2021) used a pre/post-test design to assess for changes in family medicine medical residents' knowledge and attitudes of integrative medicine (i.e., herbal and dietary supplements) following an educational intervention (i.e., 40-minute PowerPoint teaching during regularly scheduled didactics). The authors experienced similar challenges as the present study and attributed their loss to follow up to the high clinical demands of their resident participants – although 32 medical residents completed the baseline survey and educational intervention, only 18 attended a subsequent didactic session when the post-intervention survey was administered. The authors suggest the use of creative data collection strategies to improve participation, such as placing a mailbox in the resident workspace to reduce barriers to survey completion and submission. The effectiveness of a given data collection approach likely varies for each respective organizational setting, department, discipline of medicine, and so on; therefore, utilization of multiple data collection approaches will likely help to achieve optimal participation. Given the frequency of providers' reported discomfort with ACEs screening (Kalmakis et al., 2017), future research should also consider the ways that this could potentially interfere with primary care providers' survey participation.

Time Delays Related to Data Monitoring

Another prominent limitation of this study involved our challenges with the timely implementation of successive Plan-Do-Study-Act (PDSA) cycles. Among these difficulties included the slow and ineffective completion of chart review data to identify monthly ACEs screening rates at initial patient visits. Midway through the current study, it became apparent that we needed more rapid access to ACEs screening data to better understand the frequency and extent of providers' screening efforts, as this information was needed to inform appropriate next steps. In retrospect, these delays likely could have been prevented through the initial implementation of a trackable Epic SmartPhrase rather than performing chart reviews of Establish Care visits – a method that is both time consuming and lacks sensitivity to other clinical encounters like follow up visits. If electronic health record templates had been initially utilized as the primary method for obtaining chart review data, this would have significantly reduced the length of time between data collection (i.e., provider documentation of patient encounters) and subsequent adjustments to intervention activities, which ultimately would have allowed for more PDSA cycles. On a broader level, we believe that this challenge of the present study has important implications on overall trends within implementation research.

Electronic health records have a wide-ranging utility for implementation research, and among those benefits are the use of customizable tools and templates. In recent years, the development of customizable electronic documentation templates (e.g., Epic SmartPhrase) has led to various innovations in clinical practice. When used strategically for purposes of quality improvement, such templates can provide quick access to clinical guidelines, and have been shown to increase adherence to best practices for blood pressure monitoring in primary care (Yabut et al., 2022) and opioid prescriptions for chronic pain (Vranian et al., 2022), among many others. In a study of trauma screening feasibility with pediatric primary care patients, medical

residents reported benefit from using EHR documentation templates to increase trauma screening frequency (Dueweke et al., 2019). Similarly, Blackstone and colleagues (2022) discuss the use of the health maintenance feature in EHR to provide clinical staff with reminders to complete depression screenings with primary care patients. Taken together, there are countless opportunities for using customizable electronic templates, tools, and alert systems in future implementation research and quality improvement efforts, with evidence to suggest that these methods can increase adherence to treatment guidelines, increase screening frequency, and facilitate documentation.

While there is widespread uptake of EHR tools and templates for clinical purposes, there appears to be a relative lack of application of these for research purposes. In the present study, we adopted the use of an Epic SmartPhrase for tracking primary care providers' documentation of ACEs screening. Regarding data collection and monitoring, this allows for rapid detection of completed screenings in comparison to a traditional retrospective chart review method. Although this method lacks sensitivity to instances of ACEs screening that are not documented with our SmartPhrase, it allows for rapid access to gross screening trends. In the present study, our access to SmartPhrase data was delayed beyond the course of our 12-month study period, and efforts to access this data are still ongoing. Therefore, while we recommend the use of EHR documentation templates for future ACEs and trauma screening implementation research, we caution about the need to confirm the functionality of data collection and monitoring systems prior to study implementation.

Inflexibility to Clinical Demands of Primary Care Providers

Another shortcoming of the present study included the initial inflexibility of our data collection and intervention methods to the clinical demands of the primary care setting. During

didactic education sessions in the earlier phases of our 12-month study period, we encouraged providers to complete routine ACEs screening during adult patients' Establish Care visits in our university-affiliated integrated primary care clinic. Based on feedback obtained from primary care providers during didactic ACEs education sessions, we determined that initial visits could be a difficult time to complete ACEs screening. More specifically, due to the high concentration of clinical topics reviewed at Establish Care visits (e.g., presenting concerns, personal medical and social histories, family medical history), there may be insufficient time to complete screening for ACEs or trauma history. Although some providers may find it beneficial to include ACEs/trauma screening information in the social history section of their clinical intake notes, many providers may prefer to complete these screening questions during subsequent patient encounters.

The eventual implementation of an Epic SmartPhrase for ACEs screening had multiple benefits for both clinic providers and our study members. As noted above, this gave providers access to a documentation template to make ACEs screening documentation more feasible, while also allowing for convenient access to ACEs screening guidelines. The SmartPhrase also enacted a system in which our study members could have streamlined access to ACEs screening data by running billing reports for instances in which the SmartPhrase was used, which eliminated the need for lengthier chart reviews of all Establish Care visits. Further, if providers used our SmartPhrase to document ACEs screening, this gave us access to screenings that took place during all patient encounter; these screenings would have otherwise been missed during chart reviews of Establish Care visits.

Regarding the need for flexibility to improve screening feasibility, we also acknowledge the potential benefit of an adjusted format for ACEs and trauma screening. Due to providers'

consistent reports of low screening feasibility, a briefer format for ACEs/trauma screening may improve providers' attitudes toward routine screening. Rather than administering an ACEs screening measure, Bodendorfer and colleagues (2020) examined the feasibility of having an ACEs conversation with parents/guardians during pediatric well-child visits, during which primary care providers informally assessed for ACEs survey items; the authors noted that 60% of the ACEs conversations took only one to two minutes. A two-item ACEs screening tool has also been developed and evaluated by using ACEs items of childhood emotional abuse and household problematic alcohol use (Wade Jr et al., 2017). The authors note that these two items were chosen due to being the most frequently endorsed items related to childhood abuse/neglect and household dysfunction, respectively, on a large public health survey. Given this brief measure's good sensitivity (99%) and convergent validity with an expanded ACEs measure, it may provide utility in healthcare settings. For instance, endorsement of one or both of these items may provide justification for more comprehensive ACEs or trauma screening.

Concerning alternative forms of trauma screening, Thombs and colleagues (2007) discuss their use of a brief two-item screening tool to detect the history of childhood physical and sexual abuse for patients at a large health maintenance organization ("When I was growing up, people in my family hit me so hard that it left me with bruises or marks," "When I was growing up, someone tried to touch me in a sexual way or tried to make me touch them."), and report that this method demonstrated good sensitivity (84.8%) and specificity (88.1%) to physical and sexual abuse history. Similar to the two-item ACEs screening measure above, use of a two-item childhood abuse screening tool excludes assessment of many other social risk factors. Nonetheless, responses to two-item screeners may provide a basis for expanded ACEs and

trauma assessment and facilitate referrals to appropriate clinical resources, such as behavioral health consultants within a PCBH model.

Regarding this abbreviated screening format, the expansion of depression screening in healthcare settings may also provide a helpful model for future ACEs/trauma screening implementation. For instance, the validation of a two-item depression screening tool for the primary care setting (Patient Health Questionnaire-2 [PHQ-2]) has seemingly reduced providers' barriers to depression screening, whereby positive screening responses can be followed by expanded assessment of depression symptomology to facilitate treatment planning (Kroenke et al., 2003). Despite these benefits, many barriers to universal PHQ-2 screening still exist, alluding to a need for further implementation research.

Similar to the methods of the current study, Blackstone and colleagues (2022) provide a helpful model of PHQ-2 screening implementation across five academic family medicine clinics through successive PDSA cycles over an 8-month period. The authors' quality improvement efforts focused on the assessment of perceived barriers to depression screening, education of providers and clinical staff about depression prevalence and implications for patient health, and the development of a standardized workflow to complete PHQ-2 screening – for instance, rooming staff identified if screening was due, administered the screener when appropriate, recorded screening results in EHR, and identified providers of positive screenings so they could initiate follow up discussion during patient encounters. The authors observed an increase in depression screening rates at all five of their family medicine clinics and noted a 22% overall increase in depression screening rates. As universal depression screening in primary care continues to become more widespread, this may create a useful model for the implementation of ACEs and trauma screening.

Taken together, allowing for more flexible timing and a briefer format of ACEs and trauma screening may reduce screening barriers and increase providers' screening frequency. Instead of advocating for universal ACEs screening during initial intake visits (as was done in the present study), primary care providers may endorse greater comfort with ACEs screening as they build rapport with patients over time. The feasibility of ACEs screening may also increase across multiple patient encounters. While providers will likely pushback against universal ACEs screening recommendations, they may find greater utility in completing brief universal trauma screening or screening for ACEs when they perceive it to be clinically indicated. Future ACEs and trauma screening implementation research should focus on gathering feedback from healthcare providers to better understand providers' preferences about the timing and format of screening.

Insufficient Education and Training with Primary Care Providers

Throughout the present study, our intervention plan inherently focused on a breadth (versus depth) of intervention topics and activities, which may have ultimately contributed to low ACEs screening uptake among primary care providers. For instance, we chose to complete ACEs education sessions with all primary care providers within our family medicine clinic instead of focusing on a specific category of provider (i.e., faculty physicians, medical residents, physician extenders). In hindsight, we identify the alternative approach – that is, using intervention methodologies that allow for a greater depth of education and training with a smaller subset of providers – as a potentially favorable alternative for future screening implementation studies.

While the present study was completed using a rapid-cycle quality improvement approach, alternative methodologies may have allowed for improved provider education and training, data collection, and evaluation of intervention methods. For instance, a pilot program

with a smaller number of providers may have allowed a better assessment of the effectiveness of our intervention while simultaneously focusing on a greater depth of training with a smaller subset of providers. Future ACEs screening implementation studies may want to initiate pilot programs by first eliciting providers who are interested in learning more about ACEs/trauma screening. Additionally, future implementation research could utilize a quasi-experimental design by targeting intervention tasks on a smaller subset of primary care providers at a given clinic. While our intervention broadly targeted all four modules at our family medicine clinic, a quasi-experimental design would have allowed us to evaluate providers' potential increases in ACEs screening frequency relative to other providers who had not participated in the ACEs education intervention. Both of these alternative strategies could likely be completed on a much shorter timeline compared to attempts to increase departmental ACEs screening, which was the approach of the present study.

Beyond these methodological advantages, there are also ethical advantages to completing ACEs education and training interventions with smaller groups of providers. Primary care providers in the present study and extant literature consistently express discomfort with initiating ACEs/trauma screening with their patients (Kalmakis et al., 2017; Weinreb et al., 2010). Without sufficient education and training, healthcare providers risk contributing to potential negative consequences of universal ACEs screening in healthcare settings, including patient discomfort and stigma, increased costs related to overtreatment and unnecessary referrals, and treatment interference due to a focus on past experiences instead of current symptomology (Finkelhor, 2018). Therefore, ACEs and trauma screening implementation should ideally be accompanied by adequate provider training, clear benefit to patients (e.g., validation of prior traumatic events, appropriate integration of screening results into treatment, connection to follow up resources),

and proper systems for reviewing screening results with patients to prevent erroneous disclosures of prior traumatic experiences (Ford et al., 2019). As noted above, implementation interventions that utilize multifaceted and interactive continuous education programs, training with audit and feedback, and clinical decision support systems demonstrate the strongest outcomes concerning targeted healthcare provider behavior changes (Chauhan et al., 2017). Taken together, future ACEs and trauma screening implementation studies that allow for more thorough education and training with healthcare providers will likely observe greater uptake of routine screening practices.

Lack of Clinical Guidelines for ACEs Screening and Related Interventions

A final shortcoming of the present study, and of the larger ACEs literature, is the lack of specific clinical guidelines for healthcare providers caring for adult patients with a history of ACEs. Numerous studies detail the dose-response relationship between ACE scores and subsequent chronic health conditions throughout the lifespan (Sonu et al., 2019; Campbell et al., 2016; Dube et al., 2010; Anda et al., 2008; Felitti et al., 1998). However, to our knowledge, there are no current peer-reviewed publications with recommendations to healthcare providers about using adult patients' ACE scores to inform treatment decisions, such as enhanced screenings for chronic health conditions and initiation of appropriate prevention and intervention strategies (e.g., medication/dosage changes, additional lab and imaging orders, referrals to specialist care). In a systematic review of ACEs-related health interventions for the primary care setting, Korotana and colleagues (2016) only identify psychotherapeutic treatment modalities (e.g., cognitive-behavioral therapy, mindfulness-based therapy, interpersonal therapy, expressive writing). Existing ACEs-related clinical resources recommend that healthcare providers educate patients about the likely influence of ACEs and toxic stress on their chronic health conditions,

and that providers encourage patients to engage in stress-mitigating activities related to sleep, exercise, nutrition, mindfulness, mental health, and healthy relationships (ACEs Aware, 2020).

This limitation poses a considerable barrier to ACE screening implementation efforts in healthcare settings. In the present study, qualitative feedback from primary care providers reflected concerns about the clinical utility of ACEs screening, with one attendee stating that "all my patients will screen positive." This information would suggest a high relevance of ACEs on the health of primary care patients, especially those in rural underserved clinical settings like that of the present study. Despite this clear need, providers seemingly perceive there to be a low clinical utility to ACEs screening. Even though our didactic education for primary care providers highlighted the relationship between ACEs and chronic disease prevalence, our education materials included limited information about appropriate clinical recommendations for primary care providers. Without clear guidelines about the use of patients' ACE scores for clinical decision-making, healthcare providers will likely continue to perceive screening efforts as having low clinical utility.

Given the lack of clinical guidelines associated with ACEs screening, future ACEs research must address this need. While not found in the research literature, a prominent ACEs advocacy organization describes the need for increased clinical assessment and treatment planning for chronic health conditions among adult patients with elevated ACEs (ACEs Aware, 2021). Relatedly, future implementation studies should evaluate the potential clinical utility of using patients' positive ACEs screening results to initiate screenings for specific physical and mental chronic health conditions (e.g., depression, anxiety, PTSD, diabetes, hypertension, dyslipidemia, obesity, pulmonary disease, autoimmune disease, cancer), as there is sufficient justification for enhanced screening practices. Further, the results of the present study

demonstrate that a small percentage of primary care providers in our clinic were already using adult patients' ACEs history to initiate early prevention/intervention efforts (6%) and refer patients to specialist care (4%). A substantially higher percentage of providers endorsed that they had used patients' ACEs history to make referrals to integrated behavioral health services within the past year (19%), which may have favorable implications on the continued use of ACEs screening in a Primary Care Behavioral Health (PCBH) model.

Beyond these recommendations, future ACEs screening implementation research may benefit from utilizing a population health framework, such that screening, prevention, and intervention efforts are directed at patients with the highest degree of risk and/or highest potential for benefit. Given the dose-response relationship between ACE scores and subsequent health conditions (Felitti et al., 1998), implementation studies should evaluate the potential benefits of initiating prevention/intervention efforts with patients who endorse the most elevated ACE scores upon screening in a respective clinical setting. Previous research suggests that ACE scores of six or higher are associated with premature mortality by 20 years (Brown et al., 2009), and this clinical cutoff score may provide more clinical utility in certain healthcare settings than the suggested clinical cutoff score of four (Alhowaymel et al., 2023; Felitti et al., 1998). Alternatively, implementation research may want to evaluate the potential benefits of health interventions that target emerging adult patient populations (i.e., ages 18-35 years), with the goal of preventing or delaying chronic disease onset. Among individuals with elevated ACE scores, Sonu and colleagues (2019) observed that higher chronic disease rates were already present in young adulthood (i.e., ages 18-34 years), and that these rates continued to increase throughout older adulthood relative to individuals with lower ACE scores.

Lastly, we suggest that future ACEs research seeks to longitudinally monitor clinical outcomes to facilitate improved ACEs-related clinical guidelines. Previous research has observed increased healthcare utilization among primary care patients with an elevated ACEs history (Kalmakis et al., 2018), and routine ACEs screening in healthcare settings may increase if implementation studies are able to model a reduction in healthcare utilization through effective ACEs screening, prevention, and intervention efforts. In addition to healthcare utilization, future ACEs research should also seek to use electronic health records to longitudinally monitor other important clinical metrics (e.g., hospitalization and readmission, age of chronic disease onset, number of disease comorbidities, Framingham Risk Score, mortality), as these steps are likely needed to improve ACEs-related clinical guidelines.

Conclusion

The current study helps to inform future efforts to implement adverse childhood experiences (ACEs) screening and other trauma-informed primary care efforts, and identifies various barriers related to provider and organizational uptake of screening practices. In the present study, survey responses from our sample of primary care providers reflected a perceived appropriateness of ACEs screening with adult primary care patients. They expressed greater comfort with listening and responding to patient-initiated disclosures of ACEs history rather than initiating ACEs screening themselves, and this trend appears to be related to providers' concerns that screening efforts will contribute to patient discomfort and potential re-traumatization. Accordingly, to augment provider-initiated ACEs and trauma screening, we emphasize the need for future quality improvement efforts and implementation research to address these concerns through education about patients' overall receptivity to such screenings across various healthcare settings.

In addition to addressing providers' attitudes about ACEs screening, we also acknowledge the importance of addressing environmental/organizational factors related to ACEs screening implementation. Due to primary care providers' consistent reports of time constraints and various competing demands during patient encounters, we suggest that brief and flexible screening recommendations (versus universal, longer-format screenings) may increase screening feasibility and clinical utility for providers. The utilization of electronic screening templates may also facilitate provider-initiated screening efforts, while allowing for rapid access to screening data for purposes of both quality improvement and implementation research. Implementation models of universal depression screening in the primary care setting may provide a helpful guide to future ACEs and trauma screening implementation efforts.

Preliminary findings from the present study suggest that didactic ACEs education interventions help to reduce providers' barriers to ACEs screening. We would expect reduced screening barriers to subsequently influence increased screening frequency, although we were not able to complete this analysis in the present study. Nonetheless, the implementation science literature broadly supports the effectiveness of continuous and interactive educational interventions, as well as provider training that allows for skills practice with feedback. More than one ACEs education session, such as follow up booster sessions, is likely needed to achieve sustained increases in ACEs/trauma screening frequency. Future implementation studies may also want to examine the effectiveness of other types of interventions (e.g., incentivization, environmental restructuring, modeling, enablement) on increased ACEs and trauma screening frequency. To increase trauma-informed care practices in the primary care setting, we join the existing implementation science literature in emphasizing the importance of obtaining buy-in from departmental leadership and primary care providers.

We suggest that future ACEs and trauma screening implementation research consider using pilot and quasi-experimental studies to focus intervention activities on smaller groups of healthcare providers. This will likely increase the effectiveness of provider education and training interventions while providing a more replicable model for future studies. Given the inherent logistical difficulties of implementing consistent education and training interventions with primary care providers in clinical settings, future studies should explore formats that maximize providers' participation in education and training interventions while minimizing the burden of participation.

Finally, future research should continue to explore and evaluate appropriate strategies of ACEs screening implementation in healthcare settings. ACEs-related clinical practice guidelines are likely required to increase the perceived utility of ACEs screening for healthcare providers. Findings from the present study suggest that primary care providers are already using patients' ACEs history to inform prevention and intervention strategies related to psychiatric concerns, sleep difficulties, blood glucose, weight, pain, cholesterol, blood pressure, and alcohol/substance use, among others. We recommend that healthcare professionals utilize the ecobiodevelopmental model to guide clinical decision-making for patients with elevated ACE scores.

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Appendix A: Quality Improvement Materials

Projected PDSA Cycles Timeline

PDSA Cycle 1 (September-October 2021)

- Identify current monthly ACEs screening rates in Epic
- Complete ACEs education and qualitative feedback session with medical providers
- Integrate medical provider feedback into intervention materials and processes
- Follow up with medical providers about changes to intervention materials and processes
- Monitor Epic for changes in monthly ACEs screening rates

PDSA Cycle 2 (October-November 2021)

- Complete ACEs education session with behavioral health consultants
- Disseminate ACEs education and screening materials to clinic modules
- Monitor Epic for changes in monthly ACEs screening rates

PDSA Cycle 3 (November-December 2021)

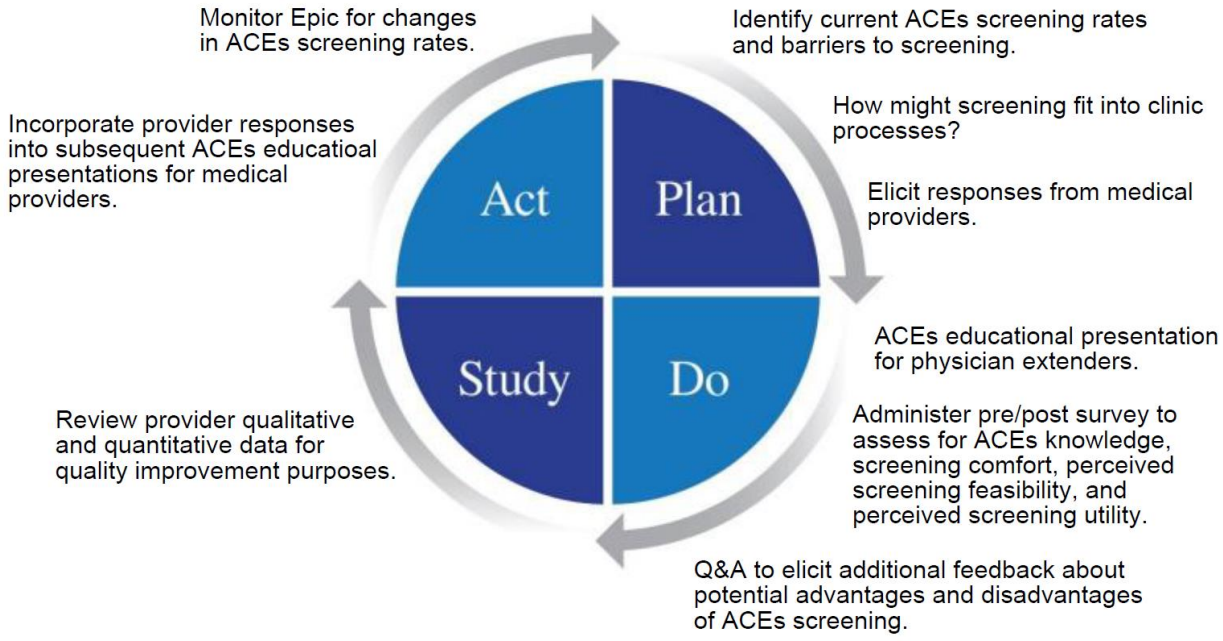
- Complete ACEs education and qualitative feedback session with medical providers
- Integrate medical provider feedback into intervention materials and processes
- Follow up with medical providers about changes to intervention materials and processes
- Monitor Epic for changes in monthly ACEs screening rates

Subsequent PDSA Cycles (January-September 2022)

- Complete ACEs education and qualitative feedback sessions with medical providers
- Integrate medical provider feedback into intervention materials and processes
- Follow up with medical providers about changes to intervention materials and processes

- Disseminate ACEs education and screening materials to clinic modules
- Add screening templates and SmartPhrases to Epic for ACEs screening
- Discuss ACEs education and screening materials with clinic nursing staff
- Monitor Epic for changes in monthly ACEs screening rates

PDSA Cycle 1



Pre/Post-Study Survey

Part 1

Instructions: *Please respond to each statement by selecting the answer that best represents your opinion. Your responses are confidential.*

1) I am knowledgeable about Adverse Childhood Experiences (ACEs) and their influence on patient health.

- ○ Strongly Disagree
- ○ Moderately Disagree
- ○ Slightly Disagree
- ○ Neither Agree nor Disagree
- ○ Slightly Agree
- ○ Moderately Agree
- ○ Strongly Agree

2) I am comfortable completing brief screening for Adverse Childhood Experiences (ACEs) with my adult primary care patients.

- ○ Strongly Disagree
- ○ Moderately Disagree
- ○ Slightly Disagree
- ○ Neither Agree nor Disagree
- ○ Slightly Agree
- ○ Moderately Agree
- ○ Strongly Agree

3) Adverse Childhood Experiences (ACEs) contribute to health conditions that are largely resistant to intervention and cannot be effectively treated.

- ○ Strongly Disagree
- ○ Moderately Disagree
- ○ Slightly Disagree
- ○ Neither Agree nor Disagree
- ○ Slightly Agree
- ○ Moderately Agree
- ○ Strongly Agree

4) I have sufficient time to screen for, and when applicable, briefly discuss Adverse Childhood Experiences (ACEs) with my adult primary care patients.

- ○ Strongly Disagree
- ○ Moderately Disagree
- ○ Slightly Disagree
- ○ Neither Agree nor Disagree
- ○ Slightly Agree
- ○ Moderately Agree
- ○ Strongly Agree

5) Adverse Childhood Experiences (ACEs) screening should be completed with pediatric patients, and is not appropriate for adult primary care patients.

- ○ Strongly Disagree
- ○ Moderately Disagree
- ○ Slightly Disagree
- ○ Neither Agree nor Disagree
- ○ Slightly Agree
- ○ Moderately Agree
- ○ Strongly Agree

6) Screening adult primary care patients for Adverse Childhood Experiences (ACEs) will increase treatment effectiveness and improve patient outcomes.

- ○ Strongly Disagree
- ○ Moderately Disagree
- ○ Slightly Disagree
- ○ Neither Agree nor Disagree
- ○ Slightly Agree
- ○ Moderately Agree
- ○ Strongly Agree

7) If one of my adult primary care patients were to complete Adverse Childhood Experiences (ACEs) screening, I am confident in my ability to incorporate appropriate health intervention strategies into their treatment plan.

- ○ Strongly Disagree
- ○ Moderately Disagree
- ○ Slightly Disagree
- ○ Neither Agree nor Disagree
- ○ Slightly Agree
- ○ Moderately Agree
- ○ Strongly Agree

8) If one of my adult primary care patients were to disclose a history of Adverse Childhood Experiences (ACEs) on a screening measure, I am comfortable listening to their experiences and responding empathically.

- ○ Strongly Disagree
- ○ Moderately Disagree
- ○ Slightly Disagree
- ○ Neither Agree nor Disagree
- ○ Slightly Agree
- ○ Moderately Agree
- ○ Strongly Agree

Part 2

Instructions: *Please respond to each question based on your clinical experiences over the past 12 months. Your responses are confidential.*

1) Have you attended an ACEs educational session within the past year?

- ◯ Yes, at ECUFM
- ◯ Yes, outside of ECUFM
- ◯ No
- ◯ I don't know

2) How many times within the past 12 months have you completed ACEs screening with a primary care patient?

- ◯ 0 times
- ◯ 1-5 times
- ◯ 6-10 times
- ◯ 11-20 times
- ◯ More than 20 times

3) How many times within the last 12 months have you paged behavioral health for an integrated care consultation, or referred a primary care patient to behavioral health, due to their ACE score?

- ◯ 0 times
- ◯ 1-5 times
- ◯ 6-10 times
- ◯ 11-20 times
- ◯ More than 20 times

4) How many times within the last 12 months have you initiated preventative care or early intervention with a primary care patient due to their ACE score?

- ◯ 0 times
- ◯ 1-5 times
- ◯ 6-10 times
- ◯ 11-20 times
- ◯ More than 20 times

5) How many times within the last 12 months have you referred a primary care patient to specialist care (e.g., cardiology, endocrinology, oncology, pulmonology, etc.) due to their ACE score?

- ◯ 0 times
- ◯ 1-5 times
- ◯ 6-10 times
- ◯ 11-20 times
- ◯ More than 20 times

6) If you have altered a treatment plan with a primary care patient within the past 12 months due to their ACE score, please identify which changes you have made from the list below.

Increased screening/intervention for *(check all that apply)*:

	0 times	1-5 times	6-10 times	11-20 times	More than 20 times
Weight/obesity (e.g., medications, diet, physical activity, CBT for weight management)	○	○	○	○	○
Sleep difficulties (e.g., medications, sleep study, CBT for insomnia)	○	○	○	○	○
Pain/chronic pain (e.g., medications, physical therapy, CBT for pain)	○	○	○	○	○
Tobacco/nicotine use (e.g., assessment, Motivational Interviewing, nicotine replacement therapy, pharmacotherapy)	○	○	○	○	○
Alcohol and other substances (e.g., assessment, Motivational Interviewing, SBIRT)	○	○	○	○	○
Environmental risk/domestic violence (e.g., community resources, social work)	○	○	○	○	○
Blood pressure (e.g., monitoring, medications)	○	○	○	○	○
Blood glucose (e.g., monitoring, labs, medications)	○	○	○	○	○
Cholesterol/triglycerides (e.g., labs, medications)	○	○	○	○	○
Cancers (e.g., labs, scans, medications)	○	○	○	○	○
Cognitive impairment/decline (e.g., MoCA, medications)	○	○	○	○	○

Pre/Post-Education Survey

Instructions: *Please respond to each statement by selecting the answer that best represents your opinion. Your responses are confidential.*

1) I am knowledgeable about Adverse Childhood Experiences (ACEs) and their influence on patient health.

- ◯ Strongly Disagree
- ◯ Moderately Disagree
- ◯ Slightly Disagree
- ◯ Neither Agree nor Disagree
- ◯ Slightly Agree
- ◯ Moderately Agree
- ◯ Strongly Agree

2) I am comfortable completing brief screening for Adverse Childhood Experiences (ACEs) with my adult primary care patients.

- ◯ Strongly Disagree
- ◯ Moderately Disagree
- ◯ Slightly Disagree
- ◯ Neither Agree nor Disagree
- ◯ Slightly Agree
- ◯ Moderately Agree
- ◯ Strongly Agree

3) Adverse Childhood Experiences (ACEs) contribute to health conditions that are largely resistant to intervention and cannot be effectively treated.

- ◯ Strongly Disagree
- ◯ Moderately Disagree
- ◯ Slightly Disagree
- ◯ Neither Agree nor Disagree
- ◯ Slightly Agree
- ◯ Moderately Agree
- ◯ Strongly Agree

4) I have sufficient time to screen for, and when applicable, briefly discuss Adverse Childhood Experiences (ACEs) with my adult primary care patients.

- ◯ Strongly Disagree
- ◯ Moderately Disagree
- ◯ Slightly Disagree
- ◯ Neither Agree nor Disagree
- ◯ Slightly Agree
- ◯ Moderately Agree
- ◯ Strongly Agree

5) Adverse Childhood Experiences (ACEs) screening should be completed with pediatric patients, and is not appropriate for adult primary care patients.

- ◯ Strongly Disagree
- ◯ Moderately Disagree
- ◯ Slightly Disagree
- ◯ Neither Agree nor Disagree
- ◯ Slightly Agree
- ◯ Moderately Agree
- ◯ Strongly Agree

6) Screening adult primary care patients for Adverse Childhood Experiences (ACEs) will increase treatment effectiveness and improve patient outcomes.

- ○ Strongly Disagree
- ○ Moderately Disagree
- ○ Slightly Disagree
- ○ Neither Agree nor Disagree
- ○ Slightly Agree
- ○ Moderately Agree
- ○ Strongly Agree

7) If one of my adult primary care patients were to complete Adverse Childhood Experiences (ACEs) screening, I am confident in my ability to incorporate appropriate health intervention strategies into their treatment plan.

- ○ Strongly Disagree
- ○ Moderately Disagree
- ○ Slightly Disagree
- ○ Neither Agree nor Disagree
- ○ Slightly Agree
- ○ Moderately Agree
- ○ Strongly Agree

8) If one of my adult primary care patients were to disclose a history of Adverse Childhood Experiences (ACEs) on a screening measure, I am comfortable listening to their experiences and responding empathically.

- ○ Strongly Disagree
- ○ Moderately Disagree
- ○ Slightly Disagree
- ○ Neither Agree nor Disagree
- ○ Slightly Agree
- ○ Moderately Agree
- ○ Strongly Agree

Qualitative Feedback Questionnaire for Primary Care Providers

Facilitation Instructions: *Estimate 15 minutes for qualitative feedback (5 minutes per question). Elicit feedback from all group members, when possible. Assess agreement or discrepancy among group members. Seek clarity in areas of diverging opinions. Guide group toward collaborative problem-solving (e.g., "Would this solution work?", "What would improve this process?"). Concisely answer questions asked by group members, when possible and appropriate.*

1. How prepared do you feel right now to complete ACEs screening with your patients? (e.g., slightly, moderately, extremely)

    a. What would you need to feel prepared? (e.g., education/training, materials)

2. How feasible do you believe it is to complete ACEs screening with your Establish Care patients? (e.g., slightly, moderately, extremely)

    a. At what time during the visit would it be most feasible to complete screening (e.g., beginning, middle, end)?

3. In your opinion, what are the disadvantages of screening for adverse childhood experiences (ACEs) among adult primary care patients?

    a. What barriers could get in the way of screening?

    b. What would be your greatest concerns about screening?

4. In your opinion, what are the advantages of screening for adverse childhood experiences (ACEs) among adult primary care patients?

    a. How might screening inform your treatment planning? (e.g., referrals, increased insight about chronic disease risk, greater attentiveness to preventative care)

    b. In what other ways could ACEs screening potentially benefit your clinical practice (e.g., outsource patients to behavioral health, reduce patient visits)?

Key Informant Interview Questionnaire for Behavioral Health Consultants

Interviewer Instructions: *Estimate 30 minutes per interview (1-3 minutes per question). All questions pertain to patients who have been referred to the behavioral health team due to their ACE Score. Ask all parts of every question.*

1. Approximately how many adult primary care patients have you seen over the last 12 months who were referred to you due to their ACE Score?

2. Approximately what percentage of these patients did you see during Integrated Care (IC), and what percentage did you see in the Behavioral Health (BH) Clinic?

3. When you received a page during IC, how did you learn about a patient's ACE Score (e.g., primary care provider (PCP), nurse, Epic, patient, other)?

    a. Was this typically before, during, or after the consultation?

    b. Were ACE Scores the only information that you received, or was more information typically provided about patients' past experiences or current symptoms?

4. When you received a referral for the BH Clinic, how did you learn about a patient's ACE Score (e.g., primary care provider (PCP), nurse, Epic, other)?

    a. Was this typically before, during, or after the consultation?

    b. Were ACE Scores the only information that you received or was more information provided about patients' past experiences or current symptoms?

5. With a typical patient (e.g., IC consultation, BH Clinic assessment/treatment), how much of your time was spent discussing topics related to their adverse childhood experiences versus other treatment issues (e.g., none of the time, a little of the time, some of the time, much of the time)?

6. How would you characterize patients' attitudes towards discussing their adverse childhood experiences (e.g., positive/negative, willing/unwilling, lucid/reluctant, understanding/misunderstanding, appreciative/unappreciative)?

7. With patients who were referred for their ACE Score, what other *mental* health conditions, if any, were commonly present throughout assessment and treatment?

8. With patients who were referred for their ACE Score, what other *physical* health conditions, if any, were commonly present throughout assessment and treatment?

9. As a BHC, in what ways did you incorporate patients' ACE Scores into their behavioral health assessment and treatment?

10. As a BHC, in what ways did you find it advantageous to know a patients' ACE Score, whether or not you incorporated it into their behavioral health assessment and treatment?

11. As a BHC, in what ways did you find it disadvantageous to know a patients' ACE Score, whether or not you incorporated it into their behavioral health assessment and treatment?

12. In your opinion, do you believe that having a patient's ACE Score alone would provide adequate referral information to complete your consultation? Why or why not?

13. In your opinion, would you recommend that other primary care clinics use ACE scores to identify patients with higher disease risk and initiate behavioral health consultation/assessment/treatment? Why or why not?

Adverse Childhood Experiences (ACEs): A Screening Script for Primary Care Providers

Administer at Adult Establish Care Visit

During a first visit, we ask new patients about any experiences of past traumatic or stressful events. We know that stressful events that take place during childhood can have a lasting influence on both physical and mental health throughout adulthood. For this reason, and to learn a bit more about you, we ask all new patients to complete this brief survey. After reading through the 10 items, add up the number of stressful events that you may have experienced before the age of 18 – the total score will be between 0 and 10. You DO NOT have to tell me which specific events you have experienced. (assist patients with addition as needed)

Provide ACE Questionnaire for Adults (allow 1-3 minutes to complete)

ACE Score: 0-3

Thank you for completing this form. If you have questions about any of these items, please let me know and we can discuss more either today or at a future visit.

ACE Score: 4-10

Thank you for completing this form. I see that you marked [ACE Score] of these items. If you feel comfortable sharing more about these events, or how they may be affecting your health, I am happy to listen. We can also connect you with our behavioral health staff during your visit today if you would like to discuss more with them.

If Patient Discloses More Information

I'm so sorry/sad that this happened to you and appreciate you sharing this information. I value the opportunity to partner with you in the ways that this relates to your healthcare.

Is it okay if I page our behavioral health staff to meet with you here today to discuss more? We can also arrange time for you to meet with our behavioral health staff at your next appointment, or provide you with a referral to meet with them in their clinic upstairs.

If Patient Does Not Wish to Discuss

Ask patient if you can provide them with ACEs informational handout.

Epic Documentation:

In Establish Care note, indicate…

ACE Score (0-10)

BH treatment was Offered / Accepted / Denied

BH follow up scheduled for *Next IC Appointment / BH Clinic (place referral)*

Example: Pt's ACE Score=4, BH referral was offered and accepted by pt for next IC appointment.

Adverse Childhood Experiences (ACEs) Screening: Epic SmartPhrase

Use ".ACESSCREENING"

Adverse Childhood Experiences (ACEs) screening was completed to better understand the patient's social risk factors. Patient's **ACE Score = X/10**, which *does* [score of ≥ 4] OR *does not* [score of ≤ 3] meet the suggested cutoff for clinical risk (≥ 4).

[If clinical risk is met] A Behavioral Health consultation was offered *but the pt declined at this time* [Stop here] OR *and was accepted by the patient*. Patient was *seen by BHC at today's visit* OR *scheduled to see a BHC at their next IC appointment; BH was notified to follow-up with pt at this time.*

[If appropriate for documentation:]

Pt endorsed an ACEs history (prior to age 18) including…

1. *neglect* (e.g., not having enough to eat, clean clothing, or appropriate supervision)
2. *physical abuse* (e.g., being punched, hit, beaten)
3. *verbal abuse* (e.g., sworn at, insulted, or put down)
4. *emotional abuse* (e.g., felt that no one loved them or thought they were special)
5. *sexual abuse* (e.g., inappropriate touching of private areas; oral/anal/vaginal intercourse/penetration)
6. *parental loss* (e.g., divorce, abandonment, death)
7. *household domestic violence* (e.g., witnessed hitting, punching, beating, or threatening harm to another)
8. *household member mental illness* (e.g., depression, attempted suicide)
9. *household member substance abuse* (e.g., alcohol, illicit drugs, prescription drugs)
10. *household member incarceration*

NOTE: *If a patient has disclosed potentially sensitive personal information related to ACEs, and you are including this information in their encounter documentation, consider designating the note as "Sensitive."*

ACEs Education Presentation

Adverse Childhood Experiences

Childhood Maltreatment		Household Dysfunction	
1. Physical Abuse	☑	6. Caregiver Mental Illness	☑
2. Sexual Abuse	☑	7. Domestic Violence at Home	☑
3. Emotional Abuse	☑	8. Caregiver Incarceration	☑
4. Physical Neglect	☑	9. Caregiver Substance Abuse	☑
5. Emotional Neglect	☑	10. Caregiver Separation/Divorce	☑

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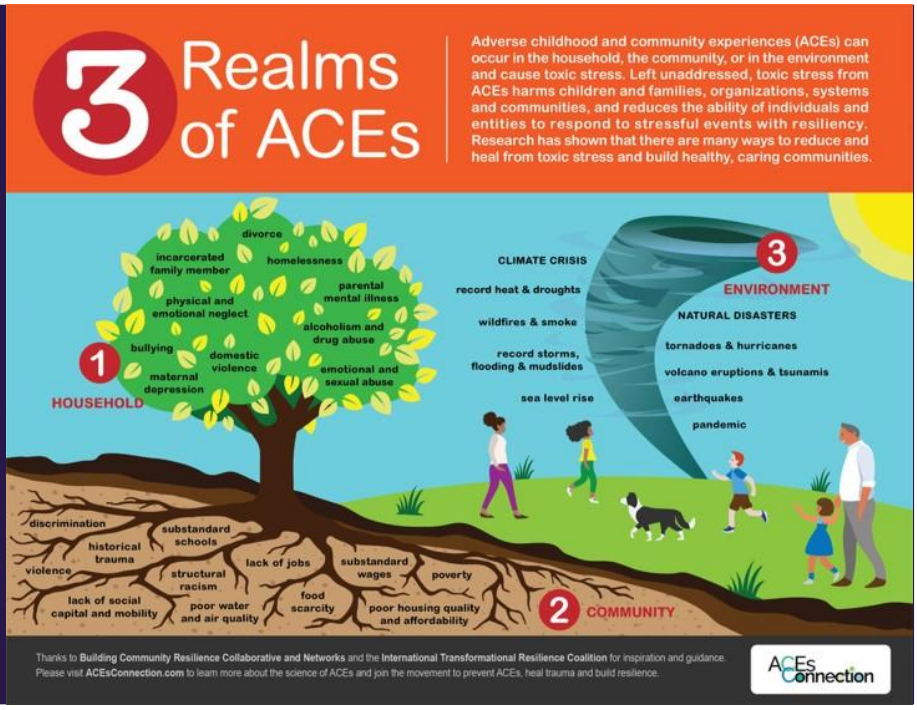
ACE Score= X/10

1. Household
2. Community
3. Environment



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Why Does this Matter for Me?

- ACEs screening shown to increase PCPs report little formal ACEs training, but have expressed the desire to have this included in residency training curriculum
- PCPs face common barriers to screening including low screening confidence, insufficient time for screening, concerns about patient rapport/discomfort, and concerns about having the necessary resources and skills to address positive screening results
- ACEs screenings increase through staff trainings that increase provider confidence and competence in administering screenings, through accessible and robust mental health resources, and through organizational support

ECU

Trauma-Informed Care

Five Core Values (Harris & Fallot, 2001)

- Safety, Trust, Empowerment, Choice, Collaboration

Trauma-Informed Primary Care (Roberts et al., 2019)

- Screening and trauma recognition
- Affirmation of the health effects of trauma
- Patient-centered communication and care
- Emotional-safety emphasis
- Knowledge of helpful treatment for trauma patients

ECU

The ACEs Study (Felitti et al., 1998)

Public health survey through Kaiser Permanente (*N*=8,056)

Respondents with ≥ 4 ACEs demonstrated graded dose-response relationship between ACEs and numerous health concerns:

- 4-12 fold risk of self-reported:
  - Depression, Suicide attempt, Alcoholism, Drug abuse
- 2-4 fold risk of self-reported:
  - Smoking, Risky sexual behaviors, STD, Poor self-rated health
- 1.4-1.6 fold risk of self-reported:
  - Physical inactivity, Severe obesity
- Increased risk of ischemic heart disease, cancer, chronic lung disease, skeletal fractures, and liver disease

ECU

Two Decades of ACEs Research

In adults, ACEs associated with:

- Ischemic heart disease (Dong et al., 2004)
- Obesity (Dube et al., 2010)
- Fair/poor general health, Frequent mental distress, Asthma, Diabetes, Coronary heart disease, Stroke, Myocardial infarction, Disability (Gilbert et al., 2015)
- Diabetes, Coronary artery disease, Myocardial infarction, Stroke, Depression (Campbell et al., 2017)
- Chronic disease prevalence in young adults (18-34 yrs) (Sonu et al., 2020)

Compared to individuals with 0 ACEs, those with ≥ 6 ACEs die, on average, 20 years earlier (Brown et al., 2009)

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Two Decades of ACEs Research

In children/adolescents, ACEs associated with:

- Delays in cognitive development, asthma, infection, somatic complaints, sleep disruption (Oh et al., 2018)
- Weight gain/loss, Failure to thrive, Enuresis, Encopresis, Constipation, Hair loss, Poor control of chronic disease (e.g. asthma, diabetes), Developmental regression, School failure/absenteeism, Aggression, Poor impulse control, Frequent crying, Restricted affect or numbing, Unexplained somatic complaints (e.g., headache or abdominal pain), Depression, Anxiety, and Interpersonal conflict (Purewal et al., 2016)

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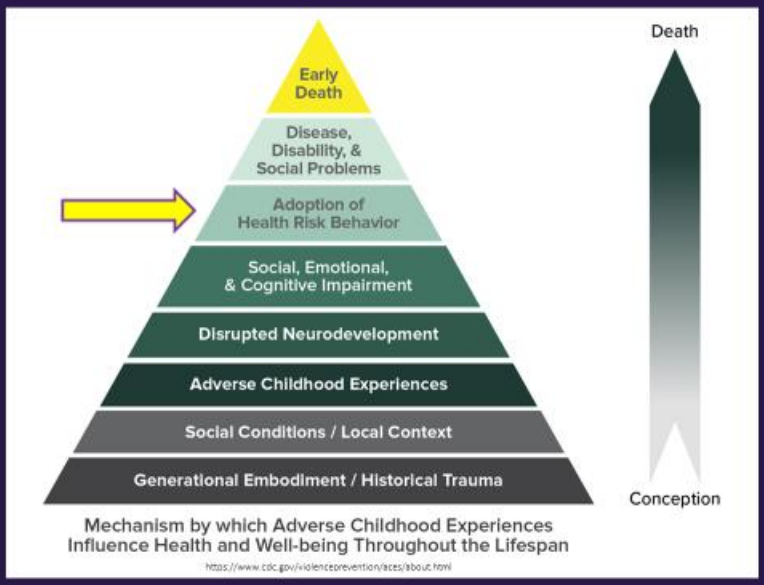
Ecobiodevelopmental Framework

- American Academy of Pediatrics (Shonkoff et al., 2012)
- Chronic/toxic stress
- Early prevention and intervention to reduce chronic disease risk



ACEs Screening in Primary Care

- In a survey of Family Medicine medical residents, only 3% reported significant knowledge about ACEs, but 84% said they would like to see ACEs education/training integrated into their residency curriculum (Collins et al., 2021)
- At well-child visits, pediatric patients' parents/guardians felt positively about (76%) and were comfortable with (81%) ACEs screening discussions with a PCP; 71% of providers felt that parents/guardians were receptive to these conversations (Bodendorfer et al., 2019)
- 77% of families with positive screenings accepted preventative services (Kia-Keating et al., 2019)
- Barriers to ACEs screening among PCPs include lack of screening confidence, insufficient time for screening, concerns about re-traumatizing patients, and concerns about insufficient resources and skills to manage positive screening results (Kalmakis et al., 2017)
- ACEs screening shown to increase through staff trainings that increase provider confidence and competence in administering screenings, accessible and robust mental health resources, and organizational support (Mishra et al., 2021)

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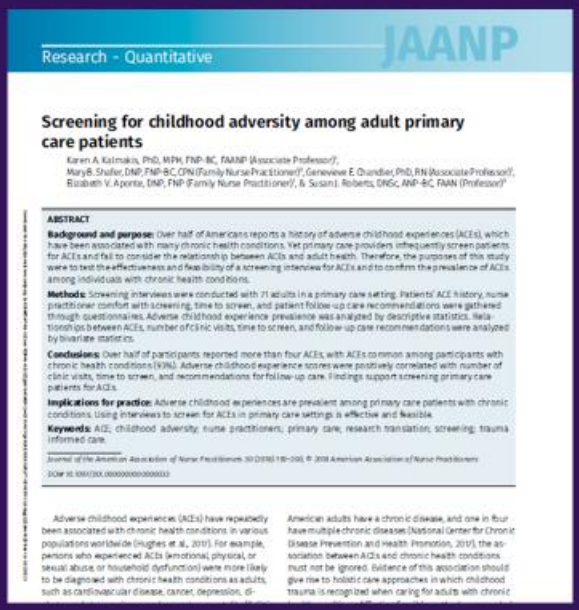
ACEs Screening in Primary Care

Kalmakis et al., 2018

- NPs administered ACEs screening interviews (*N*=71)
- Over half of participants reported ≥ 4 ACEs
- ACE scores positively correlated with more clinic visits
- ACE scores positively correlated with time taken to complete screening
  - Mean interview time = 8.5 minutes



Research - Quantitative JAANP

Screening for childhood adversity among adult primary care patients

Karen A. Kalmakis, PhD, MPH, FNP-BC, FAANP (Associate Professor)[1], Mary B. Shafer, DNP, FNP-BC, CPN (Family Nurse Practitioner)[2], Genevieve E. Chandler, PhD, RN (Associate Professor)[1], Elizabeth V. Aponte, DNP, FNP (Family Nurse Practitioner)[3], & Susan J. Roberts, DNSc, ANP-BC, FAAN (Professor)[4]

ABSTRACT

Background and purpose: Over half of Americans reports a history of adverse childhood experiences (ACEs), which have been associated with many chronic health conditions. Yet primary care providers infrequently screen patients for ACEs and fail to consider the relationship between ACEs and adult health. Therefore, the purposes of this study were to test the effectiveness and feasibility of a screening interview for ACEs and to confirm the prevalence of ACEs among individuals with chronic health conditions.

Methods: Screening interviews were conducted with 71 adults in a primary care setting. Patients' ACE history, nurse practitioner comfort with screening, time to screen, and patient follow-up care recommendations were gathered through questionnaires. Adverse childhood experience prevalence was analyzed by descriptive statistics. Relationships between ACEs, number of clinic visits, time to screen, and follow-up care recommendations were analyzed by bivariate statistics.

Conclusions: Over half of participants reported more than four ACEs, with ACEs common among participants with chronic health conditions (93%). Adverse childhood experience scores were positively correlated with number of clinic visits, time to screen, and recommendations for follow-up care. Findings support screening primary care patients for ACEs.

Implications for practice: Adverse childhood experiences are prevalent among primary care patients with chronic conditions. Using interviews to screen for ACEs in primary care settings is effective and feasible.

Keywords: ACE; childhood adversity; nurse practitioners; primary care; research translation; screening; trauma informed care.

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Adverse childhood experiences (ACEs) have repeatedly been associated with chronic health conditions in various populations worldwide (Hughes et al., 2017). For example, persons who experienced ACEs (emotional, physical, or sexual abuse, or household dysfunction) were more likely to be diagnosed with chronic health conditions as adults, such as cardiovascular disease, cancer, depression, di-

American adults have a chronic disease, and one in four have multiple chronic diseases (National Center for Chronic Disease Prevention and Health Promotion, 2017), the association between ACEs and chronic health conditions must not be ignored. Evidence of this association should give rise to holistic care approaches in which childhood trauma is recognized when caring for adults with chronic

Screening at ECUFM

Goals:

✓To increase routine ACEs screening with adult primary care patients at Establish Care visits

✓To affirm the influence of trauma and life stressors on patient health, and increase patient-centered communication

✓To offer higher risk patients (ACE Score ≥ 4) the option to meet with a BHC during their IC visit

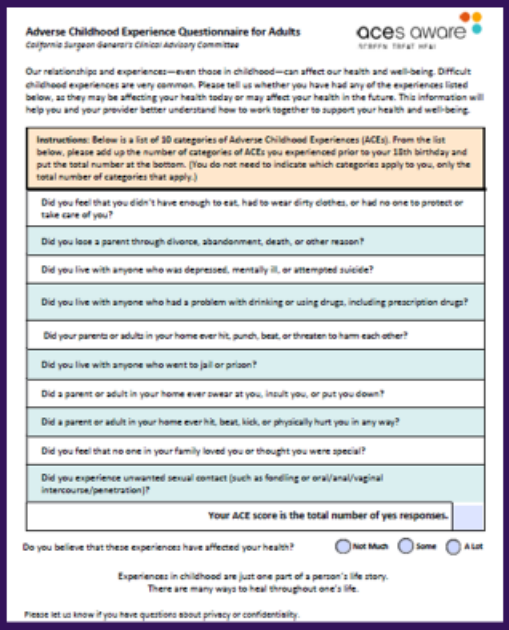
ACEs Screening Measures

ACE-Q (10-item)

- **Pros:** Increased item specificity
- **Cons:** Decreased patient privacy and autonomy

Adverse Childhood Experience Questionnaire for Adults

- **Pros:** Increased patient privacy and autonomy; Influence on health
- **Cons:** Decreased item specificity



Adverse Childhood Experience Questionnaire for Adults

California Surgeon General's Clinical Advisory Committee

aces aware

Our relationships and experiences—even those in childhood—can affect our health and well-being. Difficult childhood experiences are very common. Please tell us whether you have had any of the experiences listed below, as they may be affecting your health today or may affect your health in the future. This information will help you and your provider better understand how to work together to support your health and well-being.

Instructions: Below is a list of 10 categories of Adverse Childhood Experiences (ACEs). From the list below, please add up the number of categories of ACEs you experienced prior to your 18th birthday and put the total number at the bottom. (You do not need to indicate which categories apply to you, only the total number of categories that apply.)

Did you feel that you didn't have enough to eat, had to wear dirty clothes, or had no one to protect or take care of you?
Did you lose a parent through divorce, abandonment, death, or other reason?
Did you live with anyone who was depressed, mentally ill, or attempted suicide?
Did you live with anyone who had a problem with drinking or using drugs, including prescription drugs?
Did your parents or adults in your home ever hit, punch, beat, or threaten to harm each other?
Did you live with anyone who went to jail or prison?
Did a parent or adult in your home ever swear at you, insult you, or put you down?
Did a parent or adult in your home ever hit, beat, kick, or physically hurt you in any way?
Did you feel that no one in your family loved you or thought you were special?
Did you experience unwanted sexual contact (such as fondling or oral/anal/vaginal intercourse/penetration)?
Your ACE score is the total number of yes responses.

Do you believe that these experiences have affected your health? ◯ Not Much ◯ Some ◯ A Lot

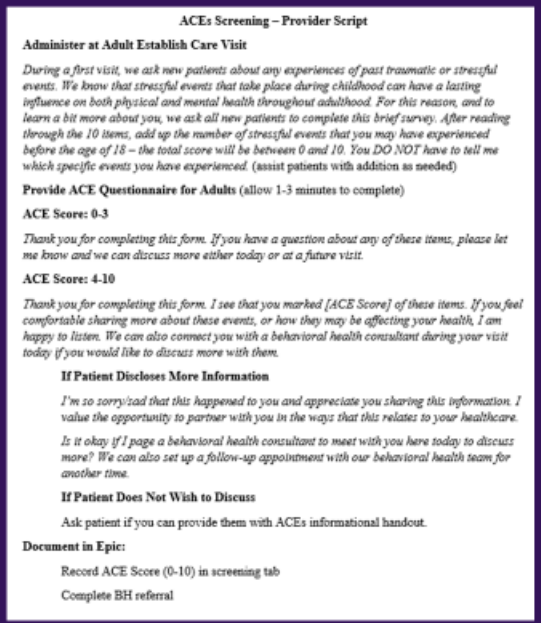
Experiences in childhood are just one part of a person's life story.
There are many ways to heal throughout one's life.

Please let us know if you have questions about privacy or confidentiality.

ACEs Screening Script

Key Points:

- Respect patient privacy and autonomy – it is their choice to disclose
- Communicate gratitude for any information shared and partnership in patient care
- Offer, but do not force, behavioral health consultation/referral
- Document ACE Score in Epic note



ACEs Screening – Provider Script

Administer at Adult Establish Care Visit

During a first visit, we ask new patients about any experiences of past traumatic or stressful events. We know that stressful events that take place during childhood can have a lasting influence on both physical and mental health throughout adulthood. For this reason, and to learn a bit more about you, we ask all new patients to complete this brief survey. After reading through the 10 items, add up the number of stressful events that you may have experienced before the age of 18 – the total score will be between 0 and 10. You DO NOT have to tell me which specific events you have experienced. (assist patients with addition as needed)

Provide ACE Questionnaire for Adults (allow 1-3 minutes to complete)

ACE Score: 0-3

Thank you for completing this form. If you have a question about any of these items, please let me know and we can discuss more either today or at a future visit.

ACE Score: 4-10

Thank you for completing this form. I see that you marked [ACE Score] of these items. If you feel comfortable sharing more about these events, or how they may be affecting your health, I am happy to listen. We can also connect you with a behavioral health consultant during your visit today if you would like to discuss more with them.

If Patient Discloses More Information

I'm so sorry/sad that this happened to you and appreciate you sharing this information. I value the opportunity to partner with you in the ways that this relates to your healthcare.

Is it okay if I page a behavioral health consultant to meet with you here today to discuss more? We can also set up a follow-up appointment with our behavioral health team for another time.

If Patient Does Not Wish to Discuss

Ask patient if you can provide them with ACEs informational handout.

Document in Epic:

Record ACE Score (0-10) in screening tab

Complete BH referral

Epic Documentation

- Recommended during Establish Care visit note
- Indicate:
  - ACE Score (0-10)
  - Was behavioral health consultation/referral used

Example: *Pt's ACE Score=4, BH consultation was offered and accepted by pt for next IC appointment.*

- Future Steps: Epic SmartPhrases and ACEs screening templates

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Case Example 1

George is a 27-year-old Black male who presents to ECUFM for an Establish Care visit. At the time of his appointment, George's BMI and blood pressure are slightly elevated, though he does not report any significant health conditions or complaints. He scores 2/6 on a PHQ-2 screener and indicates that he drinks approximately 2 beers/day to unwind and cope with stress.

Given his age and relatively low health risk, you provide George with recommendations about physical activity and diet/nutrition. He is scheduled for routine follow up care in 6 months.

How could ACEs Screening inform treatment planning?

ECU

Case Example 1, revisited

George is a 27-year-old Black male who presents to ECUFM for an Establish Care visit. At the time of his appointment, George's BMI and blood pressure are slightly elevated, though he does not report any significant health conditions or complaints. He scores 2/6 on a PHQ-2 screener and indicates that he drinks approximately 2 beers/day to unwind and cope with stress.

Upon screening, you learn that George's ACE Score is 4/10, and he discloses past experiences of physical abuse, parental separation, household substance use, and domestic violence. After sharing about the ways that these stressors could affect his health, he agrees to meet with a BHC on IC to discuss behavioral strategies for stress management. Given his elevated risk for chronic health conditions, you make note to monitor his weight and BP more closely at follow up to see if he is benefitting from behavioral strategies.

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Case Example 2

Linda is an 18-year-old White female who presents to the ED for chest pain, SOB, and concerns that something could be wrong with her heart. After evaluation, she is not admitted to inpatient, but scheduled for follow up with her PCP at ECUFM. During her primary care visit Linda's blood pressure is WNL, and after completing a lab workup she appears unremarkable for any cardiovascular concerns.

Linda's somatic complaints are attributed to school-related stress, and no specific follow up plan is made.

How could ACEs Screening inform treatment planning?

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Case Example 2, revisited

Linda is an 18-year-old White female who presents to the ED for chest pain, SOB, and concerns that something could be wrong with her heart. After evaluation, she is not admitted to inpatient, but scheduled for follow up with her PCP at ECUFM. During her primary care visit Linda's blood pressure is WNL, and after completing a lab workup she appears unremarkable for any cardiovascular concerns.

Upon screening, you learn that Linda's ACE Score is 6/10. Although she is not comfortable disclosing the details these experiences, Linda is amenable to BHC follow up at her next appointment. Linda also agrees to take an informational handout about the relationship between ACEs and various health concerns. She appears to take comfort in knowing that past stressors could be influencing her health and treatment options are available.

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ECU

ACEs Resources

https://www.cdc.gov/violenceprevention/aces/about.html

https://www.acesaware.org/screen/screening-for-adverse-childhood-experiences/

https://www.acesconnection.com/blog/aces-101-faqs

ECU

Appendix B: IRB Approval Letter

EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board
4N-64 Brody Medical Sciences Building· Mail Stop 682
600 Moye Boulevard · Greenville, NC 27834
Office **252-744-2914** · Fax **252-744-2284** · **rede.ecu.edu/umcirb/**

Notification of Exempt Certification

From: Social/Behavioral IRB
To: Alexander Capiaghi
CC: Matthew Whited
Date: 2/2/2022
Re: UMCIRB 21-002296
Adverse Childhood Experiences (ACEs) Screening in Integrated Primary Care

I am pleased to inform you that your research submission has been certified as exempt on 2/2/2022. This study is eligible for Exempt Certification under category # 2b & 4c .

It is your responsibility to ensure that this research is conducted in the manner reported in your application and/or protocol, as well as being consistent with the ethical principles of the Belmont Report and your profession.

This research study does not require any additional interaction with the UMCIRB unless there are proposed changes to this study. Any change, prior to implementing that change, must be submitted to the UMCIRB for review and approval. The UMCIRB will determine if the change impacts the eligibility of the research for exempt status. If more substantive review is required, you will be notified within five business days.

Document	Description
Application for Waiver or Alteration of HIPPA Authorization(0.01)	HIPAA Documentation
Consent Paragraph_Key Informant Interview.doc(0.01)	Consent Forms
Consent Paragraph_Pre-Post Education Survey.doc(0.01)	Consent Forms
Consent Paragraph_Pre-Post Study Survey.doc(0.01)	Consent Forms
Dissertation Proposal(0.01)	Study Protocol or Grant Application
HIPAA-Research-on-Decedents-Information-Form-Revised-9-23-20.pdf(0.01)	HIPAA Documentation
Key Informant Interview Questionnaire with Behavioral Health Consultants(0.01)	Interview/Focus Group Scripts/Questions
Pre/Post Education Session Survey(0.01)	Surveys and Questionnaires
Pre/Post-Study Survey(0.01)	Surveys and Questionnaires

For research studies where a waiver or alteration of HIPAA Authorization has been approved, the IRB states that each of the waiver criteria in 45 CFR 164.512(i)(1)(i)(A) and (2)(i) through (v) have been met. Additionally, the elements of PHI to be collected as described in items 1 and 2 of the Application for Waiver of Authorization have been determined to be the minimal necessary for the specified research.

The Chairperson (or designee) does not have a potential for conflict of interest on this study.