DESCRIPTION AND CRITICAL EVALUATION OF MODELS OF PSYCHOLOGY PRACTICE IN THE PEDIATRIC INTENSIVE CARE UNIT

by

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ABSTRACT

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During and after hospitalization in the pediatric intensive care unit (PICU), a significant proportion of patients and their family members experience clinical levels of distress (i.e., traumatic stress, anxiety, and depression). Pediatric psychologists are well-suited to support families during hospitalization and are increasingly present in PICUs. Models of psychology practice have been explored in other pediatric settings, but a comprehensive assessment of models of psychology practice in the PICU has not been conducted. The present study aimed to evaluate current models of psychology practice in PICUs and explore psychologists' perceptions of the ideal model of care for PICU families. Fourteen participants (13 psychologists, 1 psychology intern; 100% White, 93% female) with recent PICU experience and representing 13 institutions completed a survey and participated in one of five focus groups regarding their institution's current model of psychology practice and recommendations for the ideal model. The most common institutional model of psychology practice was a hybrid model involving both service-specific psychologists (i.e., psychologists dedicated to a specific pediatric population who see their patients when they are in the PICU) as well as consultation-liaison psychologists (i.e., psychologists who serve multiple inpatient units and are referred to cases in the PICU). Psychologists embedded in the PICU were less common. Participants described that having dedicated PICU time would be ideal and offer several benefits (e.g., improved identification of patients and families). These findings contribute to better understanding of current models of psychology practice and offer preliminary suggestions for an improved model that requires further investigation. Advocacy strategies such as collecting and utilizing outcomes data, sharing information about the role of psychology, establishing standards of care, fostering relationships, and being present in the PICU will support the recommended improvements.

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DESCRIPTION AND CRITICAL EVALUATION OF MODELS OF PSYCHOLOGY PRACTICE IN THE PEDIATRIC INTENSIVE CARE UNIT

Children hospitalized in the pediatric intensive care unit (PICU) require critical medical care for life-threatening conditions. Patients and their families members describe this experience as extremely stressful (Abela et al., 2022; Colville & Pierce, 2012; Lopes-Júnior et al., 2018), and a substantial proportion of patients and their caregivers experience clinically significant distress both during and after hospitalization (e.g., Balluffi et al., 2004; Lopes-Júnior et al., 2018; Nelson & Gold, 2012). Patient and parent distress during hospitalization is associated with negative short-term (e.g., reduced shared decision-making) and long-term (e.g., development of posttraumatic stress disorder; PTSD) consequences (Madrigal et al., 2018; Balluffi et al., 2004; Stowman et al., 2015). Given these negative outcomes, there is a need to intervene with patients and their family members at high risk for experiencing short- and long-term distress. Pediatric psychologists are increasingly present in hospital settings and provide psychological support to children and families. While models of psychology practice have been more thoroughly researched and well-established in some medical clinics (e.g., integrated behavioral health) (Lines & Riley, 2020), models of psychology practice in the PICU have not been comprehensively studied. In order to work toward a gold standard model of psychology practice in the PICU, it is necessary to better understand current models. The present study sought to describe current models of psychology practice in the PICU and evaluate perceptions of the optimal model of psychology practice in PICUs to move toward a gold standard model of care.

PICU Background

More than 106,000 infants, children, and adolescents were admitted to a PICU in the United States in 2021 (*Virtual Pediatric Systems, LLC*, 2022). The PICU specializes in providing care for critically ill or injured youth, ranging from newborns to up to 21-year-olds, with about half of children under two-years of age (Namachivayam et al., 2010). These children require critical medical care for life-threatening conditions; a review of 54 PICUs reported the primary reasons for admission as respiratory (33%) and neurologic (23%) conditions, with 10% related to trauma and 40% to pre- or post-operative care (Edwards et al., 2012), though these variables likely vary across PICUs. The majority of children admitted to the PICU (70%) have at least one pre-existing chronic health condition (Edwards et al., 2012). For about half of patients, discharge occurs within two days of admission, resulting in a relatively short PICU stay; the average length of stay is five days for children admitted to the PICU, suggesting that those discharged after two days are typically hospitalized for significantly longer (Edwards et al., 2012). Due to advancements in treatment, the PICU mortality rate has decreased from 11% in 1982, to 5% in 2006, and to a current rate of about 2% (*Virtual Pediatric System, LLC*, 2020; Namachivayam et al., 2010). Regardless of length of stay and this relatively low mortality rate, patients and their families experience stressful circumstances prior to, during, and after hospitalization in the PICU.

Most (70%) PICU admissions are non-elective as opposed to planned post-operative admissions (Edwards et al., 2012). Therefore, the majority of patients do not expect to be admitted to the PICU and thus patients and family members are likely unprepared for hospitalization both emotionally and practically; for caregivers, this may include arranging care for other children and missing work. Often, hospitalization is immediately preceded by a traumatic event (e.g., motor vehicle accident/fall), or parents might have agonized over whether to bring their child to the hospital (e.g., as they have progressive difficulty breathing from a viral infection). Many parents have described that the transition to the PICU, such as the drive to the hospital, is extremely stressful (Colville et al., 2009). Given that patients are primarily admitted to the PICU from the emergency department (45%) or the operating room/procedure suite (34%), many patients and families have also already begun to deal with hospital-related stressors or serious medical procedures prior to their PICU stay (Edwards et al., 2012). Siblings of patients describe stressors that existed prior to the patient's illness (e.g., parental divorce, family member's death) that affected their experience in the PICU (Abela et al., 2022).

Once hospitalized in the PICU, families describe stressful circumstances related to the child's illness and ongoing treatment, the PICU environment, and alteration in parenting or sibling roles. While survival rates have increased, most childhood deaths that occur in inpatient hospital settings occur in the PICU (Carter et al., 2004). This may partially explain why many parents overestimate the possibility of their child's death and worry that their child may die (Rodríguez-Rey et al., 2018; Balluffi et al., 2004). Many parents and siblings describe this uncertainty and worry about the patient's outcome to be stressful (Abela et al., 2022; Hagstrom, 2017; Jee et al., 2012).

Stressors continue throughout treatment as many (65%) children undergo invasive procedures such as intubation and mechanical ventilation, which involves placing a tube down the throat and using a machine to facilitate breathing (Namachivayam et al., 2010). Patients describe that having multiple unknown professionals providing care and performing procedures as well as altered levels of consciousness is stressful (Lopes-Júnior et al., 2018). Parents and siblings reported that witnessing these types of medical procedures and observing the patient's appearance and discomfort is stressful (Abela et al., 2022; Alzawad et al., 2021; Colville et al., 2009; Hagstrom, 2017). Additionally, parents describe feelings of helplessness and a change in their role as a parent due to an inability fulfill their child's needs (Alzawad et al., 2021; Jee et al., 2012; Simeone et al., 2018). Families are not only subject to stressors related to their own experience but also experience stress related to the general PICU environment (Abela et al., 2022; Alzawad et al., 2020). Specifically, families describe anxiety due to witnessing events in the PICU (e.g., alarms, coding) even when unrelated to their child and recognize the critical state of both their child and others in the PICU (Colville et al., 2009; Lopes-Júnior et al., 2018).

Many parents also report balancing the competing demands of being physically present with other family members at home versus with the patient at the hospital to be stressful (Hagstrom, 2017), and this separation from family is stressful for siblings and patients (Lopes-Júnior et al., 2018; Rennick et al., 2021). Siblings describe that the PICU hospitalization impacts their social life (e.g., participation in extracurriculars), school attendance, and role within the family (e.g., taking on additional responsibilities); they also note that observing their parents experience significant stress is a stressor for them as well (Abela et al., 2022; Rennick et al., 2021).

While discharge from the PICU signals improvement in the child's medical state, transitioning to a new setting and managing on-going treatment needs contribute to continued stressful circumstances after leaving the PICU. For most families, their stay in the hospital continues after discharge from the PICU, as approximately 80% of children are discharged to another hospital setting, and only 16% are discharged directly home (Edwards et al., 2012). For those discharged to another unit, they need to adjust to a new environment and continue to manage the stressors associated with hospitalization. Many parents describe this transition to be stressful, as they lose contact with staff they had established relationships with and experience a reduction in staff presence (Colville et al., 2009).

Once the child has returned home, the child's condition often demands new and intensive caregiving responsibilities from parents without the support of the PICU environment and staff. This is due to the fact that the increased survival rates have been accompanied by a corresponding increase in child morbidity and decrease in child quality of life and adaptive behavior functioning post-discharge (Aspesberro et al., 2015; Ebrahim et al., 2013; Namachivayam et al., 2010). Specifically, an increasing number of children demonstrate moderate-to-severe disability and persisting physical complaints (e.g., pulmonary and neurological problems) after discharge (Knoester et al., 2008).

Researchers have described the concept of "post-intensive care syndrome" (PICS), which is characterized by physical, cognitive, psychological, and social dysfunction that can occur in patients after discharge (Tang et al., 2021), which can impact the family as a whole (Davidson et al., 2012). PICU hospitalization can alter family relationships, cohesion, and finances (O'Meara et al., 2022; Rennick et al., 2021). Patients describe having early memories of frightening ICU experiences (Lopes-Junior). Families may have increased anxiety that whatever initially brought the patient into the PICU might happen again and that they need to be vigilant to avoid this. In fact, parents and siblings report increased anxiety and vigilance about the patient's health after a PICU hospitalization (Colville et al., 2009; Rennick et al., 2021; Terp & Sjöström-Strand, 2017). Unfortunately, this worry is somewhat warranted as one in ten of these children will be readmitted to the PICU unexpectedly within the first year of discharge, leaving families to experience all of these stressors again (Edwards et al., 2018).

Family Psychological Outcomes

Given these extremely stressful circumstances, it is not surprising that many patients and family members experience psychological distress during and after discharge from the PICU. For the purposes of this study, psychological distress is conceptualized as experiences of traumatic stress, anxiety, and/or depression given their high comorbidity and shared underlying constructs of dysphoria and negative affect (Grant et al., 2008; Byllesby et al., 2016). This includes acute stress disorder (ASD), which is characterized by experiencing, witnessing, or learning about a trauma (i.e., actual or threatened death, serious injury, or sexual violation) and experiencing symptoms of traumatic stress, including intrusive distressing memories of the event, negative mood, avoidance of trauma-related stimuli, inability to remember important aspects of the trauma, and/or hypervigilance, within one month of the trauma (American Psychiatric Association, 2013). PTSD is defined by very similar symptomatology as ASD, but PTSD differs in time since the trauma such that symptoms of traumatic stress must continue or begin at least one-month post-trauma exposure.

Previous research suggests that parent mental health has been the focus of most family centered outcomes research related to PICU hospitalization (O'Meara et al., 2022). About 16-62% of patients demonstrate symptoms of PTSD and 20-30% of kids demonstrate a deterioration in emotional well-being after discharge (Lopes-Júnior et al., 2018). There is a significant lack of information on siblings' outcomes (O'Meara et al., 2022). The limited research including siblings suggests that siblings experience shock, fear, worry, and sadness during hospitalization, and parents perceive that hospitalization was emotionally challenging for siblings (Abela et al., 2022; Rennick et al., 2021). After hospitalization, parents report that siblings demonstrated increased signs of anxiety and overprotection toward sibling, and they noted emotional and behavioral changes (Rennick et al., 2021; Terp & Sjöström-Strand, 2017).

During PICU hospitalization, about 32% of parents meet criteria for ASD (Balluffi et al., 2004), and on average demonstrate the same level of ASD symptoms as patients admitted to the

PTSD unit of a psychiatric hospital (Auerbach et al., 2005). After discharge, about 11-21% of parents develop diagnosable PTSD (Nelson & Gold, 2012), compared to 6.8% of the general population (Kessler et al., 2005). PICU parents are also more likely to develop PTSD than parents of children in general pediatric wards (Rees et al., 2004), which suggests that there are unique factors related to PICU hospitalization that result in greater risk for PTSD than general hospitalization. Regarding symptoms of anxiety (e.g., worry, feeling tense), previous research suggests 26-60% of parents experience extreme anxiety during hospitalization (Stremler et al., 2017; Needle et al., 2009), and about one-fourth of parents continue to experience long-term anxiety after discharge (Bronner et al., 2009; Colville & Pierce, 2012; Rothschild et al., 2020). Finally, about half of parents experience symptoms characteristic of major depression (e.g., depressed mood, loss of interest or pleasure) during hospitalization (Fauman et al., 2011; Stremler et al., 2017), and 16-24% reported clinically significant depression at 3 months post-discharge (Bronner et al., 2009; Rothschild et al., 2020). One study found that about 10% of parents were newly diagnosed with ASD, PTSD, depression, anxiety, or another mental health condition in the 6 months after discharge (Logan et al., 2020); it is likely that this data underestimates the number of parents meeting criteria for these conditions given that parents in this study sought formal mental health treatment.

While a substantial subset of patients and families experience short- and long-term psychological distress, families demonstrate varying outcomes after their child's injury or illness (Muscara et al., 2015; Price et al., 2016). Price et al. (2016) outlined the empirically developed Integrative (Trajectory) Model of Pediatric Medical Traumatic Stress, which describes four trajectories of family traumatic stress: resilient, recovery, chronic, and escalating (see Figure 1). Most families are considered resilient such that they demonstrate expected increases in traumatic stress in response to their child’s illness or injury but then show a return to typical levels while the child undergoes acute medical care. Fewer families fall within the recovery group in which they demonstrate higher and longer lasting levels of traumatic stress that eventually decline after discharge from care. The smallest number of families demonstrate chronic or escalating levels of traumatic stress in which traumatic stress is maintained or increased after discharge from the PICU, respectively.

Families in the recovery, chronic, and escalating groups experience short- and long-term negative consequences for both the child and parent. During hospitalization, parent distress impacts their ability to make decisions and care for their child, which may affect the child’s health outcomes. Previous research suggests that mood and anxiety impact decision-making preferences, such that relatives of patients in the ICU who are more anxious and depressed prefer a more passive decision-making role (Anderson et al., 2009). In the PICU, the emotional state of both the parent and child can hinder shared decision-making (Boland et al., 2019; Madrigal et al., 2018), which is a well-established component of patient-centered care (Barry & Edgman-Levitan, 2012). Parents have also reported their own emotions to be a barrier to participating in the care of their child undergoing day surgery (Chapados et al., 2002), which is likely heightened in the PICU setting given the higher intensity of care.

Parental distress also impacts long-term outcomes for both the parent and child. Specifically, parent symptoms of ASD during hospitalization predict subsequent development of PTSD (Balluffi et al., 2004), which is associated with poorer financial (Walker et al., 2003), physical health (D’Andrea et al., 2011; Löwe et al., 2011; Mikuls et al., 2013), and cognitive outcomes (Woon et al., 2017). The child’s experience also predisposes them to mental health sequelae such as PTSD (Nelson & Gold, 2012), and previous research suggests that maternal

PTSD is correlated with child PTSD nine months after discharge from the PICU (Bronner et al., 2008). Finally, parent mental health also correlates with child health-related quality of life six years after pediatric injury (Sluys et al., 2015). This suggests that mitigating distress during hospitalization could improve parent and child mental and physical health outcomes. Therefore, is it critical to find effective ways to support families through the stressful circumstances in the PICU in hopes of minimizing these negative outcomes for both the patient and family.

Importance of Psychologist Intervention in the PICU to Reduce Family Distress

Increasing the presence of psychologists in the PICU likely reduces these adverse outcomes by providing psychosocial support to patients and families during hospitalization. According to Price et al. (2016)'s model of pediatric medical traumatic stress, providing trauma-informed care, screening for risk, and preventing and treating significant traumatic stress in the time immediately following trauma and while receiving acute medical care can improve psychological outcomes. Previous research supports this theory such that fewer symptoms of ASD and higher resilience during hospitalization have been associated with reduced risk for long-term PTSD, depression, and anxiety for parents (Balluffi et al., 2004; Rothschild et al., 2020). For patients, acute stress disorder symptoms during hospitalization also predicted later PTSD symptoms, and this was mediated by anxiety, negative affect, and hospital fear (Stowman et al., 2015).

Providing psychosocial support to families during PICU hospitalization likely reduces distress and has several benefits. Research on interventions to improve psychological outcomes in parents and children is limited and has primarily focused on parents, especially mothers, and reduction of PTSD symptoms; however, these studies suggest that interventions can lead to a reduction in parent and child psychopathology (Baker & Gledhill, 2017). Other research also suggests that psychosocial support during hospitalization is likely beneficial and also focuses on parent outcomes. Providing psychosocial support to parents during PICU hospitalization can reduce distress, increase their participation in their child's care, has been requested by parents (Colville & Gracey, 2006; Gramszlo et al., 2020; Jones et al., 2017b; Melnyk et al., 2004; Shaw et al., 2014; C. Williams et al., 2018). Higher perceived emotional support correlates with lower levels of anger and depression (Phillips et al., 2021), and discussing their own feelings during hospitalization has been associated with less posttraumatic stress in parents (Colville & Gracey, 2006). In mothers with preterm infants in the neonatal ICU, trauma-focused cognitive behavioral therapy during hospitalization resulted in decreased PTSD, depression, and anxiety at 6 months after their child's birth relative to parents who received only one informational session (Shaw et al., 2014). Additionally, greater fulfillment of hospital (e.g., provider availability and compassion), family (e.g., babysitting services), and community (e.g., social support) needs is associated with fewer symptoms of depression and increased participation in child's care (Jones et al., 2017a). This provides hope that greater fulfilment of these needs and increased early psychosocial support during hospitalization could lead to improved parental psychological outcomes.

Increasingly present in hospital settings (Willen, 2007), pediatric psychologists are well suited to identify and intervene upon family distress in the PICU. Pediatric psychologists promote positive medical and psychosocial outcomes for children and families undergoing medical care through consultation, assessment, intervention, prevention, research, and advocacy (Willen, 2007). PICU medical providers value the expertise and support of psychologists in addressing family distress and view this as a collaborative shared responsibility (Balistreri, 2021). Researchers have called for increased presence of psychologists in the PICU (Colville, 2001; Tunick et al., 2013), and the American Academy of Pediatrics recommends that psychologists be available for consultation in the PICU (Hsu et al., 2019).

Psychology practice in hospital settings have been explored and described more thoroughly in other pediatric populations, such as the neonatal intensive care unit (Saxton et al., 2020), hematology and oncology (Kazak & Noll, 2015), and pediatric palliative care (Hildenbrand et al., 2021). However, current models of care have not been thoroughly assessed within the PICU. Psychologists in multiple roles likely practice in the PICU, including service-specific psychologists (i.e., psychologists dedicated to a specific pediatric population and see their patients when they are in the PICU), consultation-liaison (CL) psychologists (i.e., psychologists who serve multiple inpatient units and are referred to cases in the PICU), and embedded psychologists who are dedicated to the PICU. It is important to comprehensively describe the practice of psychologists in the PICU given the unique characteristics of the PICU that differ from other settings. Given the higher level of acuity, psychologists must address a higher demand for caregiver needs, utilize a range of clinical skills to meet the needs of the diverse patient population, and be available to respond to rapidly changing clinical situations. While the need for psychologists practicing in the PICU is evident, the model for incorporating them is less clear as compared to other pediatric populations.

The Current State of Psychology Practice in the PICU

The current state of psychology practice in the PICU has not been thoroughly explored. Previous research has focused on adult ICU settings, evaluated all critical care settings without distinguishing between adult and pediatric care, assessed general inpatient CL service patterns, or focused on one PICU from one institution rather than comprehensively assessing models across PICUs.

Previous research in the adult ICU setting has evaluated psychology consultation patterns (Hosey et al., 2019). In one adult ICU, psychology consultations were placed around 8 days after admission on average, and patients with a longer ICU length of stay were more likely to be consulted. About a third of patients who had consultations had a comorbid psychiatric condition at admission. The most common reasons for consultation were emotional distress and engagement in rehabilitation therapy. This research suggests that patients with longer lengths of stay and/or comorbid psychiatric conditions may be more likely to be referred for a psychology consultation in the adult ICU.

The clinical contexts and role of psychologists has been evaluated across all critical care settings without distinguishing between adult and pediatric contexts (Stucky et al., 2016). Regarding clinical settings, psychologists who worked in critical-care settings at least monthly more likely to be at a Level-1 or pediatric trauma center, and they were more likely to provide services on general medical-surgical units. Of the psychologists who frequently work in ICU settings, about 25% of psychologists attended critical care rounds with physicians regularly and/or provided educational services to allied health staff or medical trainees. Very few psychologists reported being involved in patient satisfaction and quality improvement initiatives in the ICU. The most common provided clinical services were cognitive assessments, capacity assessments, family support/education, behavioral management, psychotherapy, suicide-risk assessment, pain management, and/or help determining rehabilitation services appropriateness.

Inpatient CL psychology practice has been studied, which included practice in the PICU, but did not focus on psychology practice in the PICU (Kullgren et al., 2015). At one institution, 27% of CL referrals were from the PICU (Piazza-Waggoner et al., 2013), and there have been calls for a CL model approach to psychology practice in the PICU (Colville, 2001; Tunick et al., 2013). Inpatient CL pediatric psychologists primarily work at academic medical centers, provide coverage Monday through Friday during business hours, receive 6 new consults per week on average, and see patients for an average of 5.5 contacts. Most consults occurred at unscheduled times in the patient's private room. CL pediatric psychologists have described challenges to this model such as managing competing outpatient clinical service demands, general time demands, and financial concerns (e.g., funding, billing, reimbursement). Some of these practice patterns and challenges may be similar among psychologists practicing in the PICU using a CL model, but there are likely additional considerations specific to the PICU given the different characteristics of that setting.

Psychology consultation patterns within the PICU specifically have been assessed twice at one institution at two time points (Tunick et al., 2013; J. Williams & Koocher, 1999) with largely consistent findings. Therefore, the more recent study will be focused on. From 2006-2009, about 5% of PICU patients were referred to pediatric psychology at this institution. Patients with longer length of stay, older children, those with unanticipated admissions, previously healthy children with accidental trauma or new onset acute illness, and patients with a higher mortality rate were more likely to be consulted. About half of referred patients had a documented psychiatric diagnosis, and when the parent was the target of intervention, 41% of parents had a known psychiatric diagnosis. Patients referred to psychology had a variety of reasons for admission. The most common reasons included congenital cardiac conditions and acute illnesses related to chronic medical conditions; injuries, acute illnesses, non-cardiac surgeries, and self-harm each accounted for about one-tenth of the referrals. More than half of the time, the referral involved another family member (e.g., parent, siblings) rather than focusing solely on the patient.

Referral questions primarily focused on management issues (e.g., adherence concerns, coping with medical needs, sibling adjustment, end of life care), with less frequent consults related to diagnostic considerations and mental health disposition planning needs. Referral concerns commonly focused on assistance with child coping and adaptation to traumatic stress of the PICU and/or their illness, parent and family support, and psychiatric symptoms in patients and/or parents. Williams et al. (1999), noted that the overarching treatment goal was to improve long-term adjustment through methods of self-talk, relaxation, normalizing reactions, and providing emotional support (e.g., listening, responding empathetically). There was significant variability in the number of sessions completed with families; psychologists met with patients and/or families for an average of four visits but oftentimes met with them only once.

Referrals were most commonly initiated by social workers, followed by nursing staff, physicians, psychiatry, and other disciplines, while parents rarely initiated referrals. Referral questions differed based on the referring provider’s discipline; social workers more commonly referred for parents’ psychiatric symptoms, nursing staff more commonly referred for parent and family support needs, whereas physicians more commonly referred for psychiatric symptoms in patients and/or for patients following self-harm. This suggests that the perceived role of psychologists may vary across disciplines.

Previous research on the role of psychologists in critical care settings provides a foundation of knowledge regarding models of psychology practice in the PICU. However, models of psychology practice across several PICU settings have not been assessed. It is important to comprehensively assess psychology practice across settings in order to describe current models and the scope of practice as well as to learn about strengths and weaknesses of different approaches. Focus groups would be a useful methodological approach to explore the practice of psychologists in the PICU but has not been utilized. Focus group methods are helpful to explore new and complex topics (Carey, 2012). They are well-suited for participants who are knowledgeable on the topic area, are willing and capable of communicating, and share a common language and experience (Carey, 2012). Focus groups can be preferred to one-on-one individual interviews for some research questions to allow for group dynamics and discussion which can facilitate increased engagement (Greenbaum, 2000). This approach is typically utilized in multi-method research design and can be used to clarify, extend, or qualify findings produced by other methods (Silverman, 2011). Therefore, using both surveys and focus groups would allow for capturing both the depth and breadth of the research topic.

The Current Proposal

Patients hospitalized in the PICU and their families are at-risk for negative psychological outcomes during and after hospitalization. Providing psychosocial support during hospitalization likely improves outcomes. Pediatric psychologists are well-suited to provide this support to patients and families, but the current practice of psychologists in PICUs has not been comprehensively explored. Describing the current practice of psychologists in the PICU will advance practice toward a standard model of care to improve intervention for children and families in the PICU. Bringing together a team of experts in critical care/pediatric psychology, critical care medicine, and qualitative research methods, the present study aimed to describe current models of integrating psychologists in the PICU through recruiting pediatric psychologists with PICU clinical experience to participate given their expertise in this area. A mixed-methods approach using surveys and focus groups was used to address the following specific aims. First, the present study aimed to describe the current state of psychology practice in PICUs. Second, the present study aimed to evaluate perceptions of the optimal model of psychology practice in PICUs to move toward a gold standard model of care.

Method

Researcher Positionality and Orientation

Explicitly examining personal assumptions, worldviews, and positionality relative to the participants increases awareness of their potential impact on the research process (Hampton & Reeping, 2019). The principal investigator (K.B.) identifies as a White, cisgender female clinical psychology graduate student, does not have lived experience in the PICU, and has limited clinical experience in the PICU. Her research experiences have focused on the emotional well-being of families with a child hospitalized in the PICU. She holds the belief that pediatric psychology can play an important role in supporting parents in the PICU.

The research team aimed to use community based participatory research methods to inform the design and implementation of this project through close collaboration with PICU psychologists in the Critical Care Special Interest Group (SIG) of the Society of Pediatric Psychology (SPP); the principal investigator is the trainee representative on the SIG's board. The present study's aims were derived from discussions with several pediatric psychologists with PICU experience in addition to review of the literature.

Participants

Fourteen participants with recent PICU experience (13 psychologists, one psychology intern) representing 13 institutions in 13 states participated in the present study. Almost all participants identified as White (100%) and female (93%). Participants had an average of seven years of clinical experience as a psychologist (*M*=7, *SD*=6, Range=1-23) and an average of seven years practicing in the PICU (*M*=7, *SD*=7, Range=1-27). Two participants were from the same institution; to avoid overrepresentation of descriptive data related to this institution, participants' responses regarding descriptive information about the institution were compared and compiled.

Both participants' personal and opinion-based data was included independently. All participants were compensated with a $25 gift card for participating in the study.

Procedure

The study was approved by UWM's Institutional Review Board. Participants were recruited by email through two SIGs of Division 54 (SPP) of the American Psychological Association that were likely to include eligible members: Critical Care and Consultation-Liaison.

Participants utilized a link to a Qualtrics survey in the recruitment email to provide informed consent, contact information, and brief demographic information. Participants were scheduled by email. Once scheduled, they were sent a Qualtrics survey to complete prior to participating in the focus group. In order to protect the confidentiality of the participants, the study survey was completed in two parts. First, participants provided demographic information, including their institution, and descriptive information about their institution's model of care. At the end of this survey, they used a link to route to a separate survey that asked for more opinion-based information. This approach separated opinion-based data from the participant's institution. At the end of the survey, participants had the opportunity to provide feedback on the proposed approach to confidentiality for the focus groups.

Six to eight participants per focus group is typically recommended (Krueger & Casey, 2000; Silverman, 2011), but groups of three participants were used given recommendations for smaller group sizes when conducting virtual focus groups (Carey, 2012) and after completing the practice focus group. However, one focus group consisted of two people due to a scheduling conflict. While three to four focus groups for any one type of participant is recommended (Greenbaum, 2000), 14 participants expressed interest in participating, so five groups were conducted. Focus group questions were sent to participants in advance to allow for reflection in advance of the session. Focus groups were conducted via Microsoft Teams and lasted about 1 hour. Focus groups were facilitated by the principal investigator and supervised by her advisor, Dr. W. Hobart Davies, who both have extensive experience with qualitative research methods. Techniques for moderating focus groups (e.g., how to approach dominant/shy talkers, thoughtful use of non-verbal responses) were drawn from Greenbaum (2000) and Krueger & Casey (2000). Focus groups were audio- and video-recorded and transcribed via Microsoft Teams. The principal investigator edited the automatically generated transcripts for accuracy. Transcripts were transferred to QSR NVivo Software, a qualitative software package, for analysis.

Measures

Study Survey. A 39 item Likert scale survey (See Appendix A) was developed for the purposes of this study by our team of experts in critical care medicine and critical care/pediatric psychology and relied on surveys used by other similar research projects (Stucky et al., 2016; Tunick et al., 2013). Demographic questions evaluated background information such as participant gender, race, and years of clinical experience (e.g., as a psychologist, in the PICU). Institution characteristics were assessed with questions about the institutions' practice setting and number of critical care beds. Institutional models of psychology practice were assessed with questions related to their current model of psychology practice in the PICU (e.g., embedded, consultation-liaison), referral pathways (e.g., automatic consults, screeners), and the number of psychologists working in their institution's PICU. The psychologists' PICU role was assessed with questions such as the frequency of PICU clinical work, types of referrals and interventions (e.g., parent support, behavioral management), participation in rounds, and education responsibilities. The survey took about 15 minutes to complete.

Focus Group Interview Guide. Our team of experts in qualitative research methods, critical care medicine, and critical care/pediatric psychology developed this guide using established frameworks for qualitative research and focus groups (Kallio et al., 2016; Krueger & Casey, 2000). The development of the guide followed recommendations from Krueger & Casey (2000) including phases such as brainstorming, phrasing the questions, sequencing the questions, estimating time for questions, getting feedback from others, and testing the questions. Therefore, the interview guide was pilot tested and followed by a cognitive interview with a group of psychologists with similar experience to assess length of time, ensure accurate assessment of desired constructs, and to provide a training opportunity for the focus group facilitator. Following this pilot test, it was determined that having three participants per group for one hour would be ideal.

Focus group questions assessed topics such as current models of psychology practice in the PICU, advantages and challenges of the models, perceptions of the ideal model of psychology practice, and strategies for advocating for improvements in psychology practice in the PICU. See Appendix B for the focus group guide.

Data Analytic Plan

Quantitative Survey Data. Descriptive statistics were used to assess frequency of responses for each item.

Qualitative Coding of Focus Groups. Focus group data is most commonly analyzed using thematic analysis (Silverman, 2011). All transcripts were coded using reflexive thematic analysis to provide a rich description of the dataset (Braun & Clarke, 2006). An inductive approach was used given the exploratory nature of the study. Coding was conducted by 5 psychology graduate students, conducted in two groups of three coders. Transcripts were reviewed to independently generate codes. A final codebook was collaboratively created and then applied to all transcripts by two coders for each transcript. Disagreements were discussed to 100% consensus. Codes were collated and reviewed to identify latent themes (i.e., underlying ideas, assumptions, and conceptualizations).

Results

Current Models of Psychology Practice in the PICU

Institution Characteristics

Most participants practice in an academic medical center (85%) and Level I trauma center (77%). The institutions had a large range of number of critical care beds with a median of 55 beds (*Mdn*=55, *IQR*=25, Range: 10-716). See Table 1 for full data regarding institution-level variables.

Institutional Model of Psychology Practice

The most common model of psychology practice in the PICU was having both CL and service-specific (77%) coverage of the PICU, with CL, service-specific, and embedded (15%) and CL only (8%) being less common. Of participants who reported having at least one psychologist practicing in the PICU in the following roles, participants reported an average of 5.5 service-specific (*M*=5.5, *SD*=4.3, Range: 1-18), four CL (*M*=4, *SD*=1.4, Range: 1-15), and three embedded psychologists (*M*=3, *SD*=1.4, Range: 2-4). On average, institutions reportedly have nine psychologists practicing in the PICU in one of these roles (*M*=9, *SD*=8, Range: 1-29), though this does not account for psychologists who practice in multiple roles. Participants most commonly felt that their institution has fewer psychologists than are needed to meet patient and family needs in the PICU (57%), whereas 43% felt they have about the right number of psychologists needed. On average, participants reported that having 2.6 psychologists per 30 PICU beds would be ideal (*M*=2.6, *SD*=1.5, Range: 1-7).

Participants are most commonly referred or requested by medical providers (100%), families (92%), and/or social workers (62%). Funding for most (93%) PICU psychology practice was non-specific (e.g., part of psychology service), though two participants reported that their service receives donor funding (15%).

Psychologist Role

See Table 2 for full results. About half of participants identified as only CL psychologists (57%), with others identifying as only service-specific (14%), both CL and embedded (14%), both CL and service-specific (7%), or only embedded (7%). Participants spent an average of 20% of their typical work week working in the PICU (*M*=20%, *SD*=12%, Range: 5-50) with an average PICU caseload of two cases at any given time (*M*=2, *SD*=1, Range: 0-4). Participants reported spending an average of 61% of their time on the CL service (*M*=61%, *SD*=20%, Range: 30-95) with an average inpatient caseload of 6.5 cases (*M*=6.5, *SD*=3.6, Range: 2-15). Psychology coverage was reported to be provided on workdays (~9am-5pm; 100%), with 25% offering weekend coverage, and no participants reported providing evening or overnight coverage. Participants most commonly received PICU training via self-directed and formal learning (43%), with 29% endorsing only formal training and 21% endorsing only self-directed training. About half of participants (57%) were satisfied with their PICU training, with 21% neither satisfied nor dissatisfied and 21% somewhat dissatisfied with training.

The most common patient populations/conditions were medical complexity (93%), trauma (86%), previously healthy (79%), primary neurologic (excluding traumatic brain injury; 71%), and post-surgery (71%). The following services were most frequently endorsed as being services that participants provided often to very frequently: anxiety management (100%), family support/education (93%), and pain management (72%), with cognitive (0%) and capacity (0%) assessments being the least frequently provided services. The following targets of intervention were most frequently endorsed as being targets that participants provided often to very frequently: anxiety (100%), adjustment (85%), pain (85%), sleep (71%), trauma (71%), and screening for anxiety, depression, or trauma (64%). Regarding other PICU involvement, 50% of participants attend critical care rounds weekly or daily, 43% provide education to medical staff monthly or weekly, most (71%) rarely or never participate in staff debriefings or provide emotional support to PICU staff, and 57% of participants reported being involved in PICU program development. See Table 3.

Regarding other psychosocial supports in the PICU, all participants reported that their PICU has coverage from a chaplain, psychiatrist, social worker, and child life specialist, with most also having a music therapist (77%). See Table 4. Patients were most commonly supported by psychologists (100%), psychiatrists (100%), child life specialists (100%), chaplains (92%), music therapists (77%), and social workers (69%) across institutions. Caregivers were most frequently supported by chaplains (100%), social workers (100%), and psychologists (77%). Siblings were most commonly supported by child life specialists (85%), with psychologists involved at 31% of institutions. See Figure 2.

Focus Group Qualitative Data

Most Rewarding Aspects of PICU Psychology Practice

Qualitative themes are presented in italics and capitalized. Participants described specific ways that their PICU practice is rewarding, including *Supporting Families, Witnessing Patient/Family Progress, Collaborating with PICU Staff*, and *Other Rewarding Aspects.*

Participants noted that *Supporting Families* during a stressful experience is rewarding, defined as having the opportunities to offer comfort and support (e.g., emotional support) to patients and families. For example, one participant described, "It's an honor to kind of meet families on the worst day of their life or one of the worst days of their lives and have a role in that emotional support piece." Participants described enjoying the appreciation that families express for their support and recommendations is rewarding: "They are usually, across the board, with few exceptions, very appreciative and eager to receive extra support and services. And so it's positive interactions. It's always good to feel appreciated and that the services or skills we're able to offer are valued and useful."

Participants described that *Collaborating with PICU Staff* is rewarding, such that they appreciate collaborating with and getting to know other PICU staff. For example, one participant reported, "Working alongside just some very unique personalities who choose to spend their career in the PICU is also very interesting."

Participants described that *Witnessing Patient/Family Progress* (e.g., medical progress, resilience) over time is rewarding. One participant described, "To see their progress and to celebrate that progress with them is amazing. And to reflect back on their progress that they've been making, to go from being sedated on a ventilator to now they're walking again. So it's--that to me is incredible to be a part of the journey with them."

Participants described *Other Rewarding Aspects* of PICU practice, such as continuing to gain new skills and knowledge in the PICU, facilitating communication between the medical team and patients/families, and supporting early psychological intervention.

Evaluation of Current Models of Psychology Practice

Participants described several advantages and challenges to embedded and non-embedded (service-specific, CL) models of psychology practice in the PICU. See Figure 3.

Common Themes Across Models. Overall, participants noted that *Continuity of Care* is an advantage of all the models, whether embedded, service-specific, or CL. Participants in all roles described that following patients across different floors and units during hospitalization was beneficial for continuity of care and supported relationships and rapport. One participant described,

> We do see patients throughout their admissions. So a lot of times we will see patients on the floor and if they're transferred to the PICU, it's really nice because we transition with them, whereas their social worker changes, their nursing team changes, the attendings change. And so we are a face that has some continuity and some rapport, and we can kind of share their narrative and their story with the teams as they go along.

Participants noted that the service-specific role also has the advantage of having *Prior Relationships* with patients and families, which contributes to continuity of care from outpatient to inpatient, rapport with families, and understanding the patient and family context outside of hospitalization: “I love that I get to be a constant for them…it also feels very sacred to be like I'm someone that you know, we don't have to kind of start from scratch on the worst day of your life.”

Both embedded and CL psychologists described that generally being *Readily Available to See Patients/Families* is an advantage of their model. Two CL psychologists expressed, “My time is intentionally tried to be kept flexible to be able to respond to the hospital needs, so might have a little bit more flexibility for responding to issues sooner,” and “there will always be someone who is available, within reason, to respond.” One embedded psychologist described, “Being more embedded, we’re very available to our team and typically, I think, respond to consults pretty quickly, especially more of those like day of kind of dying experience, like fast decline, we can be very available for those type of things and I think be good support.”

However, participants noted that *Balancing Outpatient Demands* with inpatient demands can be a challenge for CL and embedded psychologists who also have outpatient responsibilities.

For example, one participant described, “Even though we're embedded, we still have other demands throughout the hospital, whether that be meetings, we do have a very small pool of outpatients that we’re required to see at our hospital too alongside of our inpatient duties…it's hard to balance all of those many different demands with just how like urgent needs come up in the ICU.” Another participant noted, “Since we do follow our patients on days when we're not on call, most of us have other responsibilities…like I might get a message from a team that's like, hey, this family is hoping you can meet with them today, but it's at 2:00 o'clock and I'm in clinic for the rest of the day.”

Embedded Model

Advantages of Embedded Model. Overall, participants expressed that being *Part of the Team* is an advantage of having time dedicated to the PICU, which includes *More Involvement in Identifying Patients/Families, Better Relationships with PICU Staff, Having a Seat at the Table,* and *Possible Flexibility to Provide a Broader Range of Services.* Participants noted that having time dedicated to the PICU contributes to being “seen as a part of the team” and “some normalization of like, we are just here, part of the team and in the milieu.” Participants noted that being part of the team may normalize psychology’s involvement for patients and families. One embedded psychologist described, “I think it’s helped normalize like we’re not just calling psychology because somebody thinks you guys are having a hard time or something’s wrong or you’re gonna get bad news. I think we’re seen a little bit more as part of the team.” Whereas two CL psychologists described possible stigma related to psychology services when they are not seen as part of the team. They noted that “sometimes there’s this thing of ‘oh, you’re calling psych on us now.’ We have to come in and be like ‘no, no, we just like-- we don’t think there’s anything wrong with you. We’re just here to support,’” and “We’re this new face they’ve never heard of, and we’re being called on them versus like presenting as a squad.”

Participants described that having psychologists with dedicated time in the PICU allows them to have more *Involvement in Identifying Patients/Families* who could benefit from psychology intervention. For some, this occurred through increased consultation and communication with medical providers: “It also led to a lot more collaborations being the point contact person from psychology. So even if they are questioning, should we put in a consult, sometimes they would kind of contact me first before ordering. Like, ‘hey, is this appropriate?’ or ‘Is this something you could do?’ So it just was very helpful in terms of communication with the team.” For others, this occurred through additional opportunities for interacting with patients and families (e.g., rounds, family meet and greets). For example, one participant described, “…Versus an embedded model, where you're there and you can-- you have a better pulse on who needs to be seen by us, who doesn't, whether you're getting wind of it from rounds or from another provider.” Another participant noted, “[Having dedicated PICU time] has allowed being able to go to psychosocial rounds twice a week, being able to round with the medical team on every family once a week. And that has actually led us to identify families that never would have gotten the consult before.”

Participants noted that being embedded contributes to *Better Relationships with PICU Staff*. One participant described, “We've built closer relationships with our PICU providers, both medical providers, nurses, and that psychosocial team. Because that's where they are all the time.” Participants described that having time dedicated to the PICU has supported their ability to *Have a Seat at the Table* to participate and be invited into meetings and initiatives. One participant noted, “I really had a seat at the table. I had a presence. They would invite me in on certain discussions and then with that, they also invited me in on group initiatives or program development initiatives.” Another participant expressed, “We are very much in the know about a lot of things. I think we have recently gotten pulled a lot more into like nursing burnout, compassion fatigue, like general unit things as well…I think it brings up a lot of newer potential things that psychology can be a part of.”

Participants expected that being embedded could lead to *Possible Flexibility to Provide a Broader Range of Services* (e.g., attending rounds and meetings, providing staff education, communicating with providers) where psychologists have time dedicated to offer these services that are typically non-billable for insurance purposes. For example, participants described, “We’re able to provide some of those non-billable services”, “I had dedicated time to round with them once a week”, and “It seems like [an embedded psychologist] would have even more liaison time than someone who is general CL, right?”. However, it is important to note that one embedded psychologist noted that they did not have time dedicated to engage in non-billable activities.

Challenges of Embedded Model. Participants expressed concern that primarily or only practicing in the PICU may impact *Psychologist Well-Being* for some psychologists due to the intensity of the PICU environment. Participants expressed, “I do think that it can be helpful to have some balance where you can see somebody through the course of their care versus if you're only seeing them in that worst moment. And then that's it. I could see that being tough,” and “if that's all you're doing all the time and that level of acuity could be really tough.” Another noted that the variety of practicing in multiple settings helps balance the intensity of the PICU. They described,

> It does reduce some of the intensity. I do think that there would be some drawbacks…if you weren't the right kind of person for the job, to being in an ICU setting 100% of the time. It's nice to go to the general floor and you know, teach a kid how to swallow a pill. Dealing with all of the trauma and death and dying and family issues 100% of the time could be challenging for some people, I think.

Participants described *Other Challenges* to the embedded model, such as difficulty with boundaries with PICU staff (e.g., being pulled into staff conflicts or addressing staff well-being) due to having closer relationships as well as variable support for non-billable services.

Non-Embedded Model (Service-Specific & CL)

Advantages of Non-Embedded Model. As described above, *Continuity of Care* was frequently reported as a primary advantage to CL and service-specific psychology roles. Participants noted that the *Variety* that comes with CL work is an advantage for them. Specifically, they described that the diversity in cases and working in different settings of CL work offers balance to their time in the PICU. “I think this is about the balance for most people, right? And why most of us like CL who do it, or choose to kind of focus on it, is that, right?” One participant noted that CL offers good training experiences to see a variety of patients and families in different contexts: “Being able to get such a like a wide array of different services is helpful training.” Participants described *Other Service-Specific Advantages* such as having closer relationships with service-specific medical providers and not needing to acquire PICU specific medical expertise in addition to their service-specific knowledge.

Challenges of Non-Embedded Model. Participants expressed concern about *Underutilization of Psychology Services* which leads to missing patients and families that could benefit from psychology services. One participant described, “I think that is just like an ethical issue I feel like I grapple with…that everyone's falling through the cracks, like we're just seeing a few select patients… it just feels quite concerning. But I think that's the big negative to being consult based and not being integrated.” Participants noted that this underutilization may be due to *Lack of Understanding about Psychology’s Role* and being *Less Present* in the PICU.

Participants expressed concern about underutilization due to *Lack of Understanding about Psychology’s Role.* Non-embedded participants noted that they are often reliant on other providers to consult psychology: “When you don't have somebody embedded in the PICU, you're sort of relying on the physicians or the, you know, social work, but often the physicians to say who does or doesn't need psychology.” Therefore, they described that they may be underutilized if referring providers lack understanding about the role of psychology and when to consult (e.g., timing, which patients/families). Participants described, “I really think we're missing a lot of the kids we should be seeing because I don't think they have a good grasp on the role of psychology in the PICU,” and “One thing that we’ve been kind of juggling recently is the timing of consults, like either being consult just like way too early…versus like way too late.”

Participants also noted that *Lack of Understanding* or different perceptions of CL versus service-specific psychologists can be a challenge: “Everybody practices differently, and sometimes we get pushback. Well, why? Why don't you practice like them or why don't they practice like you?”. A couple of participants described that this can have consequences for communication and team dynamics: “It leads to a lot of issues with handoffs and continuity and a lot of splitting.” Another described, “I think we have to be really tight with those other psychologists so that we can send them a message and say, ‘hey, this came up’ or ‘hey, that came up, this is what I said.’ It would be really easy to unintentionally split against our colleagues, and we really don't want that to happen.”

Participants noted that this lack of understanding about psychology's role necessitates *Continued Education for PICU Staff* about the role of psychology. One described "I think the teams just need some education on when would be appropriate [to consult psychology]." Some noted that this continued need for education can be time consuming: "I feel like we're constantly trying to, you know, normalize like what a consult would like, reasons for consult, and that it's not just the three that we see all of the time that people think of when they think of psychology". Many felt that this re-education would not be as necessary if they were embedded: "There needs to be kind of reeducation a little bit more often. But I wouldn't need to do that if we were embedded," and "I find that because there is no dedicated PICU psychologist, I feel like we spend a lot more time reminding people what we do and what services we provide."

Participants expressed that psychology may be underutilized because providers consult with other psychosocial providers due to psychology being *Less Present* in the PICU when they are not embedded. One participant described,

> I also think that some of our providers, it's like, 'Well, I see the social worker in the hallway' or 'I saw the child life specialists in the hallway who is unit based or the chaplain.' And so I think sometimes those services are utilized more…I don't think it's like that people aren't like psychology could be helpful, I just think we're not on their minds because they may not be seeing us.

Participants described that they have *Less Relationships with PICU Staff* due to not being embedded: "Like if somebody was just embedded in the PICU, and that's all they were doing…the relationships would happen faster," and "Not necessarily having a good relationship with the team. Like [the embedded psychologists] both spoke about how awesome the critical care doctors are, and the few I know I like. But I'm like, gosh, I wish I like had a professional relationship with them and I was able to be at meetings and be able to really get to know them."

Participants described that as non-embedded psychologists, they may have *Less Specialized PICU Knowledge,* and that it may take more time to gain PICU expertise and comfort. One participant noted,

> I think it's possible that like if you put a consult in, you're gonna get a provider who maybe doesn't have a specialized interest in the PICU or maybe even a ton of experience in the PICU just depending on like who is on that day, so potentially that's a piece that comes up too versus someone who's dedicated the to the PICU who presumably is gonna have a lot of specialized knowledge in that area.

Another participant described, "I think the learning curve in the model of being in more than one place obviously is slower, right? Like if somebody was just embedded in the PICU, and that's all they were doing, I think like the language of the different medical presentations would come along faster and the culture of the place would come along faster."

Participants noted that it is difficult to try to address these challenges (e.g., need for continued staff education, improving relationships, being more present in the PICU) due to *Lack of Dedicated Time for a Broader Range of Services* as non-embedded psychologists. One participant described, "The amount of time is minimal and because of that, I think we're falling short on educating staff about what we do in the PICU and our services, when it's a good time to consult with us or what kinds of cases are appropriate." Participants expressed that it is challenging to participate in new initiatives: "when they do ask us to do, you know, work on initiatives and stuff like that, it's very hard to be able to give our time of that because, you know, we aren't dedicated to that," and "We all have different responsibilities, so it's a little hard to engage in some of these like new initiatives and ideas when it's not just kind of built into your role."

Ideal Model of Psychology Practice

Participants reported that adding or continuing to have *Dedicated PICU Time*, defined as having time bought out to dedicate time to PICU related work, including non-billable services (e.g., education, staff support, rounds), and to increase the presence of psychology in the PICU would be ideal. One participant reported, "I think having a lot of bought out non billable time is an ideal state." Many noted that having protected time would improve their ability to build relationships, work on new initiatives, attend meetings, and provide education. They described,

> Someone who's got protected time…you're going to kind of be our champion in this area. You're gonna help build these relationships and be the point person for when they have questions or needs…Then also kind of we can take the initiative or be proactive in terms of identifying trends or needs of reaching out and kind of helping establish the more systemic kind of programs or supports.

Another shared, "The phrase protected time was the one that popped into my head of like having more psychologists and having psychologists who have time specifically dedicated to program building, education, and also just specifically dedicated to the PICU."

Participants noted that having this protected time would improve outcomes and care: "Having carved out time where we're not accountable for RVUs. I mean there is just no way to hit RVUs, make everyone at administration happy, while also doing things like attending meetings, doing program development, which we know are helpful for outcomes and also helpful for us, like getting things on track with getting the right referrals in the future. So, I think that is absolutely needed." Another participant described, "I would echo very strongly that same encouragement that sometimes needs to be had for these non-billable experiences that are still like so meaningful, like we know they like save money and they're helpful in the long run." One embedded psychologist described that having dedicated PICU time improved their job satisfaction: "I can say that [having time bought out] has been a game changer and that that is essential. And I feel like my own personal job satisfaction improved when that happened because I felt like I was doing my job better."

In addition to this model-specific recommendation, participants suggested several ideas for improving the model of psychology practice in the PICU in general, including suggestions for strategies to *Improve Patient/Family Care, Improve Staff Psychosocial Support,* and *Other Recommendations for Improvement.*

Participants suggested ideas to *Improve Patient/Family Care,* such as *Improving Identification of Patients/Families* through *Improved Protocols* and *Improved Staff Education, Improved Post ICU Care* and *Improved Care for Family Members.* They expressed the importance of improving identification of patients and families who could likely benefit from psychology intervention. Participants noted that *Improved Protocols*, such as better screening, standardized protocols, and establishing standards of care could improve identification of patients and families. Participants described, "I think an ideal model is regular screening to identify these children," and "I really like the idea of, how do I even say this, just better processes in terms of identifying these patients, so more regular screeners, more standardized screeners, or maybe more standardized time points of when to get us involved." Some noted that automatic consults can be helpful, though some noted that there can be challenges to that as well: "I know there are some places that do automatic consults, and I think there's kind of pros and cons to that….but I think the pro of automatic consults is that it really normalizes psychology for the teams and just makes sure that there's like a standard of care."

They also expressed that *Improved Staff Education* could facilitate better identification and support of patients and families. One participant noted, "I do think that one of the things that we really can offer are, in services and other trainings to support staff in the PICU to do, you know, different work, better work, improve their care, which I think, you know, also then does reduce some of our burden and need for consultation." One participant noted that they tried to implement staff education at their institution about the role of psychology, and they did not feel that it was successful. They described,

> We did try to roll out some like brief recorded like presentations that could be shared with providers and nursing, bedside staff, and just about like what does psychology do, how do we work, some of the commonly asked questions…and it was not helpful for our institution. People didn't have the time to watch them. We still get the same questions all the time.

Participants suggested ways to *Improve Post-ICU Care,* including follow-up psychology care for patients and families post-discharge from the hospital. One participant described, "I think ideally, continuity of care after the PICU so that we are following these children. And I love the idea of post ICU follow-up clinics. I think that's a really good route to go." Another described use of surveys after discharge. They noted,

> Maybe it's not even a clinic, maybe it's like just some-- our NICU does some like post NICU follow up surveys and then offers additional kind of resources and services based on responses to those. So we've just kind of been talking about that, like does our care

> end when patients leave the ICU doors or is there more that we should be doing kind of post ICU stay to provide that support.

Participants described the need to *Improve Care for Family Members* (e.g., caregivers, siblings) in the PICU. One participant described,

> We do not have the bandwidth for like caregiver dedicated or focused intervention, which there's kind of-- I don't know, but it feels more predominant or kind of more frequent in the PICU… in terms of like the ideal position, having resources and dedicated bandwidth for not just the pediatric services, but the family or caregiver needs as well would be ideal.

Participants described *Other Improvements to Patient/Family Care,* such as improving administrative processes for consent to services and scheduling time to complete consults with patients/families, providing psychology coverage on the weekends with appropriate compensation, better delineating roles between psychosocial providers, having psychosocial rounds, and using technology to provide education and/or intervention.

Participants described the need to *Improve Staff Psychosocial Support* in the PICU, with careful consideration for the role of psychologists in providing this support. Many noted the importance of supporting staff. For example, participants noted, "All these providers are so burnt out, they really do need the space," and "In terms of systemic factors for our like good, patient centered and just quality of care within a PICU, having good institutional services or supports for staff, particularly PICU staff who are going to be handling some really upsetting and challenging situations."

They described the importance of maintaining boundaries as a psychologist in consideration of providing staff psychosocial support, including "I don't necessarily see that as the role of pediatric psychologists to be providing therapy services for staff.” Another participant shared,

> I commonly will have to try to distinguish boundaries between like I am not your personal therapist, we can get you help in other ways, and I act as a lot more of like a resource giver to a lot of our therapists, staff members, everyone to kind of make sure they're getting their own help, also not kind of taking that on ourselves.

Participants shared ideas for how to improve this care. If the psychologists are involved, some noted meeting in a group format with structure to avoid serving as a therapist for providers. They described, “I do think it probably would have to be kind of more in a group format because I think I wouldn't wanna like, you know, start feeling like a therapist for the providers, right? That's the risk.” Another participant expressed,

> We're going to meet in the group setting, I'm going to have more of like an agenda or like a kind of a prepared presentation about, you know, coping and you know, responding to these needs or how they kind of help-- self-care kind of focus sort of conversation. So doing that that really trying to keep it out of like I'm providing group therapy too, you know, while still trying to hold some space and kind of validate the experiences that the staff were having, but so. I guess maybe from that perspective in terms like the ideal PICU psychologist position of like having support and systems in place to kind of help provide that so it doesn't just fall on them.

One participant described having a psychologist who was not involved in the case participate in debriefing can be helpful, “Having other psychologists that are rotating through so it's not traumatic for us too to also be the ones kind of debriefing with everyone all the time.” One participant described the importance of support from leadership to improve this support, “I do think that needs to come from the PICU like training director or the leadership, right, to be like-- to make the time and to make it seem like-- and to make it, you know, super unstigmatized and normal place that you reach out to that."

Advocating for Improved Models of Care and Increased Presence of Psychology

Participants described the need to advocate for *Increased Financial Support* to support improved models of care and increased presence of psychology in the PICU. Some participants described ideas for sources of funding, with some noting advocating for support from the medical team. For example, one participant reported, "I think they've also tried to maybe push back on the PICU and other floors too to help try to cover some of our salary because that's one of the hardest pieces is kind of taking on more people in the psychology department, at least in the way our hospital is set up," and "I don't know, if the money could just magically appear. I mean, I'm gonna say like probably the medical team is the one that would have to pony up, you know, critical care, probably they have some money I don't know, probably more than psychology has." Participants from another institution noted that they were able to increase psychology's presence through a donation: "Is there a donor, you know, that would like to do psychosocial support in the ICU? Maybe working with the foundation at your institutions to say, you know-- you can even name it…the such and such psychology support program or whatever." Participants also noted that the psychologists' salaries are significantly less than medical provider salaries: "We cost some money, but compared to what a physician costs, like, it's just a drop in the bucket." Participants provided ideas for how to advocate for increased financial support, including *Demonstrating Psychology's Value, Establishing Standards of Care, Fostering Relationships,* and *Other Advocacy Approaches.*

Participants described the importance of *Demonstrating Psychology's Value* in order to advocate for these changes. They noted that *Collecting and Utilizing Outcomes Data* and *Sharing Information about the Role of Psychology* could be ways to do this. They noted that collecting and disseminating data that demonstrates the value of psychology on different outcomes could be helpful. Some talked about the impact on medical outcomes (e.g., length of stay) and cost-effectiveness. They described,

> The people who dole out the money for services want to see data. And so I think like for anyone who's advocating, the first thing you want to think about is like what outcomes are we hoping to improve and how can we start to collect some information on that. And so that's been pretty useful in the past for other things for us just like kind of proving the value or the need or what kind of improved outcomes are we looking at.

Some participants described collecting and disseminating data about how psychology involvement can improve medical outcomes, "You have to find other metrics that are of value to the institution. So if I'm not going to make money, do I reduce length of stay, do I free up a bed in the ICU because I was able to get this kid to take their meds or get their behavior under control so they could be extubated faster or whatever it is."

Participants described using data about the number of consults seen and missed opportunities. They reported that they collected data about "the consults that we missed or were unable to see due to various reasons… it's pretty jarring." Others noted the impact on psychosocial outcomes, including patient/family and staff satisfaction**.** They described,

> Even like patient reports or staff report, staff satisfaction. I think that there's real opportunity probably for us to use that as a metric…I think even that sense of staff

> feeling like socially supported, or at least feeling like some of the burden around some of the experiences they're having is reduced would probably make a difference too.

Regarding *Sharing Information about the Role of Psychology*, participants described educating others and communicating about the role and benefits of psychology in the PICU. For example, one participant noted, “I think making them aware of some of the things that we are doing.” They described doing this through communicating with others at their institution (e.g., lunch and learns, talking about cases with colleagues): “…lunch and learns. And we would do it for nurses…we would literally sit down with them and be like, here's what we do in psychology and here's what non-pharm pain management looks like, and here's how sleep hygiene, here's what we do for sleep.” Another participant suggested giving talks. They described,

> The one thing that comes to mind is giving talks. I think that's often good and it's kind of an unofficial part of our job, but I find that like whenever I am asked to like, give a talk, let's say on medical trauma to pediatric residents or, you know, grand rounds or things like that, like people are like, ‘Ohh right, I forgot about that’, or ‘I didn't know you guys could do that’…so I think that can be one way to kind of start planting seeds, especially in institutions that aren't familiar. It's kind of, you know, giving like a talk with a case presentation that really illustrates like the many ways in which we can help.

One participant suggested writing advocacy pieces and/or commentaries: “Writing advocacy pieces and commentaries on why we need psychology in the ICU.”.

Participants described the need to *Establish Standards of Care* related to psychology practice in the PICU for medical and psychology audiences. One participant noted, “I think we have to come up with standards, we have to come up with-- this is what we recommend. I know a lot-- I know one of my other clinics, the way that they got me was because there's some treatment guidelines and it says there needs to be a psychologist or mental health care." Another described, "I think you probably would have to pitch it as part of the hospital's national reputation or something like that…like the standard of care at the best children's hospital is that you have a psychologist in your PICU. That kind of thing is, I think, probably what's meaningful to administrators who control the budget."

Participants noted the need to *Foster Relationships,* by creating and maintaining relationships and communication with others, particularly medical providers, who can help advocate for the value of psychology: "Build the relationships. Talk to the nurses," "I do think through some of that historical maybe like rapport that we've built in with people, we're getting pulled into a lot of I think like more important meetings," and "find who your allies are." Several described identifying a medical provider "champion" to help advocate for services. Participants described, "honestly, in our experience maybe some like physician champions and people that are the ones that are kind of pushing for it…kind of people who have a little bit more like power and pull in the hospital too kind of seeing psychology's value," and "I feel like you'd probably have to identify a champion. Somebody who is a provider in the PICU and maybe has some level of administrative authority that you could kind of bend their ear."

Participants described *Increasing Psychology Presence in the PICU*, by being in the PICU environment as much as possible: "just literally need to spend time and space" and "attend the meetings." They described several ways to increase presence, "You have to be there. You have to be on the floor. You have to be wandering the halls…find out when the fellow didactics are or the division meetings and go to those, and insert yourself in psychosocial rounds if you're not invited or create your own," and "If they have an opportunity to kind of go spend time there, even if it's just like, hey, can I come like observe rounds for a day or a shadow for a day."

Discussion

Summary of Findings

The present study demonstrated several findings that relate to and extend previous research about models of psychology practice in the PICU. Consistent with previous research in critical care contexts, most participants practiced in a Level 1 trauma center within an academic medical center and offer Monday through Friday business day coverage (Kullgren et al., 2015; Stucky et al., 2016). As compared to a pediatric and adult critical care study, participants in this study reported more frequent involvement in attending critical care rounds, providing educational services, and being involved in program development (Stucky et al., 2016). This may be due to these services being more common among pediatric critical care settings, increases in psychologist involvement in these areas since this previous study, and/or selection bias, such that psychologists who were more involved in these areas may have been more likely to participate in the present study.

Regarding the role of psychologists in the PICU, participants felt that the work they do in the PICU is meaningful, such that they are making a difference, getting positive feedback, and forming relationships in a difficult setting and experience. They most commonly address anxiety, adjustment, trauma, sleep, pain, and family support/education, which is consistent with previous research regarding psychology practice in one PICU (Tunick et al., 2013). However, participants in this study reported never offering cognitive or capacity assessments, which is inconsistent with a study on combined pediatric and adult settings (Stucky et al., 2016); it is possible that these services are offered more commonly in adult ICU contexts. The most common patient populations were patients with medical complexity, trauma, previously healthy, primary neurologic, and post-surgery. Psychologists were most commonly referred by medical providers, families, and social workers.

The most common model of psychology practice in the PICU was a hybrid model involving coverage from CL psychologists who serve the inpatient population and see patients in the PICU when they are consulted as well as service-specific psychologists (e.g., hem/onc), who see their patients if they are hospitalized in the PICU. Having an embedded psychologist in the PICU was less common, which, to our knowledge, reflects the broader field of psychology practice in the PICU. Participants communicated a range of embedded roles ranging from attending psychosocial or medical rounds, having time dedicated to work on program development, to having an embedded psychologist with time dedicated to clinical work in the PICU.

Participants described several advantages and challenges to these different roles (i.e., embedded, CL, service-specific). Continuity of care was an advantage of all the roles, such that psychologists could follow patients across inpatient units, and service-specific psychologists also have continuity from outpatient to inpatient care with their patients and families. CL and embedded psychologists described that having a flexible schedule that allows them to be readily available to see patients and families when needed is an advantage, though some noted that balancing outpatient demands can be challenging, which is consistent with previous research among CL psychologists (Kullgren et al., 2015).

Participants described that embedded psychologists are perceived and integrated more as a part of the team than non-embedded psychologists, resulting in better relationships with other PICU staff, having a seat at the table to be involved in initiatives, and more involvement in identifying patients and families who could benefit from their services. Whereas non-embedded psychologists felt less like they were a part of the team, likely due to not being able to be as present in the PICU, which leads to less relationships, less time for involvement in initiatives, and less specialized PICU knowledge and comfort. Many non-embedded psychologists expressed concern about underutilization of psychology due to lack of understanding of the role of psychology and the need for continued education about their role. This concern about underutilization is likely valid, given that in one PICU, only 5% of patients and families were referred to pediatric psychology (Tunick et al., 2013). Not having time to engage in non-billable services (e.g., education, program development) was a significant concern, consistent with past research among CL psychologists (Kullgren et al., 2015). Some participants described that practicing in the PICU most or all of the time might impact the psychologist's well-being (e.g., mental health, burnout) given the intensity of the setting, and some noted that they appreciate the variety of cases and balance of working as a CL psychologist.

Participants described the "ideal" model of psychology practice. About half of participants felt they had fewer psychologists than needed to effectively provide services to their PICU. On average, participants felt that having at least 2-3 psychologists per 30 PICU beds would be ideal. Overall, many participants expressed that having psychologists with time dedicated to the PICU and time bought out to offer non-billable services would be ideal. Many envisioned that this person would be involved in activities such as liaising with other providers about psychology services and consults, attending rounds, providing education to staff, and participating in program development. They felt that this would improve the identification of patients and families that could benefit from their services. Across current models, participants described that their roles varied on the following factors: responsivity, continuity of care, relationships with PICU staff, optimization of identification of patients and families who could benefit from services, time for non-billable services, specialized PICU knowledge, and psychologist well-being. It is likely that optimizing these factors would support progress toward the "ideal" model of psychology practice in the PICU. Additionally, participants expressed that there is room for improvement in patient and family care, including identification of patients and families (e.g., considering use of screeners and/or staff education), post-ICU care, and family care (e.g., siblings, caregivers).

Participants provided several suggestions for how to advocate for this ideal model, including advocating for financial support, collecting and utilizing outcomes data, sharing information with others about the role of psychology, establishing standards of care, fostering relationships, and being present in the PICU.

Clinical Implications

This study has several important clinical implications. Overall, participants felt that increasing the presence of psychology in the PICU and having dedicated time to engage in non-billable activities would be beneficial. Moving toward this model would likely have several benefits. This would likely improve patient and family care and psychological outcomes by promoting better identification of patients and families to reduce distress during hospitalization. Previous research suggests that having someone to talk to during hospitalization reduces distress, and reduced distress during hospitalization correlates with less distress later on (Balluffi et al., 2004; Colville & Gracey, 2006; Stowman et al., 2015). This is also consistent with the Integrative (Trajectory) Model of Pediatric Medical Traumatic Stress, which suggests that providing support during this time can increase the likelihood of resilience and recovery (Price et al., 2016).

Many participants noted that improved identification of patients and families is important through increasing the presence of psychology in the PICU, considering use of screeners, and improving staff education. By being more present in the PICU, psychologists can use their expertise to help identify patients and families through increased consultation with medical providers, involvement in psychosocial and medical rounds, and possible meet and greets with families. Use of brief screening tools may also be helpful in identifying patients and families most at-risk to provide additional support and/or refer to psychology, especially given the number of medical decisions ICU providers must already make independent of identifying distressed parents and determining how to respond. Specifically, intensivists make over 100 critical care decisions daily (McKenzie et al., 2015). Therefore, brief screenings may remove additional burden from providers on identifying and referring distressed families, reduce human bias in identification and referrals, and improve outcomes for families. Previous research has found that the Posttraumatic Adjustment Scale and Distress Thermometer have been effective in identifying families at risk for long-term distress (Liaw et al., 2019; Samuel et al., 2015). Furthermore, Liaw et al. (2019) found that using screening tools increased patient satisfaction with emotional support and decreased the number of calls to security for distressed families by 50%. In addition to these efforts, improved staff education would also help providers understand the role of psychology and better utilize their services.

There is likely room for improvement in post-ICU care, as noted by participants, which warrants further research. One exploratory study evaluated the benefits of offering a follow-up appointment after discharge to parents. Colville et al. (2010) found that only 25% of parents chose to attend a follow-up appointment; however, parents with higher baseline stress were more likely to attend, and parents with higher baseline stress demonstrated decreases in posttraumatic stress and depressive symptoms when offered an appointment. This suggests that follow-up appointments may be beneficial for parents experiencing more stress.

Some participants noted that it is necessary to improve support for family members of patients in the PICU (e.g., siblings, caregivers). Previous research strongly suggests that parents of patients are at heightened risk for negative psychological outcomes (Nelson & Gold, 2012). Siblings' experiences have not been thoroughly explored, but previous studies suggest that siblings experience significant stress and may also be at risk for negative psychological outcomes (Abela et al., 2022; Rennick et al., 2021). The findings of the present study suggest that child-life specialists are the primary supporters for siblings while social workers, chaplains, and psychologists more commonly support parents. Participants noted challenges to providing this care, including lack of psychologists with adult expertise as well as logistical and ethical considerations (e.g., billing, insurance, charting). Providing support to parents and siblings in the PICU is in-line with pediatric medicine's movement toward family-centered care, which includes providing formal and informal support to patients and families ("Family-Centered Care and the Pediatrician's Role," 2003). Furthermore, research suggests that parent emotional well-being can impact patient care (Anderson et al., 2009; Boland et al., 2019; Chapados et al., 2002; Madrigal et al., 2018). Therefore, it is important to improve support for patient's family members. Use of telehealth services may be helpful to increase access to care for caregivers and siblings during and after hospitalization, especially for those who are unable to be present in the PICU when psychology services are available.

Many participants described that improving psychosocial support for PICU staff is necessary. PICU providers are at risk for second victim syndrome, burnout, and psychological distress, and about a quarter of providers have considered leaving their position and reported absenteeism (Crowe et al., 2021; Wolf et al., 2021). Providers feel a low level of support from colleagues, supervisors, and the institution following adverse patient outcomes (Wolf et al., 2021). While many participants did not feel it was appropriate for pediatric psychologists to be offering one-on-one therapeutic support, they suggested ideas for improving staff support. If pediatric psychologists are involved in intervention, they felt that group-based, structured interventions would be most helpful. This is consistent with literature that suggests group-based interventions can be helpful (Choi & Lee, 2022). Many staff feel that discussions and informal social interactions with colleagues are among the most used and most impactful resources (Lee et al., 2015; Wolf et al., 2021). Other resources (e.g., taking a break) are reportedly impactful but underused (Lee et al., 2015). About half of providers in one study expressed a desire for an employee assistance program to provide counseling and access to 24/7 support to discuss experiences (Wolf et al., 2021).

Based on participant responses, the following preliminary model is proposed for an improved model of psychology practice in the PICU that warrants further exploration (see Figure 4). It would be beneficial for service-specific psychologists to continue to serve their patients in the PICU and across hospitalization given the advantage of their pre-existing relationship and rapport. It is recommended that CL and/or embedded psychologists with dedicated PICU time serve the other PICU patients, depending on the institution's number of PICU beds and number of psychologists. Further research is needed to evaluate whether and when embedded psychologists versus CL psychologists would be preferable. Participants clearly stated that dedicated PICU time is advantageous. This model would allow for psychologists to be readily available to meet the urgent and changing needs of patients and families in the PICU, to form relationships with PICU staff, to optimize identification of patients and families who could benefit from psychology services, and to develop more specialized PICU knowledge. Continuity of care across inpatient hospitalization and further exploration of post-PICU follow-up care would be helpful. For CL and embedded psychologists, consider reducing outpatient demands to allow psychologists to be readily available while also offering balance with the acuity of the PICU; psychologist well-being and optimal balance of PICU practice warrants further exploration. With multiple psychologists in different roles serving the PICU in this hybrid model, it is important that psychologists collaborate and communicate closely to avoid unintentional splitting.

It is important that psychologists and medical providers collaboratively advocate for these changes. The scientist-practitioner-advocate model emphasizes the need for psychologists to engage in advocacy (Mallinckrodt et al., 2014), and one role of CL psychologists has been described to act as change agents through engaging in system and community advocacy (Barber Garcia et al., 2022). See Table 5 for suggested advocacy steps based on the present study. It is important to consider advocacy at both the individual and systems-level. For example, embedded psychologists may be best suited to advocate for systems-level changes, given that many participants felt that being embedded allows psychologists to have a seat at the table. Whereas non-embedded psychologists may be better suited to engage in individual level advocacy efforts. Readers are encouraged to determine what is in their sphere of influence and expertise. For example, psychologists with dedicated research time could consider using that to conduct research on outcomes in the PICU related to psychology involvement.

It would also be beneficial to define the cost-effectiveness of buying out psychologists' time to engage in a broader range of activities (e.g., attending rounds) given that psychologists' salaries are significantly less than physician salaries. It is likely that hiring psychologists to support families and offer other services within their training and expertise in the PICU would reduce demands on physicians to cover these needs, which could also lead to improved physician well-being and retention. Most pediatric psychologists are responsible for generating over half of their salary, most commonly through clinical work (Opipari-Arrigan et al., 2006). Given the demand for and benefits of non-billable services in the PICU, reconsideration of this model of compensation and productivity expectations should be explored for psychologists practicing in the PICU.

Limitations & Future Directions

The present study's sample of fourteen participants may not be representative of the broader population of pediatric psychologists practicing in the PICU. Given the lack of research on the breadth of psychology practice in the PICU, it is difficult to ascertain the representativeness of this sample. Participants were recruited through pediatric psychology Critical Care and CL professional listservs, and this could contribute to possible overrepresentation of CL psychologists. To our knowledge, CL models being more common and embedded models being significantly less common does represent the broader state of the field. The sample participants were very homogenous in demographic backgrounds, primarily being White women. While this somewhat reflects the broader field of pediatric psychology which is predominantly comprised of White women (*Pediatric Psychologist Demographics and Statistics in the US*, n.d.), it underrepresents other perspectives and is not representative of the typical PICU population (Turner et al., 2011). It is possible that the experiences of the sample participants do not generalize to all PICUs nor all pediatric psychologists practicing in PICUs. It would be beneficial to more comprehensively suvey the field to see if results from this study generalize to the broader field. Additionally, it is important to continue efforts to diversify the field of pediatric psychology. While psychologists offer invaluable expertise and opinions as a key stakeholder on this topic area as models of care begin to be explored, it is also important to research other stakeholders' perspectives, including patients and families, nursing, and other medical providers. In one study, parents reported that, compared to other needs, they less frequently wanted information about their own psychologic morbidities (Rissman et al., 2021). Therefore, it is important to assess when and how parents would appreciate psychological support.

While focus groups allowed for rich discussion and direct comparisons of models of psychology practice, there are also limitations to focus groups (William, 2012). It is possible that participants may not have been as open about their experiences and opinions as they may have been in a one-on-one interview. It is also possible that the groupthink phenomenon may have influenced results, such that participants prioritize harmony and/or conformity in the group resulting in less openness and honesty about experiences and opinions.

Participants provided several ideas for how to improve the practice of pediatric psychology in the PICU that warrant further research. It is necessary to further assess the experiences of siblings, use of screening measures to identify at-risk families, post-ICU care interventions, and staff education and psychosocial support interventions. It is also important to collect data about the impact of psychology practice in the PICU on medical outcomes and psychosocial outcomes (e.g., satsifaction with care, distress) for patients, families, staff, and psychologists. While most participants were satisfied with their PICU training, it may be beneficial to assess trainees satisfaction with training as they are earlier on in their career; it may be necessary to improve support in training.

Conclusions

To our knowledge, the present study is the first to explore models of psychology practice in the PICU across multiple institutions. The presence of psychologists in the PICU appears to be increasing and becoming more of a standard part of care. A model of practice is developing, and different models with identifiable advantages and disadvantages that require further exploration are currently being used. Psychologists conduct meaningful and rewarding work in the PICU, and continuity of care is a clear advantage of current models. Findings suggest that there is room for refinement in current models of psychology practice. Improvements such as buying out time for psychologists to have dedicated time in the PICU to provide a broader range of professional services in keeping with their training and expertise (e.g., attending rounds, providing education) would likely lead to better patient and family care and also improve medical provider and psychologists' job satisfaction and well-being. Advocacting for these improvements is critical, using strategies such as collecting and utlizing outcomes data, sharing information about the role of psychology to demonstrate the value of psychology, establishing standards of care, and fostering relationships with PICU medical and psychosocial providers. While further research is needed to continue to move toward a gold standard model of psychology practice in the PICU, the current study provides a foundation of knowledge about current and ideal models to build upon.

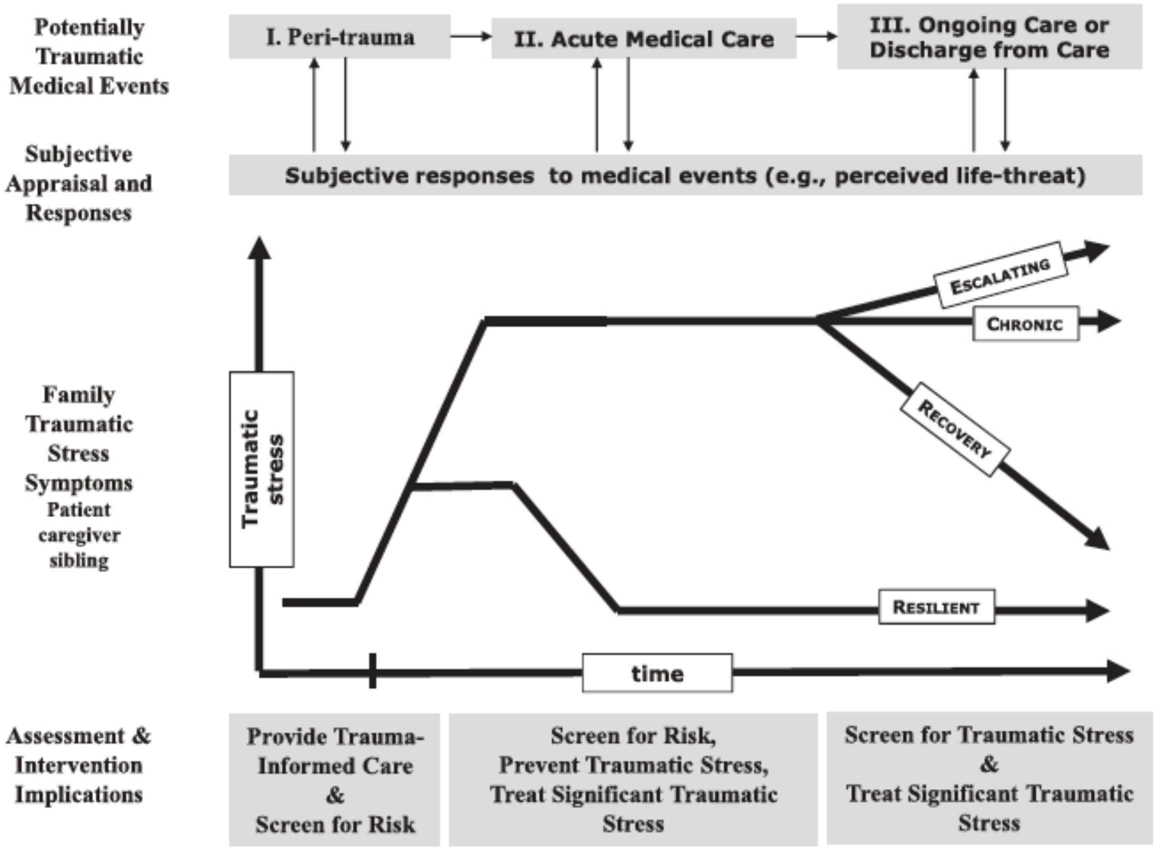

Figure 1. Integrative (Trajectory) Model of Pediatric Medical Traumatic Stress

Note. Reprinted from "Systematic Review: A Reevaluation and Update of the Integrative (Trajectory) Model of Pediatric Medical Traumatic Stress", by Price et al., 2015, *Journal of Pediatric Psychology, 41*, p. 93.

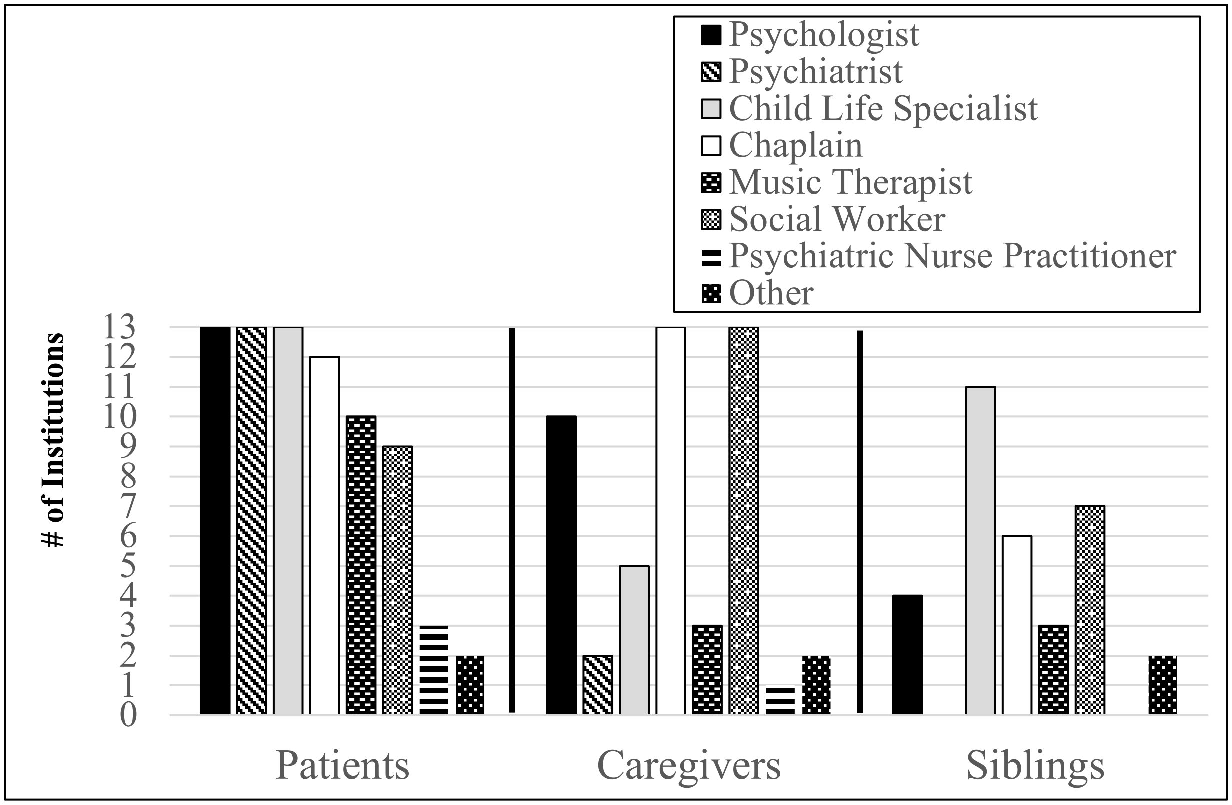

Figure 2. Frequency of Psychosocial Providers for Patients, Caregivers, and Siblings in the PICU

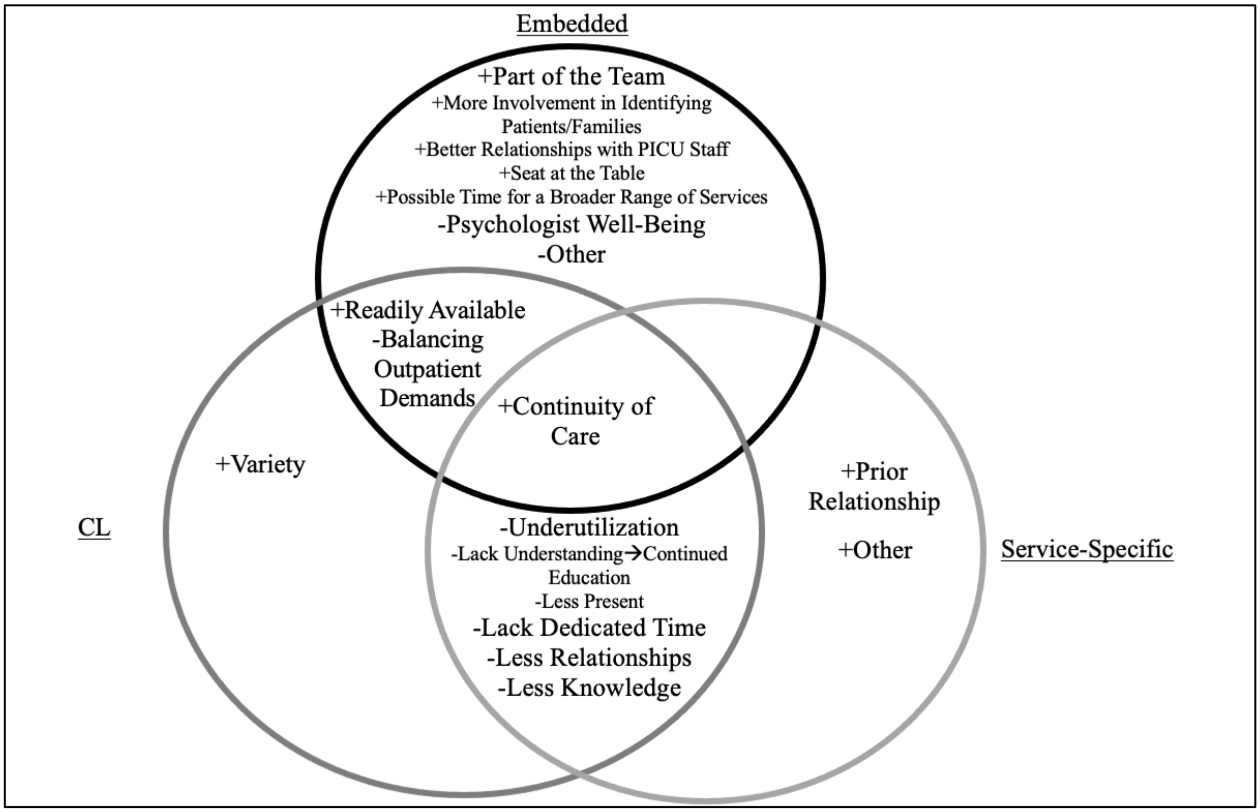

Figure 3. Advantages & Challenges to Current Models of PICU Psychology Practice

Note. "+" denotes advantages and "–" denotes challenges. Smaller font indicates subthemes.

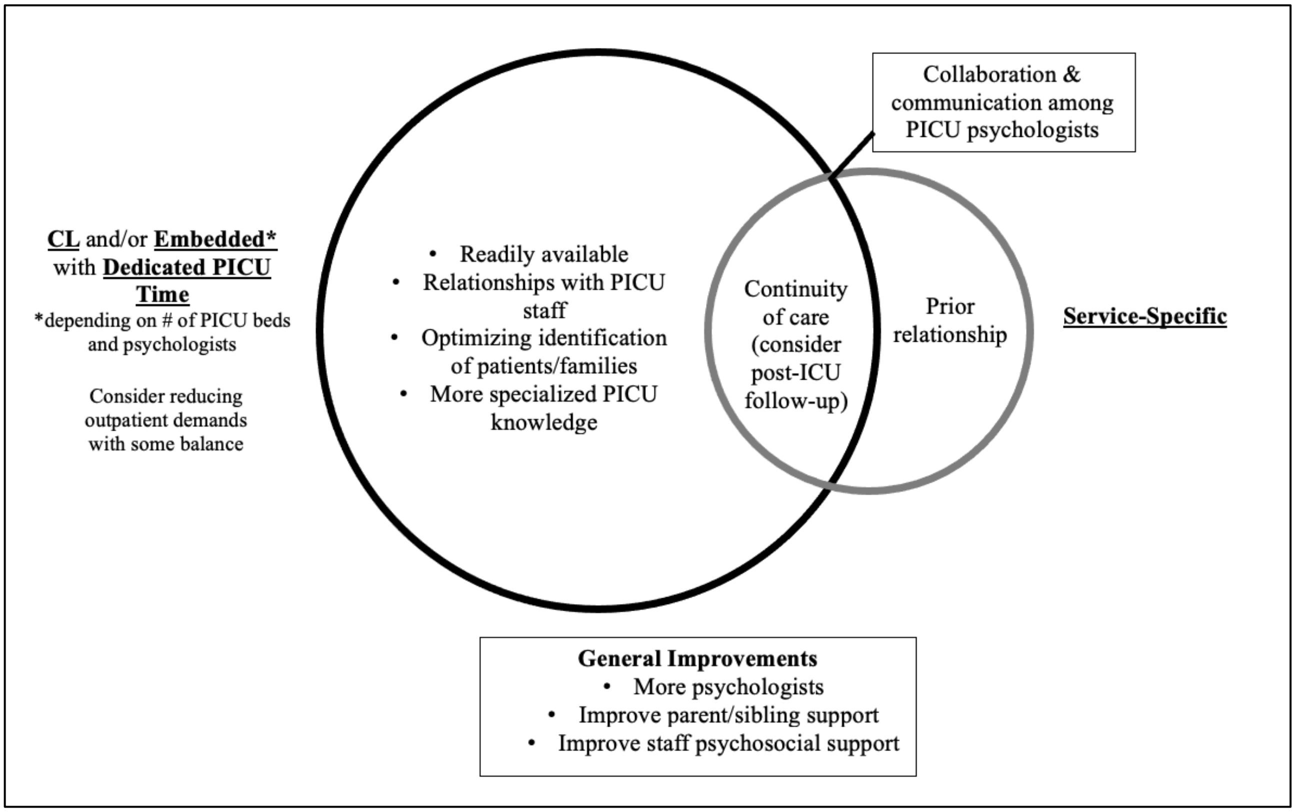

Figure 4. Proposed Improved Model of PICU Psychology Practice

Table 1. Institution Characteristics (*N*=13)

Variables	***N* (%)**
Practice Setting	
Academic Medical Center	11 (85%)
Public Hospital	1 (8%)
Private Non-Profit	1 (8%)
Rehabilitation Hospital	0 (0%)
Private for profit	0 (0%)
Trauma Center Level	
Level I	10 (77%)
Level II	1 (8%)
Level III	0 (0%)
Level IV	0 (0%)
Level V	1 (8%)
Not a Trauma Center	1 (8%)
Referral Methods	
Medical Request	13 (100%)
Family Request	12 (92%)
Social Work Request	8 (62%)
Trigger/Automatic[a]	2 (15%)
Patient Screeners[b]	2 (15%)
Parent Screeners	0 (0%)
Universal	0 (0%)
Other[c]	5 (38%)
Psychology Coverage	
Workdays (~9am-5pm)	13 (100%)
Weekends	3 (23%)
Evenings	0 (0%)
Overnight	0 (0%)
Institutional Psychology Models	
Service-Specific + CL	10 (77%)
Service-Specific + CL + Embedded	2 (15%)
CL Only	1 (8%)
Number of Psychologists in Roles	***M* (*SD*) [Range]**
Consultation-Liaison	4 (1.4) [1-18]
Service-Specific (e.g., Hem/Onc, Cardiology)	5.5 (4.3) [1-15]
Embedded in PICU	3 (1.4) [2-4]
Total[d]	9 (8) [1-29]
	***Mdn* (*IQR*) [Range]**
Number of Critical Care Beds	55 (25) [10-716]

a. Triggers/Automatic referrals described: Lengthy admission, delirium, tracheotomy, Level I trauma
b. Patient Screeners described: STEPP, suicidality
c. Other referral methods described: Psychology participation in rounds, DKA, rehab referrals, heart transplant

d. Note. Total does not account for psychologists who may be in multiple roles. This may overestimate the number of total psychologists practicing in the PICU.

Table 2. Participant Characteristics & Role (*N*=14)

Variables	***N* (%)**
Participant PICU Role	
Consultation-Liaison (CL) Only	8 (57%)
Service-Specific (e.g., Hem/Onc, Cardiology) Only	2 (14%)
CL + Embedded	2 (14%)
CL + Service-Specific	1 (7%)
Embedded Only	1 (7%)
Funding for PICU Practice	
Not Specifically Funded (Part of Psychology Service)	13 (93%)
Donor Funded	2 (15%)
Grant Funded	0 (0%)
Other	0 (0%)
Patient Populations/Conditions	
Medical Complexity	13 (93%)
Trauma	12 (86%)
Previously Healthy	11 (79%)
Primary Neurologic (not TBI)	10 (71%)
Post-Surgery	10 (71%)
Traumatic Brain Injury (TBI)	8 (57%)
Cardiology	8 (57%)
Psychiatric	8 (57%)
Transplant	7 (50%)
Oncology	6 (43%)
Other	1 (7%)
Involvement in PICU Program Development	
Yes	8 (57%)
No	6 (43%)
Ratio of Psychologist to Patient/Family Need	
Fewer Psychologists than Needed	8 (57%)
About the Right Amount of Psychologists	6 (43%)
More Psychologists than Needed	0 (0%)
Training Received	
Self-Directed & Formal	6 (43%)
Only Formal (e.g., internship)	4 (29%)
Only Self-Directed	3 (21%)
Self-Directed & Other	1 (7%)
Satisfaction with Training	
Extremely Satisfied	2 (14%)
Somewhat Satisfied	6 (43%)
Neither Satisfied nor Dissatisfied	3 (21%)
Somewhat Dissatisfied	3 (21%)
Extremely Dissatisfied	0 (0%)
	***M* (SD) [Range]**
Years as Psychologist	7 (6) [1-23]

Years in the PICU	7 (7) [1-27]
Percentage of Time in PICU in Typical Week	20% (12%) [5-50]
Percentage of Job for Inpatient CL	61% (20%) [30-95]
Average PICU Case Load	2 (1) [0-4]
Average Inpatient Case Load	6.5 (3.6) [2-15]

Table 3. Psychologist PICU Role

Variables	**Never**	**Rarely**	**Sometimes**	**Often**	**Very Frequently**
How often do you provide the following *services* in the PICU?					
Anxiety Management	0 (0%)	0 (0%)	0 (0%)	3 (21%)	11 (79%)
Family Support/Education	0 (0%)	0 (0%)	1 (7%)	4 (29%)	9 (64%)
Pain Management	0 (0%)	0 (0%)	3 (21%)	5 (36%)	5 (36%)
Trauma Work	0 (0%)	2 (14%)	4 (29%)	4 (29%)	4 (29%)
Behavioral Management	0 (0%)	1 (7%)	4 (29%)	2 (14%)	6 (43%)
Suicide Assessment	1 (7%)	5 (36%)	1 (7%)	4 (29%)	2 (14%)
Cognitive Assessment	6 (43%)	6 (43%)	3 (21%)	0 (0%)	0 (0%)
Capacity Assessment	6 (43%)	6 (43%)	1 (7%)	0 (0%)	0 (0%)
How often do you address the following *targets of intervention* in the PICU?					
Anxiety	0 (0%)	0 (0%)	0 (0%)	4 (29%)	10 (71%)
Adjustment	0 (0%)	0 (0%)	2 (14%)	3 (21%)	9 (64%)
Pain	0 (0%)	1 (7%)	1 (7%)	4 (29%)	8 (57%)
Sleep	0 (0%)	2 (14%)	2 (14%)	4 (29%)	6 (43%)
Trauma	0 (0%)	2 (14%)	2 (14%)	5 (36%)	5 (36%)
Screen for Anx/Dep/Trauma	0 (0%)	1 (7%)	3 (21%)	2 (14%)	7 (50%)
Parent Support	0 (0%)	1 (7%)	5 (36%)	2 (14%)	6 (43%)
Adherence to Medical Care	0 (0%)	3 (21%)	3 (21%)	2 (14%)	5 (36%)
End-of-Life Support	0 (0%)	2 (14%)	6 (43%)	4 (29%)	2 (14%)
Delirium	2 (14%)	4 (29%)	2 (14%)	4 (29%)	1 (7%)
Rehabilitation Needs	1 (7%)	2 (14%)	7 (50%)	1 (7%)	2 (14%)
	Never	**Rarely**	**Monthly**	**Weekly**	**Daily**
How often do you…					
Attend critical care rounds with physicians	3 (21%)	2 (14%)	2 (14%)	6 (43%)	1 (7%)
Provide education services to medical staff	1 (7%)	7 (50%)	4 (29%)	2 (14%)	0 (0%)
Participate in staff debriefings	1 (7%)	9 (64%)	3 (21%)	1 (7%)	0 (0%)
Provide emotional support to PICU staff	4 (29%)	6 (43%)	1 (7%)	2 (14%)	1 (7%)

Table 4. Frequency of Other Psychosocial Supports at Institutions (*N*=13)

Psychosocial Supports	***N* (%)**	**Qualitative Descriptions of Role**
Chaplain	13 (100%)	Spiritual support, patient and family support
Psychiatrist	13 (100%)	Consult-based; offer risk/suicide assessments, medication recommendations; address disposition, delirium
Social Worker	13 (100%)	Provide resources and/or family support
Child Life Specialist	13 (100%)	Patient & family support; adjustment to hospitalization
Music Therapist	10 (77%)	Consult-based; patient and family support
Psychiatric Nurse Practitioner	4 (31%)	Same as psychiatrists (see above)
Other – Art Therapy	2 (14%)	--
Master's Level Therapist	0 (0%)	--
Peer Support Groups	0 (0%)	--
Other	3 (21%)	Technology, pet therapy; therapeutic recreation; neuropsychology

Table 5. Advocacy Recommendations to Improve Psychology Practice in the PICU

Goal	Strategies
Increase Financial Support	-Consider asking for or advocating for donor or foundation funds to support psychology practice in the PICU. Offer to name the fund after the donor. -Request funds from the medical team
In order to advocate for increased financial support, the following suggestions are offered:	
Collect and Utilize Outcomes Data	Consider collecting data regarding… 1. Consult patterns (e.g., number of consults, number of consults that were unable to be seen and for what reasons); evaluate changes in consult patterns with increased psychology involvement 2. Medical outcomes (e.g., LOS, adherence, re-admission) related to psychology involvement 3. Psychosocial outcomes, including patient and family satisfaction, staff satisfaction, psychologist well-being (e.g., job satisfaction, burnout, moral distress), patient and family mental health outcomes (e.g., behavior, anxiety, depression, traumatic stress) 4. Cost-effectiveness of compensating psychologists to support families and engage in non-billable services
Share Information about the Role of Psychology in the PICU	-Offer Lunch & Learns with other PICU staff -Give talks or presentations highlighting the role and work of psychologists -Talk with medical colleagues about cases -Write advocacy pieces and commentaries
Establish Standards of Care	-Based on research and expert opinion, develop and establish standards of care of psychology practice in the PICU -Disseminate standards of care for medical and psychology audiences (e.g., pediatric critical care medicine, pediatric psychology)
Foster Relationships	-Talk with PICU nurses -Find psychosocial provider allies (e.g., social workers) -Identify a physician champion (i.e., someone with administrative authority who is willing to listen and help advocate for psychology)
Be Present in the PICU	-Ask to attend meetings -Start or attend psychosocial rounds -Ask to observe rounds or shadow -When possible, work in the PICU environment (e.g., writing notes) -Walk through the PICU

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APPENDIX A:

Study Survey Questions

<u>PART A:</u> Background Information. *This background information will not be linked to any opinions that you share in Parts C and D of this survey. This information will allow us to describe the representativeness of our sample and avoid overrepresentation of individuals from the same institution in descriptive data. This data will not be used for group comparisons.*

1. What institution do you practice at? _____ .
2. What state do you practice in? [drop down]
3. What is your gender identity? (select all that apply)
    a. Female
    b. Male
    c. Cisgender
    d. Transgender
    e. Non-binary, genderqueer, or genderfluid
    f. Prefer to self-describe: _____
    g. Prefer not to respond
4. With which racial and ethnic group(s) do you identify? (select all that apply)
    a. American Indian or Alaska Native
    b. Asian
    c. Black or African American
    d. Hispanic, Latino, or Spanish Origin
    e. Middle Eastern or North African
    f. Native Hawaiian or Other Pacific Islander
    g. White
    h. Prefer to self-describe: _____
    i. Prefer not to respond

PART B. Describe <u>Institution's</u> Overall Model of Psychology Practice

1. Which of the following best describes your practice setting?
    a. Academic medical center
    b. Public hospital
    c. Rehabilitation hospital
    d. Private for profit
2. What trauma center level is your institution?
    a. Level I
    b. Level II
    c. Level III
    d. Level IV
    e. Level V
    f. Other
3. Approximately how many critical care beds does your institution have? ____
4. Approximately how many psychologists at your institution (including yourself) practice in the PICU in each of the following models?
    a. Consultation-liaison: ____

        i. If any psychologists, please briefly describe model: ___
    b. Integrated/embedded in the PICU: ____
        i. If any psychologists, please briefly describe model: ___
    c. Integrated/embedded in another program (e.g., hem/onc, cardiology), and see those patients when hospitalized in the PICU
        i. If any psychologists, please briefly describe model: ___
    d. Other: ____
        i. If any psychologists, please briefly describe model: ___
5. How are psychologists referred for PICU practice at your institution? (select all that apply)
    a. Universal (see everyone)
    b. Trigger/automatic referrals (please describe): _______
    c. Parent Screeners (please describe): _______
    d. Patient Screeners (please describe): _______
    e. Medical request
    f. Family request
    g. Other criteria/protocols (please describe): _______
6. When is psychology coverage provided in your PICU? (check all that apply)
    a. During the workday (~9am-5pm)
    b. Evenings
    c. Overnight
    d. Weekends

Please click on this link now to complex Part 2 of the survey: [link to separate survey]

PART C. Describe YOUR OWN Psychology Practice *Note. Information you provide in this survey will not be linked to information provided in Part 1 of this survey (e.g., institution).*

1. Years of clinical experience practicing as a psychologist: _____
2. Years of clinical experience practicing in the PICU: _______
3. What percentage of time in your <u>typical full work week</u> do you spend working in the <u>PICU</u>? [0-100]
4. What percentage of <u>your job</u> is on the <u>inpatient consultation-liaison</u> service? 0-100
5. What is your average case load of <u>PICU patients</u> that you carry at any given time? ____
6. What is your average case load of <u>total inpatient patients</u> that you carry at any given time? ____
7. How is your practice in the PICU funded?
    a. Not specifically funded (part of being on the psychology service)
    b. Grant funded
    c. Donor funded
    d. Other ___
8. Which of the following models of psychology practice in the PICU best describes ***<u>your</u>*** role?
    a. Consultation-liaison
    b. Integrated/embedded in the PICU
    c. Integrated/embedded in another program (e.g., hem/onc, cardiology), and see those patients when hospitalized in the PICU

    d. Other

9. Which populations and/or conditions do you work with in the PICU? (check all that apply)
    a. Trauma
    b. Post-surgery
    c. Oncology
    d. Transplant
    e. TBI
    f. Primary neurologic condition other than TBI
    g. Patients with complex chronic conditions (e.g., multiple chronic conditions, sees multiple medical specialists, high health care usage)
    h. Cardiology
    i. Psychiatric
    j. Previously healthy patients
    k. Other
10. What other psychosocial supports are available to families in the PICU at your institution? Check all that apply. If relevant, briefly, what is their role at your hospital?
    a. Peer support groups
    b. Chaplain
    c. Psychiatrist
    d. Psychiatric nurse practitioner
    e. Social worker
    f. Masters level therapist
    g. Music therapist
    h. Child life specialist
    i. Other
11. Who do each of these psychosocial providers typically support? [Patients, Caregivers, Siblings of patients]
    a. Psychologists
    b. Peer support groups
    c. Chaplain
    d. Psychiatrist
    e. Psychiatric nurse practitioner
    f. Social worker
    g. Masters level therapist
    h. Music therapist
    i. Child life specialist
    j. Other
12. How often do you provide the following services in the PICU? [never, rarely, sometimes, often, almost very frequently]
    a. Trauma work
    b. Anxiety management
    c. Cognitive assessment
    d. Capacity assessment
    e. Suicide assessment
    f. Pain management

    g. Family support/education
    h. Behavioral management
    i. Other: ____

13. How often do you address the following targets of intervention for your practice in the PICU? [never, rarely, sometimes, often, almost very frequently]
    a. Trauma
    b. Anxiety
    c. Sleep
    d. Adjustment
    e. Pain
    f. Delirium
    g. Screening for anxiety, depression, trauma
    h. Parent support
    i. End-of-life support
    j. Rehabilitation needs
    k. Adherence to medical care
    l. Other: ______
14. Are you involved in any quality improvement or program developmental initiatives? Y/N
    a. If yes: please describe _____

		Never	Rarely	Monthly	Weekly	Daily
15.	How often do you attend critical care rounds with physicians?	1	2	3	4	5
16.	How often do you provide education services to medical staff?	1	2	3	4	5
17.	How often are you involved in staff debriefings?	1	2	3	4	5
18.	How often do you provide emotional support to PICU staff?	1	2	3	4	5

<u>PART D.</u> Opinions about Institution's Model of Psychology Practice in PICU

1. How would you describe the ratio of psychologists to patient and family need at your hospital?
    a. My institution has <u>more</u> psychologists than are needed to meet patient and family needs in the PICU
    b. My institution has <u>about the right amount of</u> psychologists than are needed to meet patient and family needs in the PICU
    c. My institution has <u>fewer</u> psychologists than are needed to meet patient and family needs in the PICU
2. How many psychologists do you think a 30 bed PICU should ideally have? _____
3. What do you see as <u>benefits</u> of your institution's model of psychology practice for families, providers, and yourself? ____
4. What do you see as <u>challenges</u> of your institution's model of psychology practice for families, providers, and yourself? _____

5. What model of psychology practice in the PICU do you think would be most effective in providing care for families? *This may include one or multiple approaches (e.g., inpatient C/L, integrated/embedded psychologist in PICU, psychologists embedded in other subspecialties such as hem/onc seeing their patients in the PICU).* ______
6. Please explain your rationale for your answer to the previous question.
7. What suggestions do you have to improve the practice of psychologists in PICUs? _____
8. What training did you receive to practice in the PICU? Check all that apply.
    a. Self-directed (i.e., learned on own or through experience)
    b. Through formal training (e.g., internship, fellowship)
    c. Other ____
9. How satisfied are you with the training you received to practice in the PICU? [Extremely dissatisfied, somewhat dissatisfied, neither satisfied nor dissatisfied, somewhat satisfied, extremely satisfied]
10. Are there any areas you feel you did not receive adequate training in and/or that you would like more training in now? ____
11. Thank you for completing this survey. We look forward to your participation in a focus group discussion. We would like to get your feedback on our proposed approach to confidentiality in the focus groups.
    a. We require that participants do not share specific details about what others in the focus groups share, identify specific people that participated, or share negative information about institutions based on what is discussed in focus groups. We do not want to limit your ability to share knowledge and ideas gained from the focus group discussion, so participants are encouraged to share and discuss positive ideas and knowledge gained from the focus group discussion (e.g., I learned that at another institution, they approach this in a different way, and I think that might be helpful to try at our institution).
    b. Do you approve of this approach to confidentiality related to focus group discussions? Y/N
        i. If no, what changes to this approach would you make?

APPENDIX B:

Focus Group Guide

1. Guidelines & Ground Rules:
    a. Interviewer introduce self. Thank you so much for your willingness to participate in this study.
    b. Reminder that focus group will be audio and video recorded and transcribed, and these will be stored on confidential servers and deleted once analysis is complete.
    c. Confidentiality agreement; based on survey results, people seemed ok with the proposed approach but still open to feedback/amending at this point, so I'm going to briefly remind people of this approach. We want to be able to share what learned while also maintaining safety and confidentiality in group. Here's what we were thinking: We require that participants do not share specific details about what others in the focus groups share, identify specific people that participated, or share negative information about institutions based on what is discussed in focus groups. We do not want to limit your ability to share knowledge and ideas gained from the focus group discussion, so participants are encouraged to share and discuss positive ideas and knowledge gained from the focus group discussion (e.g., I learned that at another institution, they approach this in a different way, and I think that might be helpful to try at our institution). Any proposed changes to this approach?
    d. Discuss ground rules:
        i. Hope that you all will participate actively while also allowing space for all to participate, respect the views of others, aim to stay focused on the topic or question. There are no right or wrong answers, just want to hear all of your points of views
        ii. Feel free to stay muted when not speaking if you have background noise, but also want to encourage discussion so jump in. Use raise hand feature if helpful to you. Might call on people at times but can definitely pass or say still thinking not quite ready yet but hope all will have opportunity to share thoughts for each question if you'd like. [start recording and transcription]
2. Introduction: Now, I'd like for everyone to introduce themselves. Please share your name, institution if you are comfortable, role in the PICU and how long you have been working in the PICU.
3. Ice breaker/rapport building question: What is one of the most rewarding aspects of working in the PICU?
4. Describe current models: I would like to hear about your institution's current model of psychology practice in the PICU. This may include some combination of inpatient consultation-liaison service, psychologists dedicated to PICU service, psychologists dedicated or embedded in another specialty service (e.g., hem/onc) but see their patients when in the PICU, or other approaches.
    a. How would you describe the current model of psychology practice in the PICU at your institution? And what do you think are advantages to this model of practice?

        i. *[probe: Is there any model? Is the model more consultation-liaison like or do you have dedicated psychologists for the PICU? How are psychologists referred for patients?]*
    b. What do you think are challenges to this model of practice?
    c. *Probe: Benefits/challenges for families, health care team, psychologists for each of these models.*
        i. *Aim to touch on financial considerations, providing staff support*

5. <u>Envision ideal models:</u> Now that we have described how psychologists are currently practicing in the PICU at your institutions, I want to do some envisioning together of what, if anything, might work better.
    a. What do you think would be the ideal model of psychology practice in the PICU?
    b. *Probe: What would integrated psychologist model look like in PICU? What would be the advantages and/or challenges to this approach?*
    c. *Probe: Role of psychologists in incorporating DEI and cultural considerations in the PICU*
    d. What ideas do you have for how to advocate for and move toward an improved model?
6. <u>Ending questions:</u>
    a. <u>Program development:</u> What advice would you give someone interested in increasing the presence of psychology in the PICU at their institution?
    b. Anything else we haven't talked about that would be important for us to know?
7. <u>Conclusion</u>: thank you, describe how can expect payment, will follow-up with results