The Relationship between Child Maltreatment, Religiosity, and Adult-onset Anxiety and Depressive Disorders among Participants in the Saudi National Mental Health Survey (SNMHS)

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Abstract

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This dissertation explores the interrelationships among childhood maltreatment (CM), religiosity, and adult-onset depressive and anxiety disorders using data from the Saudi National Mental Health Survey (SNMHS). It addresses whether parental religiosity is associated with CM and differs by gender, the influence of CM on adult religiosity and its gender-dependence, and the association between CM and adult-onset anxiety and depressive disorders with religiosity as a moderating factor. The first study (Chapter 2) investigates the correlation between parental religiosity and CM, finding no overall significant association but a significant protective effect against CM, particularly physical abuse, among males. The second study (chapter 3) explores the impact of CM on adult religiosity, revealing no significant association or gender differences. The third study (Chapter 4) examines the link between CM and adult-onset anxiety and depressive disorders, with religiosity moderating these effects. Sexual abuse significantly increases the risk of depressive disorders, while physical abuse increases anxiety disorder risk. Seeking religious comfort moderates these associations. In conclusion, this dissertation highlights that parental religiosity generally protects against CM, especially physical abuse among males, while CM does not influence adult religiosity. CM is associated with higher risks of mental health disorders, with religious coping moderating these effects. The findings emphasize the need for culturally tailored interventions in Saudi Arabia to promote healthy religious parenting, encourage seeking professional help, and address cultural and gender dynamics influencing CM experiences and mental health outcomes.

To my grandmother (sittu) Su'aad

May your soul rest in peace

Your sincere persistent prayer for us, your grandchildren:

"□□□□□ □□ □□□□□□ □□□□□□□ □□□□□□ □□□□ □□□□□□□ □□□□"

"May Allah bless you with a righteous upbringing and turn you into doctors of knowledge"

Has always accompanied me throughout my educational and life journey

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I am deeply grateful to everyone who has supported me throughout the journey of completing this dissertation. First and foremost, I am profoundly grateful to Allah, the Almighty, for His boundless mercy and guidance throughout my PhD journey. His blessings have provided me with the strength, wisdom, and perseverance to complete this dissertation. Alhamdulillah!

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Positionality Statement

As an epidemiologist conducting research on child maltreatment, religiosity, and mental health outcomes in Saudi Arabia, I believe it is important to acknowledge my positionality and how it may influence this work:

I am a Saudi woman who was raised in a Muslim family and community. While this gives me valuable cultural insider knowledge, I recognize that my personal experiences and perspectives may not be representative of all Saudis. My gender and upbringing, therefore, shape how I interpret and analyze issues related to child-rearing practices, religious beliefs, and mental health in Saudi society and this should be taken into consideration as I conduct the research and as others read it.

As a researcher trained in Western epidemiological methods, I aim to approach this topic as objectively as possible. However, I acknowledge that my worldview and approach to research, including this project, has been influenced by both my Saudi background and my scientific training abroad.

I am committed to conducting this research ethically and responsibly. My goal is to generate knowledge that can inform culturally-appropriate interventions to prevent child maltreatment and promote mental wellbeing in Saudi Arabia, and to do so by uplifting my voice as a woman from Saudi Arabia. At the same time, I remain reflexive about how my own biases and assumptions may impact the research process and interpretation of findings.

By explicitly stating my positionality, I hope to enhance the transparency and trustworthiness of this dissertation. I invite readers to critically engage with the work while considering the lens through which it was conducted.

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CHAPTER 1. INTRODUCTION

The intersection of traditional values and modern challenges in an evolving society like Saudi Arabia raises critical concerns about the well-being of children. Child maltreatment (CM) poses significant risks to individuals' mental health as they transition into adulthood. This dissertation explores the relationships between CM, parental religiosity as a potential buffer, and subsequent adult-onset anxiety and depressive disorders with the individual's religiosity in adulthood as a possible buffer as well. It covers the factors influencing laws, policies, and core beliefs and values that shape individuals' daily lives in the country.

1.1. Overview of Saudi Arabia's Historical and Cultural Context

Saudi Arabia (SA) is a Middle Eastern nation, bordered by Yemen to the south, the Red Sea to the west, and the Arabian Gulf to the east. It is one of the largest countries in Western Asia, covering a geographical area of approximately 2,149,790 km^2, which is almost 4/5th of the Arabian Peninsula. SA has been divided into 13 administrative regions: Riyadh (the capital city), Makkah, Medina, Ash Sharqiyah (Eastern), Al Qasim, Asir, Ha'il, Jazan, Tabuk, Najran, Al-Bahah, Al-Jawf, the Northern Border.[1,2] Islam is the dominant religion in Saudi Arabia, and its people are mainly Arabs. Sunni Islam is practiced by 80–90% of the population, while the rest follow Shia sects, other Islamic branches, or different religions.[2] The country's diverse ethnic groups, including Arabs, Afro-Asians, Indians, Pakistanis, Filipinos, and Bangladeshis, contribute to the variety of Islamic practices.[1,2]

The discovery of vast oil reserves in 1938 fundamentally transformed the country's economy, propelling the Kingdom into rapid growth and development.[3] Today, Saudi Arabia's petroleum sector accounts for approximately 61% of budget revenues, around 40% of GDP, and about 70% of export earnings.[4] Nearly a decade ago, Saudi Arabia

established its socioeconomic strategies and initiatives within a detailed five-year national development plan framework, as outlined in Saudi Vision 2030.[5,6] This vision is a strategic framework aimed at reducing Saudi Arabia's dependence on oil, diversifying its economy, and developing public service sectors such as health, education, infrastructure, recreation, and tourism.

Recent changes under Vision 2030 have been significant and transformative. In June 2018, the ban on women driving was lifted.[5,6] The introduction of cinemas in 2018 ended a 35-year ban on public cinemas.[5,6] The introduction of Value Added Tax (VAT) in January 2018 marked a significant shift towards diversifying government revenue sources beyond oil. Promoting the entertainment sector, including establishing a national entertainment authority, boosts domestic tourism and creates new jobs. Also, initiatives to attract foreign investment have intensified, including creating special economic zones and privatizing state-owned enterprises. These reforms reflect broader efforts towards a more inclusive workforce and subsequent economic growth.[5,6] Although these socioeconomic changes are relatively recent and their long-term effects on key public health issues—such as parenting behaviors, child-rearing practices, and the management of adverse childhood experiences (ACEs)—remain uncertain, it is important to consider these changes in research exploring public health issues that has roots in the past of the Saudi individuals, as this dissertation seeks to do. By doing so, researchers can develop more nuanced hypotheses about the interplay between traditional values and modern influences on public health issues for future studies, as well as informing policy recommendations that are responsive to both historical patterns and contemporary realities.

The ongoing demographic and societal transformations in SA are reshaping familial dynamics and parenting practices. As of 2024, SA's population is approximately 37.47 million, with around 60% being Saudi citizens and the rest comprising legal and

undocumented immigrants and expatriate workers.[1] Approximately 83.5% of the population resides in major cities like Riyadh. The median age is around 30.8 years, with a literacy rate of about 90%. Arabic is the official and most commonly spoken language. Most households consist of women and married couples with children, and about 28%. The average family size has decreased to about 2.4 members compared to larger family sizes 30 years ago.[1] Notably, around 60% of college graduates are women.[1] With more women graduating, the female workforce is likely to expand, which may alter gender norms and roles as well as parenting norms. Despite modernization, collectivist values still shape familial dynamics, emphasizing loyalty and parental authority.[7] Focusing on family demographic transition in Saudi Arabia, Al-Khraif, Salam, and Rashid argued, "Marital relations within the family context influence educational attainment on one hand, and the resulting family planning usage influences familial poverty, hunger, and mortality on the other."[8] Besides cultural expectations, education influences the prevalence and perception of parenting styles and a child's mental health.[9-11] Higher levels of education among parents are associated with higher parenting knowledge, more positive parenting styles, and confidence in reducing parenting dysfunction and problematic child behavior, which tend to foster better mental health outcomes in children. The potential shifts in parenting during socioeconomic changes may likely alter parenting outcomes and children's futures.

Social Inequities and Sociodemographic Context

Saudi Arabia's population of over 35 million is characterized by significant sociodemographic disparities. Education levels have improved, with literacy rates reaching approximately 95% overall, yet disparities persist between urban and rural areas.[12,13] Workforce participation is another area of inequity; as of 2021, the labor force participation rate for women was approximately 33%, compared to 79% for men.[1,14] Additionally, the quality of women's jobs is still a significant issue. Most women take low-skilled jobs previously held by migrant workers, especially in manufacturing and retail,

where men and women often work separately.[15] Youth unemployment and poverty remain a concern, with job availability lagging behind the growing number of graduates[16,17] and unofficial estimates suggesting that up to 20% of the population lives below the poverty line, though official data is scarce.[18,19] These social inequities can exacerbate stressors contributing to ACEs, such as household instability, poor access to education, and inadequate healthcare.

General Health Profile

Saudi Arabia has made significant progress in public health, achieving high vaccination rates and substantial reductions in communicable diseases.[20-23] However, non-communicable diseases (NCDs) now dominate the health landscape.[24-26] Among adults, major health conditions include obesity (prevalence of 35%), diabetes (18.3%), hypertension (29%), and cardiovascular diseases, reflecting lifestyle changes and dietary shifts.[27-30] Among youth, obesity and physical inactivity are rising concerns, with nearly 19% of children classified as obese.[28] Chronic diseases often intersect with mental health challenges, compounding the burden on individuals and healthcare systems.[31]

Mental Health Outcomes

Mental health is a growing concern in SA, particularly among youth and adults who have experienced ACEs. Studies indicate high rates of anxiety, depression, and post-traumatic stress disorder (PTSD) among those exposed to abuse or neglect.[32-34] The Saudi National Mental Health Survey (SNMHS) highlights a significant mental health burden in Saudi Arabia, with 12.7% of the population at risk for major depressive disorder (MDD) and 12.4% at risk for generalized anxiety disorder (GAD).[34] Mental health challenges are particularly pronounced among females, individuals with lower education and income levels, and smokers, while protective factors include physical activity, hobbies, and

volunteering.[34] Among adolescents, 24.4% were found to have depression and 14% had generalized anxiety disorder, underscoring the vulnerability of youth to mental health issues.[34] Stigma surrounding mental health continues to be a barrier to seeking help, as individuals often avoid treatment due to fear of societal judgment. This is compounded by a lack of mental health specialists and services, particularly in rural areas, which further limits access for vulnerable populations.[31,35]

1.2. Core Cultural Values Influencing Parenting Practices in Saudi Arabia

A combination of Islamic values and Arabic traditions shapes Saudi parents' approach to parenting. The cultural values influencing parenting include religious beliefs and practices, family and marriage, loyalty and group bonding, privacy and self-concept, and gender roles.[7,36]

Religion

Islam is dominant in shaping SA's laws, policies, cultural beliefs, and traditions. Religious practices and symbols, such as dress codes, are regulated by law, and family laws adhere to Islamic principles, including the requirement for marriages to be documented and legalized by certified religious leaders.[8,37] These religious principles influence various life aspects, including work, family, relationships, and socialization.[37-40] Islam's pervasive influence on socialization extends to developing individual religiosity in adulthood. Religiosity, the degree to which individuals adhere to and engage with religious beliefs, practices, and experiences, is a critical coping mechanism and emotional support source during life transitions.[9 40-44] Still, among Muslim youth who are increasingly exposed to diverse cultural influences and lifestyles, religiosity appears to be declining. [9] This decline is delayed until early adulthood[9], which appears to be a critical period for religious change in the strength of beliefs and adherence to religious teachings. Muslims may not always rely on religious coping to seek solace and meaning.[10] Instead, some may turn to other

strategies, including engaging in high-risk behaviors, especially men,[42,45-47] or, in some cases, distancing themselves from religion altogether in their search for comfort and relief.[14]

Family

The family holds a significant role for individuals in Saudi Arabia. Both Islamic traditions and Arabic culture view the family as the primary social unit essential for human development, with members expected to support and protect each other.[48] The family laws and policies concerning marriage, divorce, child custody, child-rearing, and gender roles are rooted in Islamic principles derived from the Qur'an and the Sunnah. As such, the family is not only the central unit for child development but also holds significant religious value. The Prophet Muhammad emphasized the importance of family, stating: "The best of you is he who is best to his family".

While the rise of nuclear families is becoming more apparent in Saudi Arabia, the extended family structure remains prevalent and deeply influential.[7,49,50] Elders are highly respected, and their involvement often fosters a sense of connectedness and social support. Extended families frequently assist with child-rearing, which can strengthen family unity, promote healthy parenting practices, and reduce the risk of CM.[49-51] This collective approach to parenting, rooted in cultural and religious values, can provide a protective environment that addresses children's needs holistically.[52]

Islamic teachings stress that families should be built on a foundation of piety, empathy, and fairness, with children treated equitably regardless of gender.[39,52,53] Within this framework, both parents share the responsibility of creating a nurturing and healthy environment for their children. Parents play critical roles, particularly during the early years of a child's life, by addressing their basic needs. These responsibilities include providing

emotional support, fostering a sense of security, instilling strong moral values, and meeting financial obligations to ensure the child's overall well-being and development.

However, while these cultural and religious ideals can serve as protective factors against CM, their implementation can vary significantly depending on individual religiosity levels and other sociocultural circumstances.[54,55] For example, parents who embody intrinsic religiosity—where their faith deeply informs their values and actions—are more likely to adhere to Islamic teachings that prioritize compassion, fairness, and the equitable treatment of children. This alignment can foster healthy parenting practices and reduce the risk of abusive behaviors.[54]

Conversely, challenges may arise when religiosity is superficial or cultural practices deviate from the core principles of religion.[50,55,56] Misinterpretations of religious teachings may inadvertently justify harmful behaviors, such as excessive physical discipline or rigid gender roles, potentially leading to CM.[56-59] Furthermore, stressors such as financial hardship, marital discord, or societal pressures can undermine parenting quality, even in religious households, especially if religiosity is not coupled with genuine empathy and an understanding of children's developmental needs.[56,60]

The extended family structure, while often protective, may also contribute to varying outcomes.[7,50] In some cases, the involvement of extended family members can provide essential support that alleviates parental stress, reducing the likelihood of CM. In others, particularly in more traditional or rural settings, rigid adherence to cultural norms may reinforce harmful practices under the guise of religious or familial expectations.[50] In this context, the interplay between Islamic teachings, familial structures, and parental religiosity levels is pivotal in shaping the risk and protective factors for CM.

Loyalty and Group Bonding

In Islamic culture, loyalty involves maintaining trust, strong bonds, and supporting all community members, even those who are not closely connected. This concept is closely tied to collectivism, which highly values the groups to which people belong, such as family and tribe.[61] Collectivism is characterized by a strong emphasis on interdependence, cooperation, and social harmony within a community. In such cultures, individuals are often defined by their roles within their families and communities rather than their personal achievements. This strong group orientation can sometimes lead to significant pressure to conform to social norms and expectations, potentially limiting personal freedom and individuality, which goes against the Islamic values.

In Saudi Arabia, family members provide primary support and unity through regular visits and calls. This practice aligns with collectivist values, where the well-being of the family and community takes precedence over individual interests. The social structure is largely tribal, with over 69 tribes defining social organization.[62] These tribes consist of various households and extended families, sharing distinct characteristics such as geographical location, dialect, cuisine, and traditions. Loyalty to one's tribe is essential in Saudi cultural identity, fostering community and trust.[63] The deep-rooted loyalty to family and tribe in Arabic culture reinforces the collective identity of Arab, including Saudi, individuals. In collectivist societies, individual reputation is closely linked to loyalty and commitment to the community. Thus, seeking independence from the group is often stigmatized and can lead to social isolation.[63]

While these collectivist values often promote positive outcomes, such as connectedness and mutual support, they can also have complex implications for CM.[64] The emphasis on familial and tribal loyalty can be a double-edged sword. As we mentioned earlier, the collective involvement of extended family members in child-rearing can reduce parental

stress, foster healthier parenting practices, and mitigate the risk of neglect or abuse.[65,66] For example, grandparents, aunts, and uncles often provide supplementary care and guidance, ensuring children's needs are met even during challenging circumstances.

On the other hand, these same values can perpetuate harmful practices. The strong emphasis on maintaining family honor and conforming to social expectations can discourage families from seeking help when abuse occurs.[57,67] Reporting CM to external authorities may be seen as bringing shame to the family or tribe, leading to underreporting and a lack of intervention. Furthermore, rigid adherence to traditional norms—such as strict gender roles or harsh disciplinary methods—may sometimes be justified under the guise of preserving cultural or religious values, even when such practices conflict with Islamic teachings that emphasize compassion and fairness.[65]

Privacy

As mentioned in the previous part, in individualist cultures, individuals primarily build their self-concept based on personal traits such as motives and abilities. In contrast, collectivist cultures, including those in Arab countries, emphasize the importance of group affiliations like family and tribe, with individuals defining themselves through their relationships with others.[61,68] The concept of privacy in Saudi culture revolves around maintaining a good reputation regarding one's behavior, body, and home, while also upholding the honor and status of the extended family and tribal name.[62] Privacy involves modesty and self-representation in public, encompassing clothing, verbal and nonverbal communication, body language, and behaviors. It also extends to a sense of shame, reflecting the fear of societal judgment when cultural norms are not adhered to.[69] This cultural emphasis on privacy and family honor significantly influences behavior and social interactions in Saudi society. SA's cultural framework shapes social interactions and personal behavior within the community.

In light of that, the fear of family failure and its associated stigma prevents many Saudis from seeking help from therapists or psychiatrists for problem-solving, as they do not want to be seen as lacking familial support which could reflect badly on the individuals themselves and their families as well.[69] In fact, research indicates that Arab individuals and families show limited professional help-seeking behaviors due to the stigma attached to it, which can affect the family's reputation in the community.[45] Additionally, the cultural norm of maintaining family honor and privacy can hinder the reporting of CM, especially sexual abuse, cases resulting in family-related issues often kept within the family circle to maintain privacy. Individuals may fear that disclosing abuse will bring shame upon their family, leading to underreporting and unaddressed issues. This creates an environment where CM can persist unchallenged, as victims may feel pressured to keep their experiences hidden to protect their family's reputation.

Gender Roles

Understanding gender roles is crucial to comprehending the social structure of Saudi Arabia and its cultural practices in parenting. Saudi families follow a patrilineal system where married couples are typically expected to live near the husband's family. Children inherit their father's family name and Islamic sect, while married women do not adopt their husband's family name. In this system, family heritage and wealth are predominantly passed through male descendants, reflecting the central role of men in family lineage and societal structure.[70,71]

Socio-cultural and Islamic values strongly influence gender dynamics in Saudi families, shaping expectations for men and women. Culturally and religiously, men are viewed as the primary financial providers, whereas women are expected to manage child-rearing and household duties, although they can also work outside the home.[46,72] Historically,

women faced significant societal and legal restrictions, limiting their participation in the workforce to caregiving roles in fields like education and healthcare. These norms are introduced early in childhood, with boys being encouraged to engage in public activities and assertive behavior, while girls are socialized to prioritize domesticity, modesty, and emotional expression.[46] Additionally, divorce was heavily stigmatized for women, who were often blamed for marital failures. While these views are evolving among younger generations, these traditional norms remain influential.[73]

Gender segregation has been a prominent cultural feature, although it has significantly changed in recent years.[6] It is sometimes imposed by law, such as in gender-segregated education at all levels, and sometimes enforced by familial traditions and cultural practices.[74] Saudi children learn gender roles early, with boys traditionally engaging in public activities with other males, while girls often socialize with females in private settings.[75]

Parenting practices shaped by the aforementioned gendered expectations can create environments that either exacerbate or mitigate the risk of CM.[76-78] For instance, the patrilineal system, which prioritizes male lineage and authority, may lead to unequal treatment of children within the same family. Sons may receive preferential treatment as future inheritors of family name and status, while daughters may face neglect or stricter disciplinary practices aimed at protecting family honor.[76,79] Such disparities can contribute to emotional abuse or neglect, particularly when daughters fail to meet societal or familial expectations tied to modesty or obedience.

Additionally, the societal expectation for women to manage household and child-rearing duties while men focus on financial provision may lead to increased parental stress, particularly in families with limited resources or support.[77,79,80] In these situations, stress

may escalate into harsh disciplinary practices or emotional neglect, increasing the risk of CM.[79] Mothers, in particular, may bear the brunt of these pressures, leading to frustration and potential lapses in caregiving quality.[72,80]

On the other hand, Islamic values that emphasize fairness, compassion, and equity in child-rearing provide a counterbalance to these risks.[39,53] Parents who internalize these principles are more likely to adopt nurturing and supportive parenting practices that reduce the likelihood of maltreatment. For example, fathers who actively engage in caregiving, guided by Islamic teachings, may help alleviate the burden on mothers, creating a more balanced and protective family environment.[40,78]

However, when cultural norms overshadow religious principles, harmful practices can become normalized.[56,78] For example, boys who are socialized to prioritize assertiveness and dominance may perpetuate authoritarian parenting styles as adults, increasing the risk of physical or emotional abuse. Similarly, girls raised to suppress independence and prioritize family loyalty may struggle to advocate for themselves, perpetuating cycles of harm through silence or avoidance of external help.[7]

These rigid gender expectations can also influence religiosity trajectories and mental health in later life.[78,81-87] Children raised in environments dominated by traditional gender roles may internalize these norms, shaping their beliefs, coping mechanisms, and relationship with religion. For boys, an upbringing centered on dominance and emotional suppression may lead to extrinsic religiosity, where faith is practiced as a social expectation rather than a deeply held spiritual connection.[78,88] This superficial engagement with religiosity may fail to provide emotional resilience or moral grounding, contributing to unresolved stress and mental health challenges such as anxiety or depression.

For girls, strict socialization around modesty and submission may result in religiosity being associated with restriction rather than empowerment.[89] As adults, they may distance themselves from religious practices if these were tied to experiences of inequality or harsh discipline. Conversely, intrinsic religiosity—when faith is internalized and aligned with principles of fairness and compassion—can foster resilience and provide a source of comfort and coping in adulthood.[88]

However, in recent years, particularly under Vision 2030, Saudi Arabia has seen a significant shift in terms of gender roles.[14] Women's participation in the workforce has dramatically increased, rising from around 17.6% in 2017 to 37% by 2023. Reforms have facilitated this growth, allowing women to enter diverse sectors, including those previously dominated by men, such as technology, finance, and leadership roles. The government has introduced policies promoting gender equity, encouraging female entrepreneurship, and supporting women in leadership positions, reflecting a broader societal transformation towards inclusivity. Healthcare, a longstanding domain for Saudi women, now sees women comprising 65% of its workforce, excelling in nursing, midwifery, and as physicians.[90,91] Vision 2030 reforms have further expanded their roles, enabling advancements into medical leadership and administration, reflecting the nation's broader commitment to inclusivity and empowerment.[91,92]

The impact of these reforms may extend beyond professional spheres to reshape family dynamics and societal norms, and even levels of religiosity, including the ways in which religious coping is utilized. By granting women greater autonomy and opportunities, these changes reduce stressors tied to rigid traditional roles, potentially fostering healthier parenting practices and more equitable family dynamics. Women now have increased access to public life, participating in sports events and engaging in diverse

economic and social activities alongside men.[6] These advancements signal a gradual reduction in gender segregation in public and social spaces, reflecting progress toward inclusivity.[6]

However, these reforms may also introduce challenges, as families navigate tensions between traditional expectations and modern aspirations.[80,93,94] Balancing cultural continuity with evolving societal roles can exacerbate parental stress, with implications for child-rearing practices and the risk of maltreatment. For some families, deeply rooted traditions and societal norms continue to sustain gender segregation in specific settings, underscoring the complexity of reconciling progress with long-standing cultural values.

These shifts can also influence levels of religiosity and religious coping, as individuals and families adjust to changing roles and societal expectations.[43] Increased autonomy and evolving societal norms may lead some to reframe religiosity, shifting from practices associated with rigid traditional expectations to a more intrinsic faith rooted in fairness, compassion, and personal meaning. Women, in particular, may find empowerment in aligning their religious practices with these values, using faith as a source of resilience and coping during periods of transition.[62,95,96] Conversely, for families experiencing stress from these changes, religiosity may serve as a stabilizing force, providing structure and support through practices such as prayer and community worship. Yet, if religiosity is perceived as tied to past restrictions or inequalities, individuals may distance themselves from formal religious practices.

1.3. Background and Rationale

Burden of Child Maltreatment In Saudi Arabia

Adverse childhood events (ACEs) are defined as "Events occurring to children under 18 years old, varying in severity and often chronic, occurring within a child's family or social environment that cause harm or distress, thereby disrupting the child's physical and psychological health and development."[66] The concept of ACEs has been expanded to emphasize a global perspective, accounting for diverse cultural, social, environmental and economic factors that affect individuals' health worldwide.[97] Research has consistently shown that exposure to ACEs is associated with increased risks of various physical and mental health problems in adulthood.[33,98-103] These include cardiovascular disease, diabetes, obesity, social withdrawal, substance abuse disorders, depression, anxiety, and suicide attempts. [33,98-103] ACEs have also been linked to risky health behaviors, poorer educational and occupational outcomes, and increased healthcare utilization.[33,98-103] The effects appear to be dose-dependent, with individuals experiencing multiple ACEs at greater risk for adverse outcomes.[100] Moreover, ACEs can impact brain development, immune function, and epigenetic processes, potentially explaining their long-term health consequences.[98] Understanding these lifelong impacts underscores the critical importance of early prevention and intervention strategies to mitigate the effects of childhood adversity on long-term health and well-being. ACEs encompass a range of stressors, with child maltreatment (CM) forms, including emotional abuse, physical abuse, sexual abuse, and neglect being the most globally prevalent, co-occurring, and devastating.[104] Globally, it is estimated that over half of all world's children, up to 1 billion children aged 2–17 years, have experienced physical, sexual, or emotional violence or neglect in the past year.[105,106]

In Saudi Arabia (SA), ACEs are alarmingly prevalent.[33] A national ACEs survey conducted in 2013 by Almuneef and colleagues found that over 80% of adults reported exposure to at least one ACE in their lifetime, with 29% reporting experiencing four or more ACEs.[33] The survey revealed that the most common types of ACEs were forms of CM, with emotional abuse being the most prevalent (52%), followed by physical abuse (42%), neglect (29%), and sexual abuse (21%).[99] Another large-scale survey by Al-Eissa and colleagues in 2012, which included over 16,000 secondary school students across five of the 13 main administrative regions in SA, reported the highest 12-month prevalence of ACEs for psychological abuse (65%), physical abuse (50%), sexual abuse (10%), and neglect (53%).[107] These findings highlight the need to address ACEs, particularly CM, in SA and deepen our understanding of their root causes to inform effective policies and interventions for prevention of CM.

In comparison to global findings, the prevalence and types of ACEs reported in Saudi Arabia reflect concerning trends but require contextual considerations due to differences in how ACEs are measured across studies and regions. For instance, while Almuneef et al. (2013) reported over 80% of Saudi adults experiencing at least one ACE and 29% experiencing four or more ACEs, Madigan et al. (2023) found global prevalence of approximately 60% for at least one ACE and 16.1% for four or more ACEs.[108] The study was a metanalysis that included 206 studies from 22 countries around the world. In the United States, estimates vary widely depending on the tool used and sample population.[102,109-111] For example, the Behavioral Risk Factor Surveillance System (BRFSS) data from 23 states showed 61.55% of adults reporting at least one ACE and 24.64% reporting three or more ACEs.[109] By contrast, studies on vulnerable populations, such as those experiencing homelessness or receiving child welfare services, report far higher rates of maltreatment.[102] Nearly 90% of participants reported experiencing at least one

ACE, while 53% reported four or more.[102] Additionally, the BRFSS ACE module relies on self-reports, often underestimating maltreatment compared to clinical assessments, which uncover higher rates of specific ACEs, such as sexual abuse, through detailed interviews.[110] Such discrepancies underscore the importance of considering methodological variations, including population demographics, and survey designs.

Notably, emotional abuse is a leading ACE type globally and in Saudi Arabia, consistent with findings from North America and Europe.[99,108,111] However, the prevalence of physical and sexual abuse in Saudi Arabia is higher than in many high-income countries. For example, Bellis et al. (2019) reported sexual abuse prevalence closer to 10% in Europe and North America.[111] These differences may reflect not only actual prevalence variations but also cultural, legal, and societal factors influencing reporting behaviors and definitions of abuse. Furthermore, neglect—reported at 29% by Almuneef et al. and 53% in the Al-Eissa et al. study—is a significant ACE globally, as noted by Madigan et al., but is often underrecognized and inconsistently measured, contributing to variability in prevalence estimates.[108] These discrepancies emphasize the importance of using standardized tools to facilitate reliable comparisons across contexts.

Despite the alarming findings in the previous studies, recent literature reviews on CM in Saudi Arabia raise significant concerns.[57,112,113] There is a widespread consensus on the severe scarcity of high-quality and reliable population-based epidemiological research on all forms of CM in SA. For instance, although Almuneef and colleagues' survey[33] was both large and national, the investigators employed a convenience sample of participants recruited from public venues, potentially resulting in selection bias. This could lead to the sampling of only those with access to or who regularly frequent such public venues, while systematically excluding others, such as individuals with disabilities. On the other hand, Al-Eissa and colleagues' study[107] was conducted in only five major cities in SA, ultimately

also limiting the generalizability of the findings. Additionally, neither of these previous studies accounted for design effects in their analyses thereby challenging the validity of their findings. Moreover, systematic reviews have also highlighted other notable shortcomings, such as small and biased high-risk samples, limited coverage and lack of national representation, inconsistent and culturally ambiguous working definitions of child maltreatment measures, and a lack of high-quality face-to-face interview data, which could reduce information bias from self-reported surveys. Consequently, research addressing the burden of CM with high-quality nationally representative data is needed to avoid biases inherent in surveys and convenience samples and to enhance the generalizability of results.

Religious-Cultural Roots of Child Maltreatment in Saudi Arabia and the region

CM is widely acknowledged to be rooted in culture, as cultural norms, values, and practices significantly influence definitions, perceptions, and responses to child abuse and neglect.[66,104,114,115] While often unspoken, cultural beliefs and practices shape social standards for appropriate and inappropriate behavior that govern what is (and is not) acceptable in interactions among people, which can lead to varying thresholds for what constitutes maltreatment across cultures. For instance, in some cultures, physical punishment is seen as a necessary disciplinary measure and is not viewed as abuse, whereas in others, it is strictly prohibited and regarded as harmful.[115,116] The World Health Organization (WHO) emphasizes that cultural norms about child-rearing, gender roles, and the value of children play a crucial role in the prevalence and types of CM observed within different societies, making it crucial to identify and understand cultural root causes in order to address the issue of CM.[66,104,114,115] SA is a predominantly Muslim country, with its constitution based entirely on Islamic laws and principles. Consequently, Islamic beliefs, teachings, and practices play a central role in guiding the daily lives of Saudis.

Furthermore, religion is globally recognized as an important socio-cultural determinant of health that generally has a positive impact on health, particularly mental well-being.[64]

"Religion" is defined as a set of beliefs, practices, and rituals associated with the" transcendent", which in Western traditions typically refers to God, while in Eastern traditions it may signify ultimate truth, reality, or enlightenment.[65,67] Religion can include beliefs in spirits, angels, or demons, and often involves specific doctrines about life after death and ethical guidelines for behavior in this life. While religion is often practiced within a community, it can also be practiced individually and privately. Despite debates about its precise definition, religion is a distinct concept.[67] Religiosity, in turn, refers to the importance of religious beliefs and practices in a person's life. Given the challenges inherent in defining and measuring 'spirituality,' this dissertation prioritizes the concept of 'religiosity.' While religiosity remains a subjective construct, it is generally more structured and lends itself to more reliable and feasible measurement compared to spirituality.[67,117,118]

It is important to note that religiosity among Saudis varies significantly according to several factors such as socio-economic status (SES), educational background, urban versus rural residence, generational differences, and individual interpretations of religious teachings.[119] Individuals from higher SES backgrounds often have different access to religious education and experiences, potentially leading to more progressive or liberal views, while those from lower SES backgrounds may adhere to more traditional practices influenced by their communities. Educational attainment also plays a role, with higher education fostering a more analytical approach to religiosity and lower education relying more on traditional authorities, although some research suggests that education has no effect religiosity.[119] Urban residents, exposed to diverse religious practices and ideas, may adopt a more individualized faith, whereas rural residents tend to follow conservative

interpretations and communal activities. Generational differences further influence religiosity, reflecting a shift from traditional routines to more individualized and adaptive practices.[84,120] While the older generation emphasizes communal and familial religious traditions —such as observing collective rituals, seeking guidance from elders or religious leaders, and maintaining strong ties to extended family through shared events like weddings or funeral prayers— younger generations increasingly integrate contemporary influences and global cultural trends into their expressions of faith. That is, this integration often involves leveraging technology and social media to access religious knowledge, engage with diverse faith communities, and express religiosity in personalized ways. Exposure to global cultures through travel, media, and education further enables them to reinterpret traditional practices, blending them with modern values such as equity and inclusivity and environmental sustainability.[84,120] Gender roles also shape religious experiences, with distinct expectations for men and women. Mainly, men tend to display their religiosity more publicly, while women often practice their religious obligations in less conspicuous ways.[119,121]

Surprisingly, and despite the centrality of religion in SA, only one study has attempted to explore the relationship between religiosity and child maltreatment in SA. Ashui[122] conducted a study in 2003 on a sample of 126 female students at King Fahad University of Petroleum and Minerals in Dammam, in the Eastern region of SA, to examine their childhood disciplinary experiences. The study found that the prevalence of abuse tended to be higher for those with higher levels of religiosity, lower levels of educational attainment, and lower economic status of the parents. These findings clearly underscore the potential role of parents' religiosity in perpetrating CM. A more recent study by Alsarhi and colleagues[123] conducted in Yemen, a neighboring majority-Muslim country with a culture similar to SA, found no association between maternal religiosity and harsh physical punishment. However, maternal religiosity significantly moderated the

relationship between harsh physical parenting and child behavioral problems. That is, children whose mothers exhibited higher levels of religiosity experienced stronger adverse effects of harsh punishment compared to those whose mothers showed lower levels of religiosity. The authors suggested that more religious parents may justify their harsh punishments by invoking their authority that's denoted in the following verse in the Muslim holy book, the Quran:

"*For your Lord has decreed that you worship none but Him. And honor your parents. If one or both of them reach old age in your care, never say to them even 'ugh', nor yell at them. Rather, address them respectfully. And be humble with them out of mercy, and pray, "My Lord! Be merciful to them as they raised me when I was young*"[124]

It has been suggested that the use of this verse in disciplinary situations is misused to instill shame and fear after harsh discipline to convey that it is imperative to blindly obey parents in order to obey God, and failure to do so may lead to parental rejection, and by extension, God's rejection. Although Alsarhi and colleagues did not find a direct association between maternal religiosity and harsh physical punishment, the moderating role of maternal religiosity on subsequent behavior problems are concerning, as they illustrate how parental religiosity may still indirectly impact CM and subsequent mental well-being.

However, the aforementioned findings have limited applicability in SA for several reasons. Ashui's study was confined to female college students in one region of SA and had a small sample size, as well as a lack of in-depth analyses, which are likely to bias the results and severely limit generalizability. Alsarhi and colleagues' study was conducted only among mothers from low-income Muslim families, likely with lower levels of education, in Yemen, and assessed only one form of CM. As a result, it remains unclear whether parental religiosity affects all forms of CM and impacts both boys and girls similarly in SA.

While previous studies and systematic reviews on CM in Saudi Arabia have not directly examined the link between religiosity and CM occurrence, religious context has frequently been proposed by researchers as an explanation for the high prevalence of certain forms of CM. [57,112,113] For example, the high prevalence of physical abuse in SA might be attributed to a spillover effect of religiously condoned mild physical punishment when teaching children performing the five daily prayers.[57,125] Additionally, the preference for large families, partly stemming from religious misbeliefs against limiting family size and cultural preferences for sons, may increase the likelihood of child neglect. [76] This is evidenced by Almuneef and colleagues' finding that children in larger households (more than 6 members) were 1.5 times more likely to experience neglect.[126] Furthermore, the conservative nature of Saudi society and the sensitivity surrounding the topic may lead to severe underreporting of child sexual abuse compared to Western societies.[112] These religiously and culturally influenced factors highlight the complex interplay between societal norms, religious beliefs, and the prevalence and reporting of various forms of CM in SA.

Child Maltreatment and Gender Differences

Gender differences in the experience of CM in SA have been previously reported; however, the literature presents mixed findings. Almuneef et al., using the national ACEs survey, found that men were significantly more likely to report four or more ACEs (33% vs. 25%) compared to women. Additionally, men reported significantly higher proportions of childhood psychological abuse (21% vs. 17%), physical abuse (16% vs. 11%), and sexual abuse (16% vs. 11%).[127] In contrast, when surveying secondary school students, Al-Eissa et al. found that the proportions for psychological abuse and neglect were significantly greater for girls, while the proportion of sexual abuse was greater for boys. No gender differences in experiencing physical abuse were observed.[107] The discrepancy between the findings of these studies could be attributed to several factors: 1) recall bias, as

Almuneef et al. surveyed older adults (mean age 34 years) investigating lifetime CM experiences, while Al-Eissa et al. surveyed young adolescents about last year CM experiences; 2) a cohort effect reflecting changes in CM perpetration trends over time across different generations; 3) utilizing different tools to measure CM and neglect in both studies. Almuneef et al used the Adverse Childhood Experience International Questionnaire (ACE-IQ), while Al-Eissa used the Child Abuse Screening Tool for children (ICAST-CH) developed by the experts of the International Society for the Prevention of Child Abuse and Neglect (ISPCAN). Although both tools are validated in SA and ask about CM and neglect, however, there are some differences in the definitions of CM. For example, the definition of sexual abuse included been talked to in a sexual way or showed pornography in the (ICAST-CH), but that element was lacking in the (ACE-IQ); 4) the possibility that, as children and adolescents grow older, their awareness and understanding of all forms of abuse become stronger, and they become less reluctant to report and disclose personal experiences of CM; 5) underreporting of sexual abuse experienced by females especially given that the higher proportions of sexual abuse among males are not in line with regional and international literature. It is postulated that sexual abuse could be severely underreported by females due to cultural considerations that view female sexual abuse as more dishonoring for the family. Another possible explanation is the greater protection of females by families in Saudi culture; 6) considering that Al-Eissa et al. only surveyed students from five major cities across SA, as opposed to Almuneef who surveyed all 13 administrative areas, it is possible that the reported sex differences in CM trends reflect regional rather than national trends. Taking all these factors into consideration, it remains unclear how gender impacts the perpetration of CM in SA and whether it moderates the impact of parental religiosity on CM. More rigorously designed national studies are needed to overcome previous biases and better understand gender differences. These studies should employ improved sampling methods to ensure

national representativeness and enhanced measures to improve privacy and increase response accuracy.

Impacts of Child Maltreatment in Adulthood

a) Adult religiosity levels

CM has profound effects on personal and social development in adulthood. Childhood, a vulnerable period encompassing cognitive, emotional, and biological development, is significantly impacted by negative experiences, which can lead to a wide range of consequences later in life. For instance, CM has been associated with various health and behavioral outcomes in adulthood, including poor physical health,[128-130] insecure adult relationships,[131] less social integration,[132] lower sense of personal control,[133] alcohol use and dependence,[134] substance abuse[135] and diminished mental well-being.[136]

However, the influence of CM on adult religiosity remains unclear. Two competing theoretical views attempt to explain this relationship.[81] One perspective posits that maltreatment during childhood may lead to lower levels of religiosity in adulthood, leading victims to doubt God's benevolence and subsequently lose faith in religious institutions.[137] Supporting this view, Bierman[81] found that abuse perpetrated by fathers correlated with lower levels of religiosity using cross-sectional data from a nationally representative sample of U.S. adults. Furthermore, other studies have demonstrated that abuse victims are more likely to harbor negative perceptions of God, making them reluctant to engage in organized religion.[85,138] Conversely, another perspective suggests that traumatic events such as CM may be positively associated with adult religiosity.[139] This view argues that seeking meaning, purpose, and perceived benefits from traumatic events through religious means can enhance one's religiosity.[140] Several studies have supported the role of religiosity in coping with various stressful life events.[141,142] Consistent with this perspective, research has shown that childhood abuse is associated

with increased religiosity in adulthood.[143,144] For example, using longitudinal analyses of a nationally representative sample of U.S. adults, Jung[144] found that childhood abuse is associated with increased religiosity in adulthood, however, this association appears to be moderated by parental gender in that abused individuals tend to be more religious when abused by their mothers compared to those abused by their fathers.

The aforementioned theories and findings are primarily drawn from Western literature, focusing on the experiences of people within Western cultures and their religious contexts, mainly Judaism and Christianity. It remains unclear whether these theories and findings hold true in non-Western and Muslim societies, such as SA. Despite religion being central to the lives of Saudis, no published studies to date have explored the impact of CM on adult religiosity levels in SA specifically or the Middle East more generally. Expanding our understanding in this area may have significant implications for adult mental well-being and the treatment of mental illnesses later in life.

b) Adult Mental Health: Anxiety and Depressive Disorders

As mentioned earlier, CM typically occurs during early childhood, which is a critical developmental period, and is associated with greater risk of adult mental illnesses such as depression and anxiety. A substantial body of literature has explored the detrimental impact of CM on adult mental well-being globally. In a systematic review of 37 observational studies on Adverse Childhood Experiences (ACEs) and various adverse health and behavioral outcomes, including violence, mental illness, and substance use, Hughes and colleagues found that individuals with at least four ACEs were at increased risk for all health outcomes compared to individuals with no ACEs. Moreover, associations were stronger for mental health relative to other outcomes.[100] Another systematic review and meta-analysis by Li and colleagues, focusing on cohort studies of child maltreatment and adult anxiety and/or depression, found significantly higher pooled odds ratios (OR)

between any type of maltreatment and adult depression (OR=2.03, [95% confidence interval (CI) 1.37–3.01]) and anxiety (OR=2.70, [95% CI 2.10–3.47]). When examining specific types of maltreatment, the odds of depression and anxiety was highest for those with a history of sexual abuse, followed by physical abuse and neglect, respectively. The estimated population attributable fractions (PAFs) revealed that over one-half of global depression and anxiety cases are attributable to childhood maltreatment.[145] These findings were also supported by Gardner and colleagues in a more recent systematic review and meta-analysis that included only population-based samples,[146] emphasizing the need for treatment and prevention of child maltreatment and adult mental illness worldwide.

In Saudi Arabia, only a limited number of studies have investigated the relationship between CM and adult depression and anxiety. Almuneef et al. reported that Saudi adults with four or more ACEs had nearly five times higher odds of depression compared to those with no exposure to ACEs.[33] The study also examined gender differences in the impact of ACEs on adult mental health, finding that women with four or more ACEs had the highest likelihood of developing internalizing disorders, particularly depression and anxiety, compared to those without ACEs. In contrast, men were more likely to experience externalizing disorders, such as drug and alcohol abuse. In a follow-up report examining child sexual abuse (CSA) specifically, Almuneef found that individuals who reported CSA had higher odds of adult depression, anxiety, and other mental illnesses compared to those who did not report CSA.[147] Other forms of CM have not been assessed for their unique effects on adult depression and anxiety. However, these findings may underestimate the true impact of CM on adult mental health due to several methodological limitations. For instance, Almuneef and colleagues assessed only previously diagnosed anxiety and depression among the sample participants, which could lead to underreporting. Furthermore, the study recruited participants from public venues

like parks and shopping malls, which may have hindered accurate reporting of mental illnesses or CM due to privacy concerns. The convenience sampling approach also introduces potential selection bias by systematically excluding relevant populations, such as individuals with disabilities.

The moderating effect of religion on various physical, social, and psychological stressful events has been reported in the literature, establishing religion as an instrumental and positive coping mechanism during times of distress.[148] However, only a few empirical studies have explored the intersection between CM, religion, and mental health.[144,149,150] For example, Gall [150]and colleagues found that those who believed they had a relationship with a benevolent God were less likely to exhibit a negative mood among a sample of 101 men and women survivors of childhood sexual abuse. Similarly, analyzing a sample of 119 depressed inpatients who experienced childhood abuse, Dervic and colleagues[149] found that those with religious beliefs were less likely to experience suicidal ideation. A more recent study found that religious salience, defined as the relative importance of religion in one's personal life,[151] buffered the adverse effect of CM on emotional wellbeing over time.[144] However, these few studies focused on Judaeo-Christian denominations within Western societies.

Similar published studies are even scarcer in the Muslim world. Ghorbani and colleagues[152] analyzed data from 200 Afghani university students, 122 of whom had experienced childhood sexual abuse, and found that individuals who suffered from childhood sexual abuse reported lower religiosity and spirituality and engaged lower positive religious coping than those who did not experience childhood sexual abuse. After controlling for negative religious coping, defined as strategies that involve tension, conflict,[153] or struggle with a higher power or religious community, and positive religious coping, defined as strategies that promote a sense of connection with a higher power,

supportive religious community, and spiritual meaning in the face of adversity,[153] was associated with better mental health, indicating the importance of the framing of one's religious beliefs and the type of religious coping mechanism they tend to use. When examining 132 Israeli-Muslims in Israel who lost a beloved person through death, Abu-Raiya and Jamal found a positive correlation between positive religious coping and both satisfaction with life and positive affect, such as feelings of joy and excitement that individuals with depression and anxiety often lack.[154] Drawing on the previous few studies among Muslim samples, there is a suggestion that the type of religious coping mechanisms play an important role in buffering the detrimental impact of life stressors, including those happening in childhood such as maltreatment, on mental health. However, it is unclear whether those findings still hold for all types of stressors, including the different forms of CM. It is also unclear if they hold for prevalent adult mental illnesses, such anxiety and depressive disorders. Additionally, the studies conducted to date, despite having been conducted in highly religious Muslim populations, were mainly conducted in areas plagued with longstanding internal conflicts and were therefore also experiencing heightened daily stressors, rendering it difficult to generalize the results to other Muslim communities with more stable geopolitical climates such as that in SA.

1.4. Research Question

The widespread prevalence of CM in SA has profound implications for various health outcomes, including adult mental well-being, which can lead to further physical and social impairments. This phenomenon is often deeply rooted in cultural contexts, one crucial aspect of which is religion, central to the daily life and mental well-being of Saudis. Despite its significance, research at the intersection of religiosity, CM, and subsequent adult mental illness in SA remains limited. This dissertation leverages data from the first Saudi National Mental Health Survey (SNMHS) to explore the interplay between parental and individual religiosity, forms of CM, and adult mental illness in SA. Focusing on

parental physical abuse, sexual abuse, and neglect as measured in the SNMHS, this study examines anxiety and depressive disorders—the most prevalent mental disorders in SA and common mental health consequences of CM globally. To this end, we pose the following important relationships:

First, we propose to evaluate the independent association of parental religiosity during the participant's childhood on the self report of any, each individual, and the number of co-occurring forms of CM captured in the ACEs measure, and as stratified by sex among the nationally representative sample of Saudi parental in the SNMHS.
Hypothesis 1: Parental religiosity during childhood is inversely associated with CM.
Hypothesis 2: Risk estimates of the previous association are expected to be more elevated among male participants.

For our second aim, we aim to evaluate the independent association of any, each individual, and the number of the three co-occurring CM forms on the individual's level of religiosity in adulthood. This aim will test the following hypotheses:
Hypothesis 1: CM is positively associated with participant’s frequency of seeking comfort in religion in adulthood.
Hypothesis 2: Risk estimates of the previous association are expected to be more elevated among female participants.

Lastly, we seek to examine whether there are differential effects by the individual's frequency of comfort seeking in religion on the association between CM (using the same three measures in Aim 1) and the occurrence and time to onset of: 1) any adult depressive disorder; and 2) any adult anxiety disorders, stratified by sex among the nationally representative sample of Saudi parental in the SNMHS. This aim will test the following hypotheses:

Hypothesis 1: CM is positively associated with adult-onset depressive and anxiety disorders.

Hypothesis 2: frequency of seeking comfort in religion will moderate the effect of CM on adult-onset depressive and anxiety disorders with lower risk estimates among those deriving a greater level of comfort from religion.

This dissertation offers several innovative contributions to the existing body of research on CM, religiosity, and mental health in SA. Unlike previous studies that relied on data from limited community settings unrepresentative of the Saudi population or employed sampling methods that did not account for complex survey designs, this research is the first to investigate the intersection of CM, religiosity, and adult anxiety and depressive disorders using a nationally representative, rigorously conducted national survey involving Saudi households. To our knowledge, no published study in SA has employed a life-course perspective to examine the role of parental religiosity during childhood on the occurrence of maltreatment and its potential influence on religiosity in adulthood. Furthermore, no existing local or regional research has investigated the potential moderating role of an individual's comfort in religion during adulthood on the relationship between CM and adult-onset depression and anxiety disorders. We hope that our findings will inform future research and guide Saudi policymakers on resource allocation and outreach initiatives aimed at raising awareness of harmful religio-cultural practices and educating parents on effective, Islamic-aligned healthy parenting methods. Ultimately, this work aims to help reducing anxiety and depressive disorders among Saudi adults through early-life, targeted, and universal, innovative interventions.

CHAPTER 2
The association between Parental Religiosity and Child maltreatment among a nationally representative sample of Saudi Households

Introduction

Child maltreatment (CM), encompassing physical, emotional, and sexual abuse, and neglect, is a serious public health problem worldwide.[59] It is attributed to a host of cultural, social, environmental and economic factors that can lead to devastating physical and psychological health outcomes throughout the life course. In Saudi Arabia (SA), research has been limited, although it has been growing over the past decade.[57,112,113] Available large-scale studies indicate an increased prevalence of CM.[33,99,107] According to Almuneef and colleagues' national survey in 2013 among Saudi adults aged 18 years and older, emotional abuse was the most prevalent (52%), followed by physical abuse (42%), neglect (29%), and sexual abuse (21%).[99] Another large-scale survey in 2012 by Al-Eissa and colleagues included over 16,000 secondary school students across five of the 13 main administrative regions in SA, reported the highest 12-month prevalence of adverse childhood events (ACEs) for psychological abuse (65%), physical abuse (50%), sexual abuse (10%), and neglect (53%), respectively.[107] Gender differences in experiencing CM have been reported in studies among Saudi participants, however, the results are inconsistent.[33,107] The overwhelming majority of the reported CM cases were found to be perpetrated by the victims' own parents. In fact, those parents were found to be mostly young, single or divorced parents, with low educational attainment, and having large family size (more than 6 members).[126,155] This highlights the importance of addressing CM at the nuclear family level; focusing on better understanding parental attributes of CM in order to develop effective targeted interventions.

Despite the alarming findings on the burden of CM in SA, recent literature reviews on CM in SA raise significant concerns.[57,112,113] There is a widespread consensus on the severe scarcity of high-quality and reliable population-based epidemiological research on all forms of CM in SA. For instance, although Almuneef and colleagues' survey[33] was both large and national, the investigators recruited a convenience sample of participants from public venues, such malls and public parks, potentially resulting in selection bias. This could lead to the sampling of only those with access to or who regularly frequent such public venues, while systematically excluding others, such as individuals with disabilities and those living in remote areas. On the other hand, Al-Eissa and colleagues' study[107] was conducted in only five major cities in SA, ultimately also limiting the generalizability of the findings. Moreover, neither of these previous studies accounted for design effects in their analyses thereby challenging the reliability of their findings. Systematic reviews have also highlighted other notable shortcomings, such as small and biased high-risk samples, limited coverage and lack of national representation, inconsistent and culturally ambiguous working definitions of CM measures, and a lack of high-quality face-to-face interview data, which could reduce bias from traditional self-administered surveys.[57,112,113]

ACEs, including CM, are widely acknowledged to have cultural roots.[59] In SA, the combination of both Islamic values and Arabic traditions shapes the Saudi cultural beliefs and practices.[77] Islamic teachings and principles serve as the foundation of the country's constitution, and extend to every aspect of Saudis daily living, including the upbringing and welfare of children. Islam mandates that parents are responsible for ensuring the comprehensive care and welfare of their children, including meeting their basic needs and safeguarding every aspect of their well-being.[39,53,156] Parents are urged to establish nurturing bonds with their children, characterized by empathy, kindness, understanding, and support, all while maintaining a balance between encouragement and caution.[39,53,156-158] Islamic teachings strictly condemn any form of neglect, abuse, or violation of children's

rights.[39,159] These principles are deeply ingrained in Islamic traditions that are emphasized in the Qur'an, Muslim's holy book, and exemplified by the life of Prophet Muhammad.

While Islam provides the religious framework, its teachings can be interpreted and applied in diverse ways by its followers, influenced by their unique characteristics and social contexts. Understanding this distinction is crucial for grasping the variability in practices and beliefs among Muslims. Consequently, some Muslim parents may use Qur'anic verses or the Prophet sayings to justify maltreatment as a way of child discipline or pleasing God. A commonly misused prophetic saying is "***Command your children to pray when they are at the age of seven years, and hit them, if necessary, for not offering it when they are at the age of ten***". Praying is one of the five pillars of Islam and it's required to be performed five times a day in a timely manner, which underscores the importance of teaching it from an early age. Condoning corporal punishment for religious learning purposes has been suggested to have contributed to the spillover to physical abuse among Muslim families, including Saudis.[57,77,114,123,125,160] The validity of this prophet saying has long been a point of contention as it contradicts the other Islamic values and the current conventions of child protection. However, there is wide consensus among Muslim scholars and legislators that if resorting to corporal punishment is a must, it must not cause the slightest harm to the child. Since that is difficult to achieve, corporal punishment is generally not advised.[16-19] In fact, a recent study by two Muslim scholars from Kuwait and SA has invalidated the aforementioned Prophetic saying and strongly advised against any type of corporal punishment as a way of child discipline.[160]

Another commonly misused qur'anic verse is "***For your Lord has decreed that you worship none but Him, And honor your parents. If one or both of them reach old age in your care, never say to them even 'uff,' nor yell at them. Rather, address them respectfully. And be humble with them out of mercy, and pray, "My Lord! Be merciful to them as they raised me when I was young***".[124] Some Muslim parents misuse this

verse in disciplinary situations to instill shame and fear and justify harsh discipline, physically or emotionally, by conveying that it is imperative to blindly obey parents in order to obey God and failure to do so may lead to parental rejection, and by extension, God's rejection. This means that even the slightest attempt of challenging parents commands or opinions may be perceived as an act of disobedience, which could likely lead to emotionally abusing the child or spill over into other types of abuse.[123]

Moreover, cases of neglect among Muslim families are suggested to result from the preference for having many children, that could be stemming from a religious misconception that it is unacceptable to limit the number of children under any circumstances.[76] Another reason is the cultural preference for sons over daughters, which may have been reinforced by a Qur'anic verse that is often misinterpreted.[76] The verse in question, which states, "***Men are in charge of women by (right of) what Allah has given one over the other and what they spend (for maintenance) from their wealth***" is sometimes misconstrued as suggesting male superiority. However, its true meaning lies in men being entrusted with certain responsibilities based on their merits, and if they fail in fulfilling those responsibilities, they may lose their entrusted status. This misinterpretation can ultimately result in families continuing to have children, regardless of their socio-economic or health status, until they reach the desired number of sons. This, in turn, could increase the likelihood of child neglect.[76] It is important to note, however, that cultural practices and societal norms among Saudis may have significantly evolved over the last decade due to the substantial socioeconomic reforms introduced since 2016 under the Saudi Vision 2030 initiative.[6] However, major cultural shifts typically require many decades and several generations to fully take root and manifest widespread changes in societal behavior and norms. Despite the recent socioeconomic reforms under Saudi Vision 2030, which have already begun to influence aspects of Saudi culture, the deep-seated cultural practices and attitudes toward family dynamics and child-rearing are

likely to persist for some time. Therefore, it is essential to investigate and understand the impact of prevailing past and current cultural beliefs and practices on the risk of CM exposure and perpetration in order to establish a solid foundation to inform current interventions and future research.

Indeed, Almuneef and colleagues found that children living in larger households (> 6 members) were 1.5 times more likely to be neglected compared to those in smaller households.[126] It is also suggested that the estimated burden of child sexual abuse in SA is severely underreported due to the high sensitivity of the topic and the conservatism of Saudi society, resulting in an even greater reluctance to report such abuse compared to other societies.[112] Despite the aforementioned observations, there is no published high-quality research that seeks to investigate the potential links between parental religiosity levels and CM experiences within the Saudi population. This gap underscores the significance of further exploring the role of parental religiosity in the context of CM, as well as potential gender differences among the Saudi population. Such research could offer valuable insights into cultural and religious factors that may influence the prevalence and nature of CM, contributing to more effective prevention and intervention strategies.

The association between parental religiosity and CM perpetration in offspring is a complex and multifaceted issue that has garnered increasing attention over the years in the Western hemisphere, but not so much on the Eastern part of the world, including SA. Indeed, two studies were published in 2011 and 2014 to assess the readiness of and progression made in SA to implement large-scale evidence-based CM prevention programs.[161,162] Despite substantial progress in addressing CM through initiatives such as the National Family Safety Program and the implementation of child protection teams, significant challenges remain, such as limited reliable data on the burden, nature, risk and protective factors of CM in the cultural context of SA, and deeply ingrained societal

attitudes that play a significant role in shaping parenting practices and potentially influencing the prevalence of CM. According to the most recent assessment, there is a moderate readiness to implement large-scale, evidence-based CM prevention programs in SA, with higher scores for knowledge and political will but low scores for material, human, and technical resources. The studies highlight the critical need for more comprehensive strategies, including public awareness campaigns and improved data collection systems to produce better and more reliable research and enhance the effectiveness of CM prevention efforts. These findings underscore the necessity for continued research to enhance and expand the knowledge base and scientific data on CM. This is essential in order to inform targeted interventions, develop culturally sensitive prevention programs, and ultimately reduce the incidence of CM and consequent health and behavioral adverse outcomes in SA.

Accordingly, we aim to investigate the independent association between parents' levels of religiosity and experiences of child maltreatment, as well as examine potential gender differences in this association using nationally representative data from the Saudi National Mental Health Survey (SNMHS). We hypothesize that a higher level of parental religiosity during childhood is negatively associated with child maltreatment, and risk estimates are expected to be more elevated among male participants. This research is crucial as it could deepen our understanding of significant cultural factors influencing child maltreatment, potentially guiding more effective prevention strategies.

Methods

Sampling and participants

The SNMHS is a part of the World Health Organization's (WHO) World Mental Health (WMH) survey initiative.[163] The SNMHS is a nationally representative survey of Arabic-speaking Saudi households between the ages of 15 and 65 from 11 out of 13

administrative areas in SA.[163] Two Southern areas, Jazan and Njaran, were excluded due to security concerns as a result of the political conflict along the Saudi-Yemeni borders at the time of the survey. The survey was conducted face-to-face through trained interviewers from 2011 through 2016 using a computer-assisted personal interview (CAPI) mode and an audio computer-assisted self-interviewing (ACASI) methods for specific sensitive sections.[163] A multistage clustered probability sampling was employed based on the 2010 Saudi population census from the General Authority for Statistics. The sampling and weight creation were described in detail elsewhere.[164] One male and one female from each household were selected across primary sampling units within the 11 distinct strata. The survey instrument was divided into two parts: (Part I) involved sections on core Mental Health Disorders (MHD) and was administered to all participants (N=4,004), while (Part II) included a subset of (Part I) to address additional, non-core sections and a wide range of related determinants of mental health (N=1,981). This subset included two groups: all individuals who reported any core MHD in PART I, and a probability subsample of those who did not report any MHDs in the core sections (selected with a 0.25 probability). Specific weights were developed for both parts I and II, taking into account the intricacies of the multistage and individual-weight sampling procedures.[163]

Our analyses were restricted to participants aged 18 years and older to ensure comparability with a companion article, which records relevant study outcomes among adults. This is in line with our adoption of a life-course approach to investigate the relationship between childhood exposures and adult outcomes. The final analytic sample for this study was drawn from Part II (N=1,793) participants as Part I didn't address relevant determinants of mental health, and thus only weights for Part II were applied in our analyses. Written informed consent was obtained in written form prior to the interviews. All procedures regarding the fieldwork and consent were approved by the

Institutional Review Board committee at the King Faisal Specialist Hospital & Research Centre in Riyadh (RAC#: 2091093).[163]

Instruments

Similar to other World Mental Health (WMH) surveys, the Saudi National Mental Health Survey (SNMHS) employed the third version of the World Health Organization's Composite International Diagnostic Interview (CIDI).[163] The CIDI, a fully structured survey instrument widely utilized in community surveys, implements a stem-branch technique to determine both lifetime and 12-month prevalence of various MHDs. For the Saudi context, the CIDI 3.0 was validated through a rigorous multi-step translation methodology, including linguistic validation, cultural adaptation, and extensive pretesting tailored specifically to the Saudi population.[165] Additionally, certain sections were incorporated into the Saudi version of CIDI 3.0 to gather data relevant to the local context, including aspects like religiosity, polygamy, and attitudes towards alcohol consumption. The survey, conducted by trained lay interviewers, primarily used CAPI as well as ACASI methods for specific sensitive sections such as those concerning substance and alcohol use. In the SNMHS, mental health diagnoses were derived from the CIDI 3.0 data using the criteria of the Diagnostic and Statistical Manual for Mental Disorders, fourth edition (DSM-IV)[163], to enable comparison of the findings with other WMH survey results.

Measures

Exposure

The primary exposure of interest is parental religiosity during the respondent's childhood. In this study, household religiosity is used as a proxy for parental religiosity as offspring's religiosity positively correlates with perceived parental religiosity.[86,166] Therefore, household religiosity will be referred to as parental religiosity hereafter. Parental religiosity during the respondent's childhood was assessed in the survey by asking

participants a single question: "How religious was your household when you were a child?" and recorded on a 4-point Likert scale (very religious, somewhat religious, not very religious, and not at all religious). In our study, we operationalized this variable as binary, with two categories: highly religious or weakly religious. Participants who reported being “very religious” or “somewhat religious” were classified as highly religious, while those who reported “not very religious” or “not at all religious” were classified as weakly religious. "Don't know" and "refused" responses were treated as missing values.

This binary categorization was chosen to enhance statistical power by increasing the sample size within each category, thereby reducing potential bias introduced by small cell sizes among participants reporting “not very religious” and “not at all religious.” Moreover, this classification better aligns with the intended meaning of the individual categories of parental religiosity. Specifically, “moderately religious” reflects a moderately strict adherence to religious teachings and practices, which is distinct from the “not very religious” and “not at all religious” categories grouped into the “weakly religious” category.

This distinction is particularly important in the context of Saudi Arabia, a country widely recognized for its high levels of religiosity. In this cultural setting, it is highly unlikely—though not impossible—for most individuals to report extremely low levels of religiosity or identify as completely areligious. As such, including “moderately religious” in the “weakly religious” grouping could misrepresent the religiosity levels of the latter subgroup.

To address potential misclassification due to social desirability bias—where participants might overreport higher religiosity levels—a sensitivity analysis was conducted. In this analysis, individuals who reported being “moderately religious” were grouped into the

"weakly religious" category to test the robustness of the findings under this alternative classification. Nevertheless, the primary categorization is emphasized in the discussion, as it is more consistent with the intended meanings of the categories and the cultural context of Saudi Arabia.

Outcomes

The primary outcomes for this study are the three forms of child maltreatment as measured individually (physical maltreatment, sexual maltreatment, neglect), globally (any form of child maltreatment), and in terms of number of co-occurring forms of child maltreatment experienced. These outcomes were measured as part of the SNMHS family-related Adverse Childhood Experiences (ACEs) measure.

Physical abuse was assessed by asking participants, "When you were growing up, how often did someone in your household do any of the things (on list A) to you?" List A included: pushed, grabbed or shoved, threw something, slapped or hit. Responses were recorded on a 4-point Likert scale (often, sometimes, rarely, never). We operationalized this variable as binary (yes, no), categorizing those who reported "never" as not having experienced physical abuse, while those who reported otherwise were considered to have experienced it. Those who reported "don't know" or "refused" were treated as missing values.

Sexual abuse was assessed with questions about experiencing rape or sexual assault under the age of 18 and having this occur three or more times. This was the only ACE where the survey did not collect information on the perpetrator's identity in terms of being a family member or a stranger. We operationalized this measure as a binary variable, classifying those who reported "never having been raped or sexually assaulted under the age of 18"

as not having experienced sexual abuse, while those who reported otherwise were considered to have experienced it.

Neglect was assessed with questions about the frequency of not having adequate food, clothing, or medical care, receiving inadequate supervision, and having to perform age-inappropriate chores. Similar to physical abuse, neglect responses were recoded on a 4-point Likert scale (often, sometimes, rarely, never). We operationalized this variable as binary (yes, no), classifying those who reported "never" or "rarely" as not having experienced neglect, while those who reported otherwise were considered to have experienced it.

The aforementioned measures were assessed using questions adapted from scales and instruments that had been validated in prior studies. However, these questions had not been specifically validated for the study population of the SNMHS.

Covariates

Effect Modifier

We included participants' gender as an effect modifier, that we operationalized as binary variable (male, female).

Confounders

On the basis of prior literature, theoretical links, and data availability, we considered including some personal, family-related, and contextual covariates as potential confounders.[81,126,155,167] We identified several covariates as strong potential confounders for CM among Saudis[5,6], these include: number of participant's siblings growing up, father's employment status, mother's educational level, history of family economic adversity, history of parental maladjustment, and living with a single or stepparent. All

these confounders were measured during the participant's childhood until the age of 18 years old. Age at interview was also considered as a strong confounder to account for potential recall bias and generational differences.

Research on Western samples indicates that individuals with less education often place greater emphasis on instilling religious faith in their children compared to those with more education.[168] Additionally, higher parental education levels have been linked with more effective parenting practices and better child adjustment outcomes.[169] In contexts of lower educational attainment, individuals may face higher rates of unemployment or economic hardship. Such challenges can lead to increased reliance on religion as a coping mechanism. Moreover, the stresses associated with being a divorced or single parent, particularly in lower socioeconomic situations, may increase the risk of child neglect or maltreatment. In these circumstances, individuals in religious communities often turn to religious faith for comfort, seeking meaning and strength in challenging times. Studies on family profiles of CM and neglect victims in Saudi Arabia indicate that children in large families, with six or more members, are at a higher risk of experiencing neglect.[126,155]

Potentials confounders were defined here as assessed in the SNMHS and further operationalization are also discussed. Mother's educational levels were assessed separately by asking respondents about the number of years of school their mother completed. We categorized the responses as having no education if the respondent reported 0 years, any numbers of years from 1 through 6 as having elementary education, from 7 to 12 years as intermediate or high school education, from 13 years and more as collage education or more. Father's employment status was also assessed separately by asking the respondent "How much of your childhood did (your father/ male head of household) either work for pay or work in a family business? Responses were recorded as "all of the time", "most", "some", "a little" or "not at all". Parental maladjustment was

assessed by asking respondents about three elements: history of family violence, symptoms of parental mental illness during respondents' childhood (particularly for depression, anxiety and panic disorders), and if the father had alcohol drinking or substance use problems. If the respondent affirmatively reported one of the previous parental maladjusted elements, we recorded that as "yes", and "no" if reported otherwise. Parents' divorce status was also included as a binary variable. Living with one or both biological parents was assessed by asking respondent if they were living with one or both biological parents until the age of 16. Responding affirmatively was recorded as "yes", and "no" otherwise. Number of siblings was assessed by asking participants: "How many brothers and sisters lived with you while you were growing up, including step, half, and adopted brothers or sisters?". We operationalized it as a contiguous variable.

Lastly, when the primary outcome was an individual type of CM, we controlled for the other two types of CM in our study to ensure isolating their effect on the main association of interest. For example, when the primary outcome was physical abuse, we controlled for sexual abuse and neglect.

Statistical analysis

We included the sample from the part II non-core section of the SNMHS (N=1,793) as some anxiety disorders and all of the sociodemographic and relevant determinants of mental health were not included in part I. All study analyses took survey design effects and weights for part II into account using STATA 18 survey analysis functions (syv).[170]

Descriptive analyses

We described the sociodemographic characteristics of the study population as a whole and by parental religiosity levels for part II using means and standard deviations (SD) for continuous variables, and unweighted frequencies and weighted percentages for

categorical ones. Standard errors (SE) were also estimated and presented for all types of variables. After that, we presented the unweighted frequencies, weighted prevalences, and SEs of the three forms of child maltreatment as measured globally (any form of child maltreatment), individually (physical abuse, sexual abuse, neglect), and in terms of number of co-occurring forms of child maltreatment experienced (0, 1, 2 or more). Results are presented for the total population and as further stratified by gender and parental levels of religiosity.

Inferential analyses:

Bivariable regression

To examine the association between parental religiosity and two of the three forms of our primary outcomes, which are having experienced any as well as each individual form of CM, and given the commonality of these binary outcomes, we fitted Poisson regression models with robust variance estimation to estimate crude Relative Risks (RRs), also known as Incidence Rate Ratios (IRRs), and their 95% Confidence Intervals (CIs).[171] For the third form of our primary outcome, as it's a count variable (number of co-occurring CMs) with observed excess zero counts, we fitted a zero-inflated Poisson regression model. It allows for modeling the positive (non-zero) count part of the variable that follows a Poisson distribution, for which, we estimated crude RRs and 95% CIs. The ZIP model also allows for modeling the excess zero part of the variable through logistic regression, because the ZIP model assumes that there are two latent groups of individuals in the excess-zero part of the variable: one group indeed has a positive probability of having a positive non-zero count (excess zeros); the other is certain to have a zero count (true zeros).[172] The observed zeros in our outcome could be from either group. That is, respondents who didn't report CM could genuinely have never experienced it, or they could have experienced one or more forms of CM but chose not to disclose them. This could be due to imperfect recall, social desirability bias, or a lack of clear understanding of the CM measurement questions.

Emotional abuse, arguably the most common type of CM among Saudis,[99,107] was not assessed in the survey. Consequently, no respondent reported this form of CM, further contributing to the reporting of excess zeros. This makes ZIP a more suitable model to fit our data over the standard Poisson regression. Additionally, the absence of data overdispersion, indicated by the variance and mean of the outcome variable being closely aligned (mean = 0.19, variance = 0.21), favors the use of ZIP regression over Zero-Inflated Negative Binomial (ZINB) regression. For the zero-inflated model, we modeled that part using the following set of inflation variables that includes mostly personal predictors, namely: age at interview, gender, the participants educational level, and parental/household religiosity. We reported beta coefficients and their SEs along with P-values. Significance level was set at 0.05. (Tables 5 and 6 in the appendix) In addition to the previous analysis, we examined whether our associations of interest differed by the respondents' gender by including an interaction term into the models and reported RRs and their 95% CI.

Multivariable regression

We fitted several multivariable Poisson and ZIP regression models to examine the independent associations between parental religiosity and CM experiences collectively, individually, and cumulatively, controlling for the confounders in the previous section. We built several models using different sets of confounders in multiple nested models to determine the best fitted model. We chose a significance level of 0.05 and reported the RRs and 95%CIs of the final selected model. (See section below) After that, we examined whether our associations of interest differed by the respondents' gender by including an interaction term into the models and reported RRs and their 95% CI.

Sensitivity Analysis

We conducted a sensitivity analysis to address two key issues:

1. **Small sample sizes**: The sexual abuse (n=38) and neglect (n=59) groups had small sample sizes, which became even smaller when stratified by parental religiosity and gender. These limited sample sizes reduced the ability of our multivariable models to adequately control for a larger number of potential confounders, potentially compromising the reliability and precision of our effect estimates.
2. **Potential misclassification in parental religiosity categories**: We categorized the original 4-category parental religiosity variable into a binary one as described earlier. This may raise concerns about potential misclassification. That is, there is a likelihood of overreporting higher levels of religiosity in Saudi Arabia, where religion is deeply central. To account for this, we conducted a sensitivity analysis using a modified binary variable for parental religiosity. In this modified version, individuals who reported having parents who were "somewhat religious" were included in the weakly religious group to reduce potential bias from overreporting.

In order to evaluate, and potentially minimize, the impact of small sample size on our adjusted estimates, specifically for sexual abuse and neglect, we employed Propensity Score (PS), which is the probability of assignment to a particular treatment or exposure group, independently of the outcome, given a set of baseline covariates.[173] This is a useful tool to efficiently control for confounding and improve precision in observational studies.[173] We estimated PS of both groups of parental religiosity levels (our main exposure variable), then included the estimated PS variable as the sole adjustment covariable instead of the individual confounders in the multivariable models. Then we compared the covariable- and PS-adjusted main effect estimates for any drastic changes in magnitude, direction, and precision. PS was calculated using the 'pscore' package in STATA 18.[174]

We estimated PS for parental religiosity levels by specifying a multi-variable logistic regression model. We included all the confounders in the multivariable models as independent variables in the PS estimation model. We also incorporated the part II survey weight variable into the PS estimation model as recommended by previous reserach.[175-178] The 'pscore' function in STATA estimates the PS and automatically determines the optimal number of blocks of identical or similar PS to achieve baseline covariables balance. To check for covariables balance, we initially evaluated the PS distribution within the exposed and unexposed groups graphically, observing areas of overlap, also known as the "area of common support.", which is necessary to allow comparability. When overlap was observed, we calculated the standardized mean and percentage differences for all baseline covariates in the PS model for both exposed and unexposed groups. Then, we assessed these standardized differences before and after PS adjustment to observe any significant reduction in the PS-adjusted values using the 'pbalchk' function in STATA. While there's no widely accepted threshold for standardized differences indicating significant imbalance, various studies suggest that a standardized difference of 0.1 might point to a meaningful imbalance between exposed and unexposed subjects.[179-181] Hence, we considered covariables balance satisfactory when the standardized difference for a covariables was approximately between -0.1 and 0.1.

Assessment of Multicollinearity

We assessed for the presence of multicollinearity among the independent variables in the multivariable models using the Variance Inflation Factors (VIFs). VIFs are a diagnostic measure to identify multicollinearity among the predictors, with a VIF value greater than 10 typically indicating significant multicollinearity. The results of the VIF analysis indicated that the mean VIF for the models ranged from 1.33 – 2.24, with individual VIF values ranging from 1.02 to 7.27. These results suggest that multicollinearity is not a concern in our models, as all VIF values were well below the threshold of 10. (supplemental table 1)

Power analysis

Power calculations were performed using the power calculator developed by Eugene Demidenko at Dartmouth[182] for minimal detectable risk calculation involving dichotomous exposure and effect modifier variables. For the association between household religiosity and any CM that is potentially modified by gender, we calculated that the minimal detectable risk estimate for Any CM among male participants is 3.87 at 80% power and 0.05 significance level, given any CM prevalence of 30% among female participants who reported having not very or not at all religious households, a prevalence of 96% of reported high or moderate household religiosity, and a 1:1 male-to-female ratio, assuming ORs of 0.5, 2, and 1 for the association between Any CM and household religiosity, Any CM and gender, and household religiosity and gender, respectively.

Results

Description of the study population

Table 1 presents the personal and parental sociodemographic characteristics of study participants in the total population and by groups of parental religiosity levels. We included a total of 1,793 observations that met our inclusion criteria. Of that, 19.09% (n = 342) reported their parents as highly religious, and 82.12% (n = 1,472) reported their parents as somewhat religious. Combining these, 95.52% (n = 1,715) of participants reported having highly religious parents. In contrast, only 4.48% (n = 70) reported having areligious or weakly religious parents, with 3.07% (n = 55) identifying their parents as not very religious and 0.84% (n = 15) as not at all religious..

Personal characteristics

The mean age of participants at the time of the interview was 34.19 years. A notable gender difference was observed between the two parental religiosity groups, with a significantly higher percentage of females in the weakly religious parents' group (82.27%)

compared to the highly religious parents group (47.10%; $p < 0.001$). The majority of participants in the total population had 4-7 siblings (42.96%) and 8-10 siblings (27.17%), while a smaller proportion had 11-20 siblings (15.60%) and 0-3 siblings (12.78%). This distribution was consistent across both highly and weakly religious parent groups.

Educational attainment of parents

Educational attainment of parents showed varied distributions; however, no significant differences were identified in the level of education between the highly and weakly religious groups, suggesting a homogeneous educational background across the sample. Regarding father's educational attainment, the largest group in the total population had no education (40.63%), followed by elementary (26.52%), middle/high school (23.54%), and college or more (9.308%). A similar pattern was observed across levels of parental religiosity. (Table 1) Mother's education attainment followed a similar trend, with the majority having no education (62.63%) and a marginal significance difference between groups ($p=0.06$).

Parental Employment and Family Structure

Parental employment status during the participants' childhood indicated that most parents were employed for most or all of the child's upbringing, with no significant difference observed between the religious groups. Most fathers were reported to be employed for most or all of the participant's childhood (66.02% in the total population). This trend is consistent across different levels of parental religiosity with no significant differences observed. A large majority of the total population reported that their mothers were not employed at all or only a little during their childhood (86.06%, $p=0.09$). Overall, 11.18% of participants reported parental maladjustment, 1.41% reported that their parents were divorced, and nearly 3% of the total population reported that one or both parents had died. A large majority of participants reported living with their biological

parents (93.91%), with a slightly higher percentage in the high parental religiosity group (94.10% vs. 89.87%, p=0.24). There were no significant differences in parental maladjustment, parental divorce, or parental death across religiosity groups.

Geographical and Contextual Differences

Participants predominantly resided in large cities (50.85%), with no significant difference in the area of living based on parental religiosity (p=0.55). Regional differences were observed, with the highest proportion living in the Western region (34.59%), but no significant variation in region of living by parental religiosity was noted (p=0.80).

Prevalence of Child Maltreatment

Table 2 presents the weighted prevalence of CM among the total population of the SNMHS and stratifies these data by gender and parental religiosity. The weighted prevalence of any CM in the total sample was 16.57%. Stratified analyses revealed significant differences in CM prevalence by gender and parental religiosity.

When stratified by gender, males reported a significantly higher prevalence of any CM compared to females (20.53% vs. 12.40%, p = 0.003). This trend was consistent for physical abuse, where the prevalence was nearly double in males (19.27%) compared to females (8.65%; p < 0.001). In contrast, no statistically significant gender differences were observed for sexual abuse (p = 0.28) or neglect (p = 0.98).

The prevalence of any CM significantly varied across levels of parental religiosity (p = 0.002). Individuals with parents categorized as "not very religious" had the highest prevalence (44.72%), followed by those with "highly religious" (19.32%) and "somewhat religious" parents (15.65%). Interestingly, individuals with "not at all religious" parents reported the lowest prevalence (7.11%).

For specific CM types: Physical abuse showed a similar pattern, with the highest prevalence among those with "not very religious" parents (33.07%) and the lowest among those with "not at all religious" parents (6.66%, SE: 0.10). Sexual abuse and neglect did not show statistically significant differences by parental religiosity ($p = 0.139$ and $p = 0.585$, respectively).

In terms of Most individuals reported experiencing no CM (83.43%), with a higher proportion among females (87.60%) compared to males (79.47%; $p = 0.007$). The prevalence of individuals reporting one type of CM was significantly higher among males (17.68%) than females (10.76%). Additionally, the prevalence of two or more co-occurring CM types was higher in males (2.85%) compared to females (1.64%, SE: 0.36). Parental religiosity also influenced the number of co-occurring CM types ($p < 0.001$). Those with "not very religious" parents had the highest prevalence of experiencing two or more CM types (2.93%) compared to other groups.

Table 1. Personal and parental sociodemographic characteristics of the study participants in the total population and by parental religiosity

Variables	Total N=1,785			Parental religiosity						p-value
				Highly religious N=1,715 (95.52%)			Weakly religious N=70 (4.48%)			
	N*	%**	SE	N*	%**	SE	N*	%**	SE	
Age at interview (Mean)	34.19	-	0.56	34.38	-	0.53	30.17	-	3.22	0.18
Age at interview										0.33
18 – 25	491	32.42	2.40	461	31.58	2.12	30	50.28	0.86	
26 – 35	574	26.14	2.29	555	26.39	2.34	19	20.81	0.31	
36 – 50	543	30.00	2.76	526	30.56	2.25	17	18.18	0.27	
51 – 65	177	11.44	1.49	173	11.47	1.51	4	10.72	0.43s	
Female gender	1038	48.75	1.51	985	47.10	1.49	53	82.27	5.51	<0.001
Number of siblings (mean)	7.52	-	0.22	7.56	-	4.18	6.85	-	3.13	0.19
Participant's Education level:										0.21
High school or less	1055	59.35	2.77	1010	59.35	2.69	45	71.73	0.98	
Collage or more	730	40.65	2.77	705	40.65	2.86	25	28.50	0.39	
Participant's income										0.22
Low	697	40.96	2.26	664	40.15	2.09	29	57.49	0.92	
Low average	176	10.06	1.46	166	10.18	1.48	10	7.97	0.14	
High average	287	17.39	1.69	276	17.57	1.55	10	13.56	0.29	
High	633	31.60	2.36	609	32.09	2.29	21	20.97	0.34	
Receiving public assistance: Yes	217	11.28	1.76	205	11.00	1.67	12	17.16	0.34	0.31
Father education:										0.56
No education	685	40.63	2.45	662	40.83	2.39	23	34.72	9.87	
Elementary	484	26.52	2.04	462	26.73	2.03	22	23.6	8.27	
Middle/high school	444	23.54	2.12	427	23.01	1.89	17	34.53	13.69	
College or more	172	9.30	1.45	164	9.44	1.48	8	7.14	3.69	
Mother education:										0.06
No education	1128	62.63	2.66	1093	63.42	2.51	35	45.37	11.71	
Elementary	381	18.54	1.45	367	18.46	1.41	14	19.67	7.39	
Middle/high school	209	14.42	2.31	192	13.62	2.02	17	32.46	13.86	
College or more	67	4.40	0.79	63	4.51	0.82	4	2.49	1.39	

*N = unweighted frequencies of observations. This cell presents either Ns for categorical variables, or means for continuous variable.

** % = weighted column percentages of observations. SD = standard deviation. This cell presents either % of the number observations for the corresponding categorical variable, or SD for the corresponding continuous variable.

SE = standard error, p-value: Pearson chi square test for categorical variables, and t-test for continuous one.

Continue Table 1. Personal and parental sociodemographic characteristics of the study participants in the total population and by parental religiosity

Variables	Total N=1,785			Parental religiosity						p-value
				Highly religious N=1,715 (95.52%)			Weakly religious N=70 (4.48%)			
	N*	%**	SE	N*	%**	SE	N*	%**	SE	
How much of childhood father was employed?										
Not at all/ a little	216	14.09	1.47	203	13.87	1.56	13	17.94	5.48	0.33
Some	339	19.89	1.56	330	20.32	1.56	9	10.84	5.07	
Most/ all childhood	1182	66.02	1.88	1137	65.81	1.98	45	71.22	7.52	
How much of childhood mother was employed?										
Not at all/ a little	1521	86.06	1.47	1467	86.71	1.37	54	71.8	14.22	0.09
Some	90	5.29	0.94	84	5.36	0.96	6	3.67	1.19	
Most/ all childhood	158	8.66	1.42	149	7.93	1.28	9	24.53	14.57	
Parental maladjustment (Yes)	274	11.18	1.02	257	10.92	0.99	17	17.40	5.80	0.18
Parents divorced (Yes)	39	1.41	0.34	36	1.43	0.35	3	1.09	0.66	0.68
One or both parents died (yes)	61	3.00	0.64	57	2.86	0.68	4	6.13	4.05	0.29
Living with biological parents (Yes)	1645	93.91	0.87	1585	94.10	0.94	60	89.87	3.95	0.24
Area of living:										
Large city	659	50.85	4.19	914	50.43	4.04	45	59.34	12.58	0.55
Suburbs/small city	320	15.72	1.94	313	16.06	2.02	7	8.49	4.07	
Town/Village/Rural	502	33.35	4.82	484	33.42	4.68	18	32.16	32.16	
Moved around	3	0.08	0.05	3	0.08	0.05	0	0	0	
Region of living:										
Northern	213	5.56	0.77	206	5.68	2.99	7	2.96	11.78	
Central	585	30.33	3.05	561	30.09	4.38	24	35.51	11.31	
Eastern	246	17.87	4.54	239	17.93	0.80	7	16.61	1.36	0.80
Western	533	34.63	3.61	508	34.50	1.66	25	37.40	3.45	
Southern	208	11.61	1.64	201	11.80	3.59	7	7.52	13.95	

*N = unweighted frequencies of observations. This cell presents either Ns for categorical variables, or means for continuous variable.

** % = weighted column percentages of observations. SD = standard deviation. This cell presents either % of the number observations for the corresponding categorical variable, or SD for the corresponding continuous variable.

SE = standard error, p-value: Pearson chi square test for categorical variables, and t-test for continuous ones

Table 2. Weighted prevalence of CM among the total population of SNMHS and stratified by gender and parental religiosity

	Total (N = 1,793)		Gender					Parental religiosity								
			Male (N=749)		Female (N=1,044)		p-value	Highly religious (N=342)		Somewhat religious (N=1,472)		Not very religious (N= 55)		Not at all religious (N= 15)		p-value
	N (%)*	SE	N (%)	SE	N (%)	SE		N (%)	SE	N (%)	SE	N (%)	SE	N (%)	SE	
Any CM (Yes)	342 (16.57)	1.42	194 (20.53)	2.16	148 (12.40)	1.79	0.003	51 (19.32)	0. 52	266 (15.65)	1. 29	20 (44.72)	0. 37	5 (7.11)	0.10	0.002
Physical abuse (Yes)	308 (14.09)	1.25	181 (19.27)	2.02	127 (8.65)	1.26	<0.001	43 (18.40)	0. 52	243 (13.14)	1. 13	18 (33.07)	0. 25	4 (6.66)	0.10	0.018
Sexual abuse (Yes)	38 (1.97)	0.59	16 (1.47)	0.47	22 (2.49)	1.02	0.28	7 (1.82)	0.09	28 (1.75)	0.54	3 (12.42)	0.26	0 (0.00)	0	0.139
Neglect (Yes)	59 (2.97)	0.65	25 (2.99)	0.89	34 (2.95)	0.93	0.98	14 (4.33)	0.24	41 (2.81)	0.59	2 (2.93)	0.05	2 (1.64)	0.03	0.585
No of co-occurred CM types	-	-	-	-	-	-										
None	1,451 (83.43)	1.42	555 (79.47)	2.16	896 (87.60)	1.79	0.007	192 (80.68)	1.17	1206 (84.35)	2.07	35 (55.28)	0.29	10 (92.89)	0.99	<0.001
1	284 (14.31)	1.30	169 (17.68)	2.07	115 (10.76)	1.71		39 (14.46)	0.38	223 (13.77)	1.21	18 (41.79)	0.36	4 (5.91)	0.09	
2 or more	58 (2.26)	0.45	25 (2.85)	0.80	33 (1.64)	0.36		12 (4.86)	0.25	43 (1.88)	0.34	2 (2.93)	0.05	1 (1.19)	0.03	

SE: standard error

*N= unweighted frequencies, (%)= weighted percentages

The percentages shown are column percentages

Association between Parental Religiosity and CM

Overall, crude and adjusted analyses revealed a protective effect of parental religiosity on experiences of CM, except for neglect, where the RR was slightly increased (crude RR = 1.30, 95% CI = 0.35 – 4.86; adjusted RR = 1.68, 95% CI = 0.55 – 5.15). However, none of these associations were statistically significant except for the adjusted association between parental religiosity and the number of co-occurring forms of CM (RR = 0.46, 95% CI = 0.27 – 0.79).

The crude analysis (Model 1) revealed that among participants who reported having highly religious parents, the risk of experiencing any type of CM is 40% lower than the risk among those who reported weakly religious parents (crude RR = 0.60, 95% CI = 0.29 – 1.23). However, the association did not reach statistical significance. Upon adjusting for various confounders, the risk estimates slightly increased (RR = 0.63, 95% CI = 0.32 – 1.24), yet still not statistically significant, indicating a potential protective effect of parental religiosity against experiencing any type of CM in general.

Specific types of maltreatment showed a similar trend. The crude RR for physical abuse was 0.67 (95% CI = 0.33 – 1.38), which slightly increased to 0.70 (95% CI = 0.36 – 1.35) after adjustment, indicating a moderately protective effect, albeit not statistically significant. Sexual abuse showed a stronger protective effect with a notable crude RR of 0.27 (95% CI = 0.04 – 1.80), which increased to 0.36 (95% CI = 0.06 – 2.14) in the adjusted model, though still not reaching statistical significance. Neglect, however, presented a crude RR of 1.30 (95% CI = 0.35 – 4.86), increasing to 1.68 (95% CI = 0.55 – 5.15) after adjusting for confounders, indicating a potential increase in risk, albeit not reaching statistical significance and with wide confidence intervals suggesting uncertainty.

Further analysis using zero-inflated Poisson regression to account for reporting excess zero in CM cases showed that the adjusted RR was 0.46 (95% CI = 0.27 – 0.79), indicating a significant decrease in the risk of multiple co-occurring forms of CM among children of highly religious parents. Furthermore, the logistic regression for the inflation portion of the adjusted ZIP model showed that being female is significantly associated with reporting no exposure to any form of CM compared to those who did (crude OR = 9.13, 95% CI = 1.86 – 154.50; adjusted OR = 17.27, 95% CI = 15.51 – 1.09). Participant's age at interview, education, and parental religiosity did not significantly predict excess reporting of experiencing any form of CM. (Table 3-a in the appendix).

Table 3. Crude and adjusted Poisson Relative Risks (RR) examining the association between parental religiosity and child maltreatment.

Outcomes	Model 1 – Crude	Model 2 – Adjusted
	RR (95%CI)	RR (95%CI)
Any CM[1]	0.60 (0.29 – 1.23)	0.63 (0.32 – 1.24)
Physical abuse[1]	0.67 (0.33 – 1.38)	0.70* (0.36 – 1.35)
Sexual abuse[1]	0.27 (0.04 – 1.80)	0.36** (0.06 – 2.14)
Neglect[1]	1.30 (0.35 – 4.86)	1.68*** (0.55 – 5.15)
No. of co-occurring CM[2]	0.53 (0.27 – 1.05)	0.46 (0.27 – 0.79)

RR = relative risk, CI = confidence interval.

[1] Poisson regression with robust variance estimation.

[2] Zero-inflated Poisson regression. The outcome (number of CM) is treated as a count variable.

Model 2: adjustment variables: age at interview, number of participants' siblings growing up, father's employment status, mother's educational level, history of parental maladjustment, parents' divorce status, living with a single or stepparent.

Personal inflation variables include: age at interview, gender, and participant's educational level.

* We also adjusted for sexual abuse and neglect, ** We also adjusted for physical abuse and neglect, *** We also adjusted for physical and sexual abuse

Gender Differences in the Association between Parental Religiosity and CM

When stratifying the previous analyses by participants' gender, for males, the crude model revealed a significant protective association of parental religiosity against reporting any form of CM, physical abuse, and the number of co-occurring CM forms. The RRs indicated a decreased risk among participants reporting highly religious parents (Table 4). Notably, the adjusted model continued to demonstrate a protective effect, although the strength of this association was generally slightly attenuated. Specifically, among those who reported higher parental religiosity, the risk of experiencing any form of CM (crude RR=0.32, 95% CI=0.20–0.51; adjusted RR=0.38, 95% CI=0.23–0.62) physical abuse in particular (crude RR=0.30, 95% CI=0.19–0.47; adjusted RR=0.36, 95% CI=0.21–0.61), and a higher number of co-occurring forms of CM (crude RR=0.37, 95% CI=0.23 – 0.62; adjusted RR=0.41, 95% CI=0.25 – 0.69) was nearly 60% lower compared to those who reported weaker parental religiosity. However, neglect presented a divergent trend, with the crude RR suggesting a weakly protective effect (crude RR=0.93, 95% CI= 0.11 – 8.19), while the adjusted RR indicated an increased risk of experiencing neglect among those reporting highly religious parents compared to those with weakly religious ones (adjusted RR=1.81, 95% CI=0.21 – 15.98). Nevertheless, all associations were statistically non-significant, indicating uncertainty around these associations (Table 4).

Similarly, the crude and adjusted RRs for females showed a potential protective effect of higher parental religiosity against all forms of CM, including experiencing any CM, physical abuse, sexual abuse, and the number of co-occurring forms of CM, except for neglect, that showed increased risk (crude RR=1.42, 95% CI= 0.28 – 7.16, adjusted RR=1.88, 95% CI=0.46–7.84). Notably, the magnitude of the protective associations among females was less pronounced than their male counterparts with all RRs ranging from 0.26 to 1.42, but higher for neglect. However, all associations were not statistically

significant with markedly wider confidence intervals indicating uncertainty of these associations.

The logistic regression part of the adjusted ZIP Poisson model with the interaction term showed that higher age at interview is significantly associated with increased odds of reporting no exposure to any form of CM compared to those who did. (adjusted OR =1.17, 95% CI: 1.02 – 1.35). Higher educational attainment was associated with decreased odd, while gender and parental religiosity are associated with markedly increased odds, however, none of these association are statistically significant. (Table 4-a in appendix)

Table 4. Crude and adjusted Relative Risks (RR) for the Poisson count model of ZIP model examining the association between parental religiosity and child maltreatment by gender.

Outcomes	Model 1 Crude	Model 2 Covariates Adjusted
	RR (95% CI)	RR (95% CI)
Males		
Any CM[1]	0.32 (0.20 – 0.51)	0.38 (0.23 – 0.62)
Physical abuse[1]	0.30 (0.19 – 0.47)	0.36 (0.21 – 0.61)*
Sexual abuse[1]	NA	NA
Neglect[1]	0.93 (0.11 – 8.19)	1.81 (0.21 – 15.98)**
No. of co-occurring CM[2]	0.37 (0.23 – 0.62)	0.41 (0.25 – 0.69)
Females		
Any CM[1]	0.61 (0.22 – 1.74)	0.61 (0.21 – 1.72)
Physical abuse[1]	0.73 (0.26 – 2.07)	0.73 (0.26 – 2.06)*
Sexual abuse[1]	0.26 (0.03 – 2.08)	NA
Neglect[1]	1.42 (0.28 – 7.16)	1.88 (0.46 – 7.84)**
No. of co-occurring CM[2]	0.75 (0.25 – 2.26)	0.72 (0.25 – 2.09)

RR = relative risk, CI = confidence interval.

Any CM, physical abuse, sexual abuse, neglect are all binary outcomes.

[1] Poisson regression with robust variance estimation.

[2] Zero-inflated Poisson regression. The outcome (number of CM) is treated as a count variable.

Model 2: adjustment variables: number of participants' siblings growing up, father's employment status, mother's educational level, history of family economic adversity, history of parental maladjustment, living with a single or stepparent, as well as age at interview.

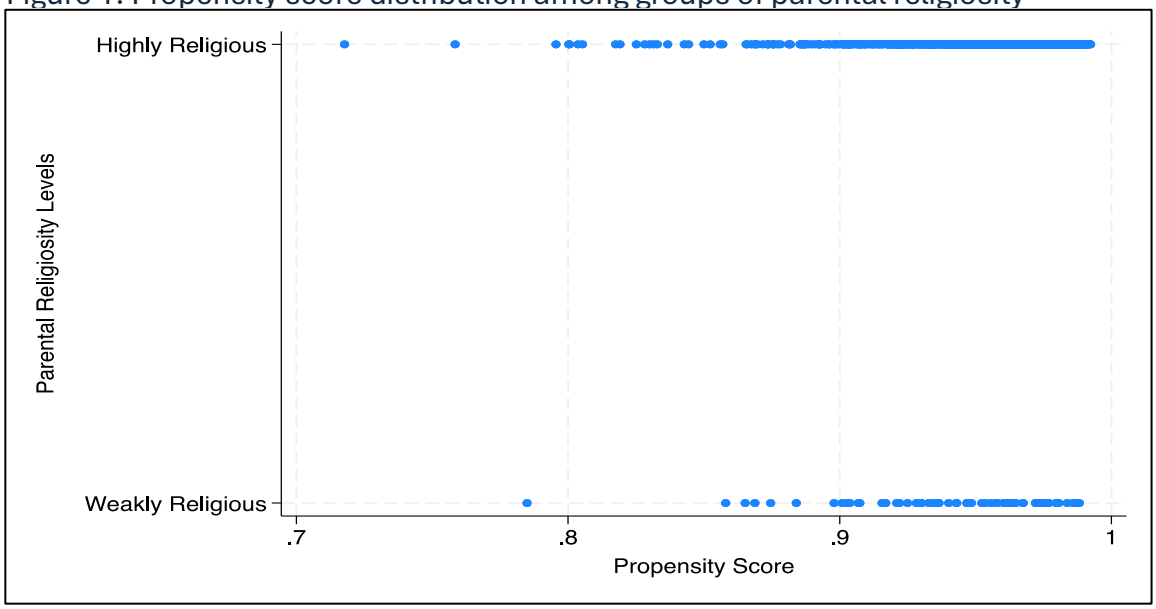
Personal inflation variables include: age at interview, gender, and participant's educational level.

Note: RR for sexual abuse could not be computed due to small cell number.

Propensity Score Estimation, Covariables Balance Checking, and Sensitivity Analysis

Figure 1 illustrates the distribution of PS between the two parental religiosity exposure groups and shows adequate overlap. The final number of PS blocks to ensure covariable balance was 7. There is reasonable overlap between the PS of the exposure groups through the 7 blocks, corresponding to PS ranging from 0.75 to 0.99, which represents the region of common support. The 'Highly Religious' group has a concentration of PS around 0.80 and 0.99, whereas the 'Weakly Religious' group has a concentration of PS around 0.85 to 0.99.

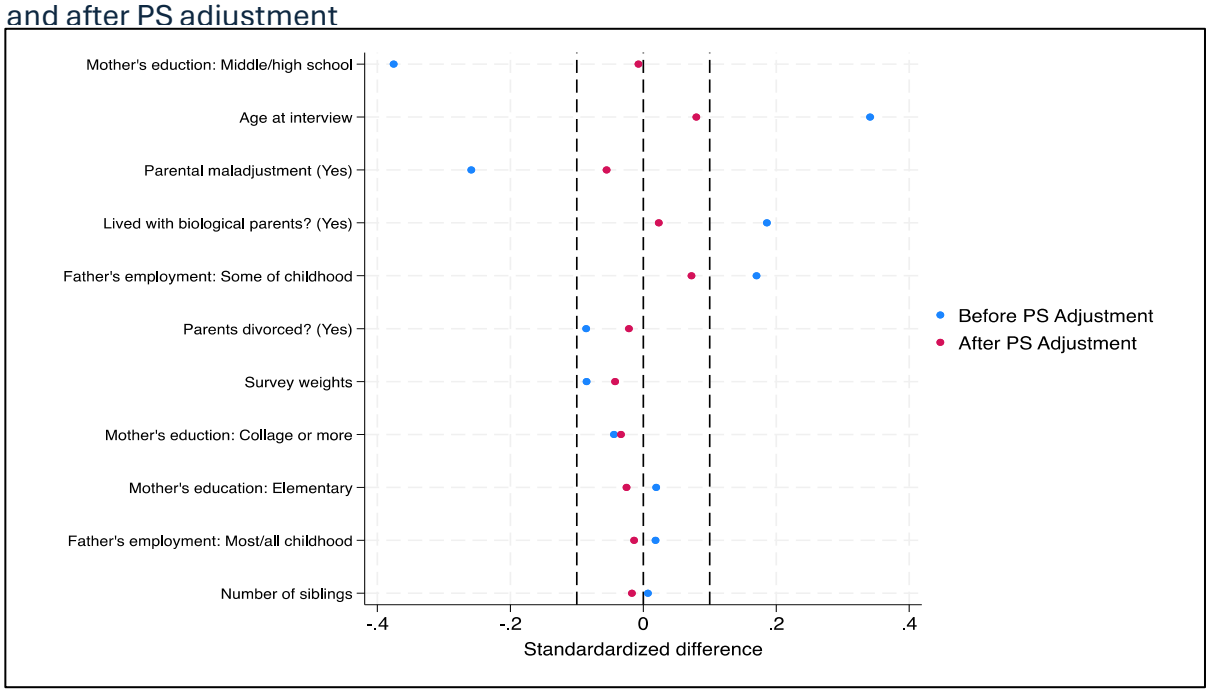
Figure 1. Propensity score distribution among groups of parental religiosity



The standardized differences for each of the measured baseline covariates before and after PS adjustment are shown in figure 2. The crude standardized differences exceeded 0.10 for 5 of the 8 baseline covariates, namely age at interview, mother education, father employment, parental maladjustment, and living with biological parents. In contrast, the PS-adjusted standardized differences are all between -0.1 and 0.1, indicating successful

covariate balance between exposed and unexposed groups. (For precise values, look at supplemental table 2 in the appendix)

Figure 2. Standardized differences of covariables by parental religiosity levels before and after PS adjustment



The sensitivity analysis

shows that in the overall sample (Table 5), the propensity score (PS) adjusted model (Model 3) yielded results similar to the covariate-adjusted model (Model 2) for most outcomes. For instance, the PS-adjusted relative risk (RR) for any child maltreatment (CM) was 0.60 (95% CI: 0.31-1.19), comparable to the covariate-adjusted RR of 0.63 (95% CI: 0.32-1.24). The protective effect for number of co-occurring CM remained significant in the PS-adjusted model (RR: 0.42, 95% CI: 0.23-0.79).

When parental religiosity was recategorized to include "somewhat religious" in the weakly religious group (Model 4), the direction of associations changed. For any CM, the RR became 1.19 (95% CI: 0.79-1.78), suggesting a potential increase in risk, though not statistically significant.

Gender-stratified analyses (Table 6) revealed that the protective effect of high parental religiosity remained significant for males in both covariate-adjusted and PS-adjusted models for any CM, physical abuse, and number of co-occurring CM. For females, while the direction of associations remained consistent, the estimates were not statistically significant and had wider confidence intervals.

The recategorization of parental religiosity (Model 4) led to changes in the direction of associations for both genders, with most RRs above 1, except for sexual abuse in females (RR: 0.34, 95% CI: 0.07-1.52). However, these estimates were not statistically significant. These sensitivity analyses suggest that while the protective effect of high parental religiosity is robust to PS adjustment, particularly for males, the categorization of parental religiosity can substantially influence the observed associations. The results underscore the importance of careful consideration of properly categorizing and reliably measuring religiosity in future studies on this topic.

Table 5. Sensitivity analysis comparing covariable-, PS-adjusted, and post-recategorization of parental religiosity RR examining the association between parental religiosity and child maltreatment.

Outcomes	Model 1 – Crude	Model 2 – Adjusted	Model 3 – PS-adjusted	Model 4 post-recategorization
	RR (95%CI)	RR (95%CI)	RR (95%CI)	RR (95%CI)
Any CM[1]	0.60 (0.29 – 1.23)	0.63 (0.32 – 1.24)	0.60 (0.31 – 1.19)	1.19 (0.79 – 1.78)
Physical abuse[1]	0.67 (0.33 – 1.38)	0.70[*] (0.36 – 1.35)	0.71 (0.36 – 1.42)	1.36 (0.87 – 2.11)
Sexual abuse[1]	0.27 (0.04 – 1.80)	0.36[**] (0.06 – 2.14)	0.33 (0.05 – 2.06)	0.91 (0.29 – 2.87)
Neglect[1]	1.30 (0.35 – 4.86)	1.68[***] (0.55 – 5.15)	1.62 (0.50 – 5.27)	1.55 (0.65 – 3.72)
No. of co-occurring CM[2]	0.53 (0.27 – 1.05)	0.46 (0.27 – 0.79)	0.42 (0.23 – 0.79)	1.72 (0.67 – 4.44)

RR = relative risk, CI = confidence interval.

[1] Poisson regression with robust variance estimation.

[2] Zero-inflated Poisson regression. The outcome (number of CM) is treated as a count variable.

Model 2: adjustment variables: age at interview, number of participants' siblings growing up, father's employment status, mother's educational level, history of parental maladjustment, parents' divorce status, living with a single or stepparent.

Model 3: adjusted for PS as covariable.

PS estimation model included all variables from model 2.

Personal inflation variables include: age at interview, gender, and participant's educational level.

[*] We also adjusted for sexual abuse and neglect, [**] We also adjusted for physical abuse and neglect, [***] We also adjusted for physical and sexual abuse

Model 4: included the recategorized parental religiosity exposure. Where "highly religious parents" corresponds to those who were only described as highly religiose, the rest of the categories, including "somewhat religious" were recategorized as weakly religious.

Table 6. Sensitivity analysis comparing covariable and PS adjusted RR examining the association between parental religiosity and child maltreatment by gender.

Outcomes	Model 2 Covariates Adjusted	Model 3 PS Adjusted	Model 4 post-recategorization
	RR (95% CI)	RR (95% CI)	RR (95%CI)
Males			
Any CM[1]	0.38 (0.23 – 0.62)	0.33 (0.21 – 0.53)	1.14 (0.69 – 1.89)
Physical abuse[1]	0.36 (0.21 – 0.61)*	0.30 (0.19 – 0.49)	1.09 (0.66 – 1.78)
Sexual abuse[1]	NA	NA	1.76 (0.42 – 7.29)
Neglect[1]	1.81 (0.21 – 15.98)**	2.05 (0.24 – 17.83)	1.39 (0.41 – 4.76)
No. of co-occurring CM[2]	0.41 (0.25 – 0.69)	0.38 (0.22 – 0.64)	1.27 (0.76 – 2.13)
Females			
Any CM[1]	0.61 (0.21 – 1.72)	0.61 (0.23 – 1.65)	0.81 (0.43 – 1.52)
Physical abuse[1]	0.73 (0.26 – 2.06)*	0.77 (0.27 – 2.17)	1.07 (0.53 – 2.17)
Sexual abuse[1]	NA	NA	0.34 (0.07 – 1.52)
Neglect[1]	1.88 (0.46 – 7.84)**	1.71 (0.40 – 7.38)	1.01 (0.35 – 2.88)
No. of co-occurring CM[2]	0.72 (0.25 – 2.09)	0.75 (0.26 – 2.16)	0.99 (0.56 – 1.76)

RR = relative risk, CI = confidence interval.

[1] Poisson regression with robust variance estimation.

[2] Zero-inflated Poisson regression. The outcome (number of CM) is treated as a count variable.

Model 2: adjustment variables: age at interview, number of participants' siblings growing up, father's employment status, mother's educational level, history of parental maladjustment, parents' divorce status, living with a single or stepparent.

Model 3: adjusted for PS as covariable.

PS estimation model included all variables from model 2.

Personal inflation variables include: age at interview, gender, and participant's educational level.

* We also adjusted for sexual abuse and neglect, ** We also adjusted for physical abuse and neglect, *** We also adjusted for physical and sexual abuse

Discussion

Our investigation is the first to analyze the potential independent association between parental religiosity levels and experiences of CM within a nationally representative sample of Saudi households. The main findings in our study are: 1) There is no significant protective association between parental religiosity levels and reporting experiencing any form of CM collectively and individually. 2) However, our data revealed a significant inverse dose-response relationship. Our study suggests that higher parental religiosity is significantly associated with lower risk of experiencing multiple forms of CM. 3) We found significant gender differences in the associations of interest. Our interaction analysis revealed that, among male participants, higher parental religiosity is significantly associated with greater protection against experiencing any form of CM in general, and against physical abuse in particular.

However, it is crucial to note that the results of our sensitivity analysis challenge the robustness of these findings, as the classification of parental religiosity levels significantly influenced the observed associations. Specifically, when we reclassified "moderately religious" parents into the "weakly religious" category, the protective associations observed in the main analysis were no longer significant, and in some cases, the direction of the association reversed. This highlights the importance of the chosen categorization in interpreting the results and emphasizes the sensitivity of these findings to methodological decisions. Consequently, while the primary analysis remains the focus of our interpretation, we acknowledge the need for caution when drawing definitive conclusions, as alternative classifications may yield different results.

Consistent with our hypothesis, our primary findings suggest a moderate protective association between higher parental religiosity and the risk of perpetrating CM and neglect. Although this association was not statistically significant for individual forms of

CM, a significant inverse dose-response relationship was observed. Specifically, children with highly religious parents were 55% less likely to be exposed to multiple forms of CM (adjusted RR=0.40, 95% CI: 0.27–0.79). This finding highlights the potential role of religiosity in reducing the cumulative burden of maltreatment, suggesting that highly religious parents may create protective environments that reduce the risk of exposing their children to diverse forms of CM.

This aligns with previous research, such as the study by French et al. (2013),[183] which demonstrated that higher levels of parental religiosity, coupled with positive parent-adolescent relationships, predicted better social adjustment and prosocial behaviors in Indonesian Muslim adolescents.[183] Similarly, Krauss et al. (2014) found that higher parental religiosity and religious socialization significantly promoted prosocial behaviors and reduced risk behaviors among Muslim adolescents in Malaysia, particularly when combined with supportive parenting and community involvement.[184] These findings underscore the potential of parental religiosity to foster environments rooted in compassion, moral guidance, and emotional support, which may serve as protective factors against adverse developmental outcomes, including exposure to multiple forms of CM.

The observed dose-response relationship enhances our understanding of CM in SA by demonstrating how parental religiosity may operate as a cumulative protective factor, particularly in reducing the risk of multiple CM exposures. These findings have important implications for the field. By identifying parental religiosity as a potential protective factor, this study provides insights for integrating cultural and religious considerations into CM prevention efforts. Programs designed to leverage parenting-related religious teachings promoting compassion and nonviolence could complement existing strategies,[185] ultimately fostering healthier family dynamics. Furthermore, reducing exposure to

multiple forms of CM is critical for mitigating its long-term impact on mental health and well-being, such as risks for anxiety and depression,[145,186-188] underscoring the broader importance of these findings in promoting healthier outcomes across the lifecourse.

In Muslim contexts, Islamic teachings emphasize values such as moral integrity, compassion, patience, and a strong sense of familial responsibility.[53,158] These principles can nurture supportive and nonviolent parenting practices, contributing to a reduced risk of CM. However, the lack of statistical significance for individual forms of CM in relation to parental religiosity—particularly when religiosity appeared protective against physical and sexual abuse but not neglect—suggests that religiosity is not a uniform protective factor against CM. This finding may be attributed to several factors that reflect cultural or contextual variations in how religiosity is expressed and how CM is perceived and reported, which are discussed below.:

Firstly, parental religiosity likely has a more nuanced impact on CM than initially hypothesized. While Islamic teachings emphasize values that should theoretically reduce CM risk, such as moral integrity, compassion, and familial responsibility,[53,158] the practical application of these values may vary. Parents might interpret religious principles differently or selectively adhere to certain teachings while neglecting others, resulting in inconsistent protective effects across different forms of CM. For example, some Muslim parents, including those in SA, misuse the Prophetic saying about hitting children who don't pray at age ten to justify physical punishment,[125] even though Islamic scholars emphasize this should never cause harm.[16-19] Furthermore, cultural beliefs encouraging large families, based on religious misinterpretations that discourage family planning, may lead some parents to have more children than they can adequately care for, increasing the risk of neglect.[76,126] Due to data limitations, we couldn’t substantiate this claim. However, future studies should aim to capture more granular data on parents’

interpretations of religious teachings and attitudes toward discipline to further explore these dynamics.

Secondly, the relationship between religiosity and CM is likely influenced by broader cultural and social factors. In SA, certain disciplinary practices, such as physical punishment, are culturally normalized and may not be perceived as abusive,[58,125] even though they might conflict with international standards for child protection, potentially leading to underreporting.[33,105] Additionally, this normalization may obscure the protective effect of religiosity on CM, as religious parents might feel societal pressure to conform to these cultural norms. Research supports the complexity of this relationship.[55,56,123] Eseed, Zadok, and Khoury (2023)[55] found that higher levels of religiosity across Jewish, Muslim, Christian, and Druze mothers in Israel were associated with increased use of punitive discipline and psychological control, though to varying degrees across the religious groups. This finding highlight how cultural norms can interact with religious values to shape parenting behaviors.[55] Similarly, Rodriguez and Henderson (2010)[56] observed that extrinsic religiosity—where religious practices are driven by social conformity—was linked to a higher potential for physical child abuse, particularly when individuals displayed high levels of social conformity.[56] These findings, together with the observed variability in the protective effects of parental religiosity across different forms of CM in our study, emphasize the need to consider the intersection of cultural norms and religious values when examining the relationship between religiosity and CM. Understanding how societal expectations and conformity influence parenting behaviors is crucial for developing culturally sensitive interventions that promote child protection while respecting religious and cultural contexts.

Lastly, methodological factors could explain the lack of significant findings. The tools used to measure religiosity and CM may not fully capture the complexity of these constructs

within the Saudi context. For example, the single-item measure of religiosity ("How religious were your parents during your childhood?") may be too simplistic to capture the multidimensional nature of Islamic religiosity. Also, considering that physical discipline is broadly (but not universally) normalized in SA,[125] the survey's definition of physical abuse—which was based on a Western framework and not adequately adapted to the local cultural context—might not fully capture behaviors considered abusive within the Saudi context. This could result in non-differential misreporting of actual abuse, potentially masking the true associations in the data. Additionally, the study may lack sufficient statistical power to detect meaningful effects due to small sample size, particularly for those reporting neglect (N=59), sexual abuse (N=38), and lower parental religiosity levels (N=70), which are likely underreported and relatively rare in this sample.

Interestingly, our analyses, despite not reaching statistical significance, indicate a potential increase in the risk of neglect with higher parental religiosity. Chance might be an explanation, especially given the small number of participants reporting neglect, which likely resulted in the relatively wide CIs indicating considerable variability, and therefore less reliable estimate. Another potential explanation for the observed increase in the risk of neglect with higher parental religiosity could be related to parental education levels, as highlighted in Table 1. Our results show that parents in the "highly religious" category notably have lower levels of formal education compared to those in the "not very religious" or "not at all religious" groups. Lower parental education is a well-documented risk factor for neglect,[59,113,126] as it can limit parents' awareness of child developmental needs and effective parenting strategies. This finding can also be partially explained by the possibility that highly religious parents might misinterpret religious teachings to justify certain neglectful behaviors, such as preference for larger families regardless of socioeconomic status.[76] We adjusted for parents education and the number of

participants' siblings as a family size indicator, thus the previous suggested explanations, while valid, may not hold in our study.

Another potential explanation is that some parents may prioritize religious rituals and community involvement over addressing their child's emotional and developmental needs, mistakenly believing that fulfilling religious duties alone ensures their child's well-being. For example, parents might pressure young children to fast during Ramadan before they are physically or emotionally ready, assuming this will cultivate greater religious devotion. Similarly, children may be enrolled in intensive religious programs that leave little time for age-appropriate activities or emotional growth. Emphasis might also be placed on religious achievements, such as Quran memorization, at the expense of academic or social development. Additionally, some parents may use religious guilt or shame as disciplinary tools, rather than addressing the root causes of emotional or behavioral challenges. Again, data limitations hindered investigations of this claim in our study. Thus, further exploration is needed to obtain more granular information on how parents characteristics, such as: how parents perceive their own parenting styles, history of exposure to CM and neglect by their own parents, the degree of cultural conformity, and how they integrate their faith into their parenting practices and how that intersect with their daily life. This detailed exploration is crucial to parse out the effect of religiosity and religious beliefs from that of the cultural ones.

Our study explored gender differences in CM experiences and their potential links to parental religiosity. The protective association of higher parental religiosity with reduced CM risk, being more pronounced and statistically significant only among males was somewhat surprising because of the higher protection that Islam typically affords females. We are uncertain of the true drivers of this finding, especially in the absence of comparable studies in similar cultural settings. However, it could stem from the cultural

preference for sons that may influence parenting behaviors even in early childhood.[76] From a young age, males are often afforded greater freedom and protection, reflecting societal expectations and reinforcing their privileged status within the family.[7] Rooted in Islamic teachings, this status positions them as future heads of the family and inheritors of the family name and wealth.[7,72] This cultural prioritization of their well-being and future responsibilities may contribute to a reduced risk of CM by shielding them from harm to ensure their readiness for these roles.[7,89] Conversely, the stricter social constraints and expectations placed on females from an early age may expose them to harsher disciplinary practices, increasing their vulnerability to CM.[89] This aligns with the broader cultural context, where girls are often raised with an emphasis on family honor and compliance with societal norms, leading to potential misuse of discipline under the guise of ensuring conformity and following religious teachings of safeguarding females.[89] These findings highlight the complex interplay between gender, cultural norms, and religiosity in shaping parenting behaviors and CM experiences. Our findings also emphasize the need for more research for more nuanced understanding of such findings, and culturally sensitive interventions that address these disparities and promote equitable, nonviolent parenting practices for both boys and girls.

Another important consideration for the decreased risk of CM, especially physical abuse, among Saudi males in our sample could be the influence of hyper-masculinity—defined as the cultural reinforcement of exaggerated male traits such as emotional suppression, aggression, and physical toughness.[189] In many cultures, including Saudi, males are often socialized to embody these ideals as they are expected to fulfill the role of sole providers for the family. This emphasis on hyper-masculinity may discourage males from acknowledging or disclosing experiences of physical abuse, as such admissions could be perceived as a weakness that contradicts societal expectations of masculinity.[7,190] As a result, the actual magnitude of gender differences in our study could be underestimated.

On the same note, social desirability bias likely extends beyond gender-specific reporting to influence how participants characterize their family's religious devotion. In Saudi Arabia's collectivist culture, where family honor and loyalty are paramount, participants may feel compelled to portray their parents as more religious than they actually were. Our sensitivity analysis provides evidence for this potential reporting bias. When we applied more stringent criteria for parental religiosity - classifying only those described as "very religious" rather than including "somewhat religious" - the protective associations substantially weakened. The relationship between parental religiosity and any CM shifted from protective (RR=0.60) to potentially harmful (RR=1.19, 95% CI: 0.79-1.78). This marked shift in effect direction and magnitude suggests two important implications. First, as we mentioned earlier in the discussion, the protective effect of parental religiosity against CM may be more nuanced than initially apparent, potentially varying with the intensity of religious devotion. Second, and perhaps more critically, our findings highlight how cultural pressures to maintain family reputation could mask true relationships between religiosity and CM through systematic overreporting of parental religious dedication. This underscores the methodological challenges in measuring sensitive cultural constructs like religiosity in societies where family honor significantly influences reporting behaviors. These measurement challenges, combined with the gender-specific reporting biases discussed earlier, suggest that our study's findings likely represent conservative estimates of both CM prevalence and its relationship with parental religiosity. Future research should consider employing multiple measurement approaches and additional validation strategies to better account for these complex cultural reporting biases.

In terms of reporting no exposure to CM, nearly 84% of the sample indicated they had not experienced it. This finding may reflect genuine experiences or could suggest

potential underreporting influenced by cultural and social factors. For this reason, we attempted at exploring the underlying attributes of such reporting behaviors, by employing zero-inflated Poisson (ZIP) regression models, which identified significant associations with age and gender. Specifically, older participants and females were more likely to report no CM exposure, with females exhibiting a particularly strong association (odds ratio of 17.27, 95% CI: 15.51–19.04). While these results may indicate true experiences, they also raise important questions about reporting biases and cultural influences on CM disclosure in Saudi Arabia.

Older participants might report no CM exposure due to memory recall issues, as the passage of time can diminish the accuracy of recalling past events, especially if the perceived severity of the abuse was low. Additionally, they may reinterpret or reconcile past experiences as they age, leading to underreporting of CM.

The strong association between female gender and reporting no CM exposure may stem from various factors. Cultural norms rooted in Islamic teachings emphasize safeguarding women, potentially resulting in higher levels of protection for Saudi females within their families[7,72]. However, underreporting due to social desirability bias may also play a role. females might underreport CM to maintain a favorable image of themselves and their families, particularly given the historical stigma surrounding female abuse in traditional contexts. Furthermore, the absence of an emotional abuse measure in the SNMHS, despite its known prevalence among Saudi females,[127,191] could contribute to the apparent underreporting of CM in this group. These findings underscore the need for a nuanced understanding of how sociodemographic factors and cultural dynamics shape reporting behaviors related to CM and highlight the importance of developing culturally sensitive approaches to address CM in Saudi Arabia.

Strength and limitations

This study is the first population-based analysis examining the independent association between parental religiosity and CM and neglect experiences in the offspring, which is a vastly understudied area in SA. It is also the first of its kind to utilize data from a nationally representative survey of Saudi households employing probability sampling and complex survey design to ensure proper representation and produce relevant national estimates that can inform future research and policy makers. Therefore, this study may contribute to enriching the scarce regional literature, serving as the foundation for future in depth analyses. Moreover, our analysis incorporates ZIP regression models to address the excess reporting of not having experienced any form of CM. While this generally appears favorable, it may not fully capture the true burden of CM. Especially that emotional abuse, one of the most prevalent forms of CM in SA, was not measured in the survey data, potentially contributing to the observed excess zeros in reporting CM exposure. In doing so, we attempted at gaining some insight into the attributes of such behavior of reporting to better understand the findings in our study.

Our study acknowledges several limitations. A significant challenge lies in the generalizability of our findings to the broader Saudi population due to differences in demographic and socioeconomic characteristics between our study sample and national census data from 2010, upon which the survey weights were developed, and the most recent 2022 census. Specifically, participants who reported having weakly religious parents differed notably from those who reported having highly religious parents and from the total population in general. For example, while females constituted nearly half of the total population in our study and in earlier censuses, they represented more than 82% of those reporting having weakly religious parents. Additionally, these females were predominantly younger, in high school or lower grades, of lower socioeconomic status, and had parents who were mostly either uneducated or had completed high school or

less. This demographic skew raises concerns about the representativeness of our sample and the potential biases in our findings.

As mentioned earlier in the discussion section, the small sample size within the weakly religious group, that becomes even smaller when stratified into smaller subgroups such as gender, presents a significant limitation. With only 70 individuals in this group and an even smaller subset of 17 males, the statistical power of our analysis is considerably reduced. This limited sample size may introduce type II error making it challenging to detect small effect sizes and may produces imprecise estimates of accuracy with wide confidence interval, which is not informative for decision makers. Despite some statistically significant results in males, the small sample size raises questions about the reliability and robustness of these findings. Therefore, public health practitioners and policymakers must be cautious in interpreting and applying these results, recognizing that they may not fully capture the experiences and needs of the broader population.

The implications of this limitation extend beyond mere statistical concerns. In the context of public health, where the goal is to identify and address disparities in health outcomes, the underrepresentation of certain subgroups, particularly those reporting sexual abuse, neglect, and weakly religious or areligious parents, that may stem from social desirability or a lack of interest from Saudi researchers, may lead to an incomplete understanding of the issues at hand. This, in turn, can hinder the development of targeted interventions and policies aimed at addressing the unique needs of these subpopulations.

For the broader scientific community, especially in SA and the Middle East, this limitation underscores the importance of ensuring adequate sample size when studying sensitive topics such as CM, particularly sexual abuse and neglect, and religiosity levels in SA. Future research should aim to oversample such groups to ensure adequate study power,

better representation, and enhance the generalizability of findings and to provide a more nuanced understanding of how religiosity and other related factors may influence CM outcomes. Researchers should consider methods such as snowballing and giving incentives when oversampling to identify and attract participants that are weakly religious or areligious, and those who have experienced sexual abuse or neglect. Additionally, employing advanced statistical techniques that can account for small sample sizes, such as Bayesian methods,[192] can improve the reliability of the results.

More importantly, minimizing social desirability bias is crucial for obtaining accurate and truthful data. While the SNMHS used CAPI and ACASI methods for sensitive questions to ensure privacy and increase the accuracy of responses, according to evidence from comprehensive meta-analyses,[193,194] paper-and-pencil and computer surveys generally yield similar mean results in many testing situations. Additional methods can be employed to help reduce social desirability bias and improve accuracy of responses.[195] For example, indirect questioning techniques, and asking questions using "unthreatening, euphemistic, familiar and forgiving words or phrases" can put the respondent at more ease an increase the likelihood of responding truthfully.[195,196] Additionally, the use of vignettes or hypothetical scenarios can make participants feel less personally implicated in their responses, further mitigating the tendency to provide socially desirable answers.[195] These methods, when combined with robust sampling strategies, can significantly enhance the quality and validity of research findings in this sensitive area.

Despite efforts to adjust for all relevant sociodemographic and contextual factors, several sources of residual confounding may persist, potentially biasing our findings. There are likely unmeasured variables that could influence the observed associations but were not captured in the SNMHS survey. For example, history of parents' exposure to CM, granular data on the gender of parent perpetrating CM, parental perception and attitudes towards

discipline and parenting styles, cultural practices and conformity, and the presence of adequate family and social support were not captured in our survey but could significantly affect the risk of CM. Additionally, the survey did not capture the different dimensions of religiosity, such as intrinsic and extrinsic religiosity, in detail. This limitation is compounded by the nuanced relationship between religiosity and cultural conformity. For example, some individuals might adhere to religious practices primarily for social benefits rather than out of a genuine understanding of or commitment to religious principles and values. This complicates the assessment of the true impact of parental religiosity on CM and neglect, as it is difficult to distinguish between genuine religious influence and culturally driven behavior.

Another significant limitation of our study is the lack of detailed information on the identity of the perpetrator in cases of sexual abuse. Our measure did not differentiate whether the abuse was perpetrated by a family member, particularly a parent, or an outsider. This limitation is crucial as it challenges our ability to directly investigate the link between parental religiosity and the perpetration of sexual abuse by parents, which this study aims to explore. Despite this limitation, we chose to retain the measure because it can still offer valuable insights into the broader impact of growing up in a religious household on the risk of experiencing sexual abuse, regardless of the perpetrator's identity. Understanding whether a religious upbringing affords children more protection or not is an important question. For instance, does growing up in a religious household provide a protective effect against sexual abuse? Moreover, in the context of SA, where sexual abuse is known to be vastly underreported, [112,197] presents a significant challenge in accurately assessing the true burden of this form of abuse, its associated risk factors, and the true magnitude of its impact on various health and behavioral outcomes. The underreporting issue further complicates our understanding and highlights the need for more comprehensive and culturally sensitive approaches to data collection and analysis.

Additionally, the survey did not explicitly measure emotional abuse, one of the most prevalent forms of ACEs in SA. This omission is a significant limitation as it hinders our ability to develop a more complete understanding of the interplay between different types of childhood maltreatment, religious upbringing, and mental health outcomes.

Both CM and parental religiosity are often measured retrospectively, which can introduce recall bias. Participants may not accurately remember or might reinterpret past events, leading to data inaccuracies. Moreover, parental religiosity was assessed from the offspring's perspective rather than directly from the parents, which could lead to measurement errors. This indirect measurement relies on the partitionist's recollection of childhood events, which can be influenced by their current beliefs and experiences as adults, potentially distorting the true picture. Additionally, as mentioned earlier, social desirability bias poses a significant limitation, especially in a collectivist culture like SA, where individuals are likely to prioritize the group's image, such as family, over personal disclosure. Participants may have been reluctant to share information perceived as embarrassing or stigmatizing, such as experiences of CM or low levels of religiosity. This could result in underreporting of CM incidents and overreporting of religiosity, leading to biased estimates. These biases can affect both the sample size and the reliability of our findings. Notably, the 95% confidence intervals (CIs) for both crude and adjusted associations are relatively wide, particularly for neglect, suggesting a considerable degree of uncertainty in our estimates. Therefore, it is essential to interpret these results with caution, recognizing the potential impact of these biases on the study's conclusions.

In the current study, we acknowledge these limitations and suggest a cautious interpretation of results, emphasizing the need for further investigation into the nuanced dynamics of abuse and religiosity that better reflects the shifting cultural landscape.

Implications and Conclusion

The findings from Aim 1 of this dissertation provide important insights into the relationship between parental religiosity and CM in SA, addressing significant gaps in the epidemiologic literature regarding one of the key sociocultural determinants of CM, that is religiosity, within this unique context. We found no significant protective association between parental religiosity and CM experiences. However, significant gender differences were observed, with male participants reporting a stronger protective effect of higher parental religiosity against CM, particularly physical abuse. These results have important practical and policy implications for interventions, programs, and future research aimed at reducing CM and mitigating its long-term consequences on mental health and social equity.

Guidance for Interventions and Programs

The findings indicate that parental religiosity is not a monolithic protective factor against CM. While higher religiosity that's aligned with Islamic values of compassion and justice may foster nurturing parenting practices, weaker or extrinsically motivated religiosity appears less protective, and in some cases, may correlate with increased CM prevalence. These insights highlight the need for community-based programs to:

- **Enhance religious education** in schools by integrating teachings that emphasize compassion, equity, and fairness in child-rearing, as rooted in equity-based Islamic principles. Additionally, expand educational campaigns and parenting workshops to reinforce these values. Significant progress has already been made, including updates to school curricula for religious subjects and initiatives like the Early Enrichment Project, a comprehensive parenting program launched in 2019.[185] These efforts provide a strong foundation for promoting positive parenting practices aligned with cultural and religious values.
- **Support at-risk families of diverse religious backgrounds**: Programs targeting families with low religiosity or secular households should provide tailored

resources to address stressors that heighten CM risks, such as financial strain, parental mental health issues, or lack of social support. These initiatives must be inclusive and respect the needs of families from diverse religious, spiritual, and areligious backgrounds, ensuring equity in service delivery. Equity in this context means recognizing that not all families in Saudi Arabia adhere to the same level or type of religiosity, and some may not practice religion at all. Programs must avoid one-size-fits-all approaches and instead offer culturally sensitive and adaptable interventions that respect these differences.

- **Incorporate gender-sensitive approaches**: Given the significant gender differences in CM prevalence and risk, interventions should address societal expectations and provide tailored support for boys and girls to ensure equitable treatment and protection. For example, programs could focus on empowering girls by addressing societal norms around honor and obedience that contribute to their vulnerability to harsh disciplinary practices. Boys could benefit from initiatives promoting emotional expression and reducing pressures related to traditional expectations of toughness and privilege. Gender-sensitive parenting workshops could also help caregivers understand and address the unique needs of their children based on their gender while promoting nonviolent and nurturing discipline practices.

Policy Implications

The stratified findings underscore the need for nuanced policy approaches that reflect Saudi Arabia's cultural and religious context. Policymakers can leverage these insights to:

- **Integrate CM prevention into religious institutions:** Mosques and religious leaders, as trusted community figures, can play a vital role in disseminating messages about positive parenting and the prohibition of abusive practices in Islam. Efforts in this area are already underway, with some religious leaders

addressing child welfare in their sermons and community programs, but these initiatives need greater emphasis and consistent integration into broader child protection strategies.

- **Improve child protection systems:** Policies ensuring mandatory reporting of CM, combined with accessible support for affected families, can address underreporting and stigma, particularly in rural and conservative areas. While some measures have been introduced to enhance reporting and support systems, such as launching the Saudi Child Helpline to, receives calls from victims and their caregivers for reporting abuse, and providing counseling and health and social services,[185] greater emphasis is needed to ensure these policies are effectively implemented and widely accessible across all regions.
- **Enhance family support services**: Strengthening family counseling services and providing culturally sensitive parenting education can reduce the stressors associated with traditional gender roles and caregiving responsibilities.

Research Implications

This study underscores the intricate relationships between religiosity, CM, and sociocultural dynamics in Saudi Arabia, paving the way for further investigation. To build on these findings and enhance understanding, future research should:

- **Clarify causality**: Longitudinal studies are crucial to determine whether religiosity influences CM or vice versa, and to explore mediating factors such as parental stress, family structure, and cultural conformity. Continuous research will help establish causal relationships while monitoring the evolving cultural and religious landscape, ensuring that policies and interventions remain responsive to emerging trends.
- **Investigate parental attributes and religiosity dimensions**: Future studies should delve deeper into the multifaceted dimensions of religiosity, including intrinsic versus extrinsic religiosity, ritualistic practices, and spiritual beliefs.

Granular data on parents' knowledge, perceptions, and attitudes toward discipline and parenting styles, as well as cultural practices, are essential to uncover nuanced mechanisms. Similarly, understanding the history of parents' exposure to CM and collecting data on the gender of the perpetrator can provide critical insights into gendered dynamics of CM and help develop targeted interventions.

- **Standardize definitions and expand cultural contexts**: Researchers should prioritize the development of clear, culturally sensitive definitions of child abuse and neglect, particularly physical abuse, within the Saudi context. Comparative studies across Middle Eastern and broader Islamic societies could identify shared patterns and region-specific factors, enriching the global literature on CM and religiosity.
- **Focus on outcomes**: Investigating the long-term mental health and social consequences of CM—such as anxiety, depression, and religiosity trajectories—among Saudi adults will inform comprehensive support systems and prevention strategies. Such outcomes are particularly relevant for understanding intergenerational patterns of abuse and religiosity.
- **Ensure adequate sampling and methodological rigor**: To address limitations in existing research, future studies should ensure adequate sampling and statistical power for each type of CM and neglect. Collecting robust data will enhance the reliability of findings and provide actionable insights.
- **Incorporate qualitative research**: Qualitative studies can provide deeper insights into how religious beliefs and practices shape parenting behaviors and responses to CM. Such approaches will illuminate the nuanced interplay between religiosity, cultural norms, and CM, particularly in Saudi Arabia and other Arab Muslim contexts.

Conclusion

This study highlights the nuanced relationship between parental religiosity, CM, and sociocultural dynamics in Saudi Arabia. While higher parental religiosity was found to have a protective association against exposure to multiple forms of CM, the lack of statistical significance for individual forms underscores the complexity of these relationships. The findings emphasize the role of cultural and religious contexts in shaping parenting practices and CM risk, while also pointing to gaps in understanding that require further exploration. By identifying religiosity as a potential protective factor, this study contributes to advancing culturally sensitive approaches to CM prevention and offers a foundation for future research aimed at improving child well-being and mental health outcomes across the lifecourse. These insights underscore the need for comprehensive, gender-sensitive, and contextually tailored interventions to effectively address CM in Saudi Arabia and similar cultural settings.

Table 3-a. Logistic regression odds ratios (OR) for the zero-inflated portion in the crude and adjusted ZIP models

Inflation Covariables	Model 1 – crude	Model 2 – covariates adjusted
	OR (95% CI)	OR (95% CI)
Age at interview	1.04 (0.97 – 1.12)	1.03 (0.97 –1.09)
Gender (female)	9.13 (1.86 – 154.50)	17.27 (15.51 – 19.04)
Education (collage or more)	0.34 (0.05 – 2.41)	0.32 (0.07 – 1.51)
Parental religiosity (highly religious)	1.10 (0.03 – 42.45)	0.65 (0.08 – 5.08)

Table 4-a. Logistic regressions odds ratios (OR) for the zero-inflated portion of crude and adjusted ZIP models <u>with interaction term</u>

Inflation Covariables	Model 1 – crude	Model 2 – covariates adjusted
	OR (95% CI)	OR (95% CI)
Age at interview	1.14 (0.98 – 1.33)	1.17 (1.02 – 1.35)
Gender (female)	9.66 (0.47 – 200.16)	35.57 (0.15 – 8307.30)
Education (collage or more)	8.69 x10-6 (6.84×10^{-12} – 1.46×10^{10})	0.02 (0.00 – 41.85)
Parental religiosity (highly religious)	5.73 (0.08 – 379.79)	10.49 (0.02 – 6371.23)

Supplemental Table 1. Multicollinearity Assessment

	Any CM	Physical abuse	Sexual abuse	Neglect	No. of co-occurring CM
Variables	**VIF**	**VIF**	**VIF**	**VIF**	**VIF**
Household religiosity (Yes)	1.02	1.02	1.02	1.02	1.02
Age at interview (continuous)	-	-	-	-	1.24
Age at interview	-	-	-	-	-
18 – 25	1.56	1.57	1.57	1.56	-
26 – 35	1.71	1.71	1.71	1.71	-
36 – 50	1.40	1.40	1.41	1.40	-
51 – 65					
Number of siblings	1.05	1.05	1.05	1.05	1.05
How much of childhood father was employed?					
Not at all/ a little	1.05	1.05	1.05	2.09	2.08
Some	1.04	1.04	1.05	2.09	2.08
Most/ all childhood	-	-	-	-	-
Mother education:	7.27	7.27	7.27	1.16	1.16
No education	5.58	5.58	5.58	1.22	1.22
Elementary	3.72	3.72	3.72	1.09	1.10
Middle/high school	-	-	-	-	-
College or more					
parental maladjustment (Yes)	1.03	1.08	1.13	1.11	1.03
Parents divorced (Yes)	1.34	1.34	1.34	1.34	1.34
Living with biological parents (Yes)	1.35	1.35	1.35	1.35	1.35
Physical abuse	-	-	1.16	1.11	-
Sexual abuse	-	1.03	-	1.04	-
Neglect	-	1.07	1.12	-	-
Mean VIF	2.24	2.09	2.10	1.36	1.33

Supplemental table 2. Standardized differences between baseline variables before and after adjusting for PS

Variable	Mean/% in highly religious parents' groups	Mean/ % in weakly religious parents' groups	Crude standardized difference	PS-adjusted standardized difference	p-value for difference	Overall p-value
Age at interview	34.31	33.42	0.341	0.08	0.509	-
Number of siblings	7.85	7.93	0.007	-0.017	0.893	-
Mother education						0.983
No education	63.60	61.70	0.293	0.041	0.725	
Elementary	21.70	22.70	0.020	-0.025	0.836	
Middle/ High school	11.10	11.30	-0.377	-0.009	0.948	
Collage or more	3.60	4.30	-0.044	-0.034	0.784	
How much of childhood father was employed?						0.785
Not at all/ a little	12.20	14.30	-0.198	-0.061	0.65	
Some	19.80	17.10	0.171	0.07	0.554	
Most/ all childhood	68.00	68.70	0.018	-0.014	0.913	
Parental maladjustment (No)	85.00	82.80	0.260	0.06	0.645	0.645
Parental maladjustment (Yes)	15.00	17.20	-0.260	-0.06	0.645	
Parents divorced (No)	98.30	98.00	-0.086	0.024	0.868	0.868
Parents divorced (Yes)	1.70	2.00	-0.086	-0.024	0.868	
Living with biological parents (No)	6.60	7.20	-0.187	-0.027	0.854	0.854
Living with biological parents (Yes)	93.40	92.80	0.187	0.027	0.854	

CHAPTER 3

The Association between Child Maltreatment and Finding Comfort in Religion in Adulthood among a Nationally Representative Sample of Saudi Households

Introduction

Child maltreatment (CM) has profound impacts on personal and social development, spanning from childhood throughout adulthood. It is associated with a myriad of adverse outcomes, ranging from low self-esteem and poor academic and workplace performance to strained interpersonal relationships.[137,142,198,199] Moreover, individuals who have experienced CM are more likely to engage in health-risk behaviors such as smoking and excessive alcohol consumption, and they often suffer from poor physical health, cognitive difficulties, and mental health problems.[199-201] In Saudi Arabia (SA), findings from a large survey in 2013 demonstrated the detrimental impact of adverse child events (ACEs), including CM, on later health outcomes such as increased risk of physical and mental illness and health-risk behavior. Those who reported four or more ACEs faced significantly higher risks for major health issues like heart disease and obesity, and were much more likely to suffer from anxiety and depression, and engage in health-risk behaviors such as alcohol and drug use, compared to those with no ACEs.[33] Gender differences were also reported, with higher risk of mental illness observed among women, and substance abuse among men.[127]

Research spanning various countries and religions indicates that religiosity – the degree to which an individual is committed to or involved with religion, encompassing beliefs, practices, participation in religious activities, and the influence of religion on their life and values – often has a positive effect on health and behavioral outcomes throughout the life course, particularly in coping with stress, trauma, and hardships in adulthood.[41,44,84,148,167,202-204] For example, a cross-sectional study on school students

(grades 7 – 12) in Al-Qassim region in SA found that those who reported both low religiosity and low family atmosphere were at higher risk to have a risky lifestyle such as low physical activity, unhealthy diet, and smoking, compared to those who reported higher religiosity and better family atmosphere.[84] In a U.S. sample of school adolescents, Chandy and colleagues discovered that for those who had experienced sexual abuse, self-identification as religious or spiritual served as a significant protective factor against negative outcomes, such as delinquent behavior, eating disorders, and suicidal involvement, alongside family connections.[204] Another study conducted by Vaingankar and colleagues among a multi-ethnic Asian population with diverse religious affiliations—including Christianity, Hinduism, Islam, Sikhism, and Taoism—in Singapore found that individuals with any religious affiliation reported higher total Positive Mental Health (PMH) scores compared to those with no religious affiliation. These findings underscore the potential of religiosity as a vital element in fostering resilience and promoting mental health across different cultural and religious contexts. It also highlights its importance as a factor in public health strategies aimed at improving the overall quality of life and reducing health disparities.

However, experiences of CM may influence adult religiosity in contrasting ways, which can have significant implications for personal development, mental, and overall well-being.[81,87,144,152] There are two competing theories: One theory suggests that negative childhood experiences can lead to a decrease in religiosity, as individuals may develop negative perceptions of God as being unloving and distant, leading to a reduction or a loss of faith. Conversely, another theory argues that trauma can actually increase religiosity, as individuals turn to religious engagement as a means of seeking solace and meaning.[81,85,137,138,140,141,143,144] While there is an increasing body of evidence supporting both theories, it predominantly originates from Western, Judeo-Christian contexts. There's a widespread consensus on the need to examine the role of religion and religious

outcomes within the specific cultural context of religious groups to achieve more relevant and accurate findings for deeper and more nuanced understanding.[167,203,205] For example, Vaingankar and colleagues found that in addition to religion being positively associated with PMH, Unique patterns of PMH subcomponents –including general coping (GC), emotional support (ES), spirituality (S), interpersonal skills (IS), personal growth and autonomy (PGA), and global affect (GA)— across different religious groups were identified. For example, Christianity was significantly associated with higher ES, while Buddhism and Islam with higher GC, ES and IS.[203] In light of these findings, the authors emphasized the need for mental health interventions tailored to each religious group within their cultural context for better outcomes. However, similar studies are scarce in SA and the Middle East (ME) at large,[152,206] leaving the applicability of the aforementioned theories and findings in non-Western, Muslim societies, including SA, largely unexplored. Bridging this research gap is essential for a comprehensive understanding of how CM experiences and religious coping in adulthood interact in order to inform effective intervention strategies for psychosocial therapy tailored to these specific experiences and cultural contexts.

Gender differences in religiosity often vary significantly across different religious groups and cultural contexts.[121,207] For example, studies have shown that Christian women, from predominantly Western samples, are generally more religious than their male counterparts, frequently participating in religious services and expressing higher levels of personal religiosity. In contrast, research on Muslim populations indicates that men and women display similar levels of religious commitment, with men often more visible in public religious practices due to cultural and religious norms. Loewenthal and colleagues have emphasized in their research the importance of researching religiosity within the specific context of a given religious group and their specific cultural context to gain better more accurate understanding.[207] This may have important implications on

other aspects of religiosity, such as resorting to religious coping in times of distress. Therefore, investigating gender differences in the association of CM and adult religiosity, particularly religious coping, within the Saudi cultural context is essential. This is especially important given the centrality of religion to Saudis and the distinct cultural norms and expectations for males and females in SA, which are shaped by Islamic values and Arab culture.[46,47,73-75,89,208] For example, the male guardianship system, which was recently abolished, allowed family patriarchs to exert considerable control over their female relatives' lives, regulating their social interactions, mobility, appearance, employment, and education in the name of protection. However, this protective intent could easily escalate into excessive control, turning into abuse that was often rationalized as a religious obligation. Such dynamics may cause alienation among some women from their faith, impacting their engagement with religion and their search for comfort and solace within it. Conversely, Saudi females are typically raised to highly respect Islamic values and cultural norms, in part to uphold the ideal image of Saudi Muslim womanhood.[89] This image often includes the responsibility of passing these values on to younger generations. Consequently, women tend to be more religious than men, and some may uncritically accept and even support longstanding abuses or harmful cultural norms, believing them to be in alignment with and justified by their religious beliefs. As a result, they often turn to religion as a means of coping with these harmful norms. This complex interplay between cultural practices, religious interpretation, and gender roles underscores the importance of exploring these dynamics to understand better how gender influences the relationship between CM and religiosity within the Saudi context. This understanding can inform tailored interventions that address both the cultural and religious dimensions of coping mechanisms in the face of CM.

Moreover, previous studies have suggested that gender can play a critical role in how individuals perceive and respond to childhood trauma, including CM.[81,206,209] For

example, a study reporting on a sample of major depression patients in a Turkish psychiatric hospital found that women are often reported to engage more in religious practices and may use religion as a coping mechanism more frequently than men, potentially reflecting broader gendered patterns of emotional processing and social support seeking.[206] Conversely, men might experience societal pressures that discourage emotional expression, including religious expressions of vulnerability such as increased praying and supplication, leading them to adopt health-risky behaviors like smoking and substance use as coping mechanisms.[206] This pattern of adult coping and behavioral outcomes was also observed among Saudi male participants who reported CM experiences in the aforementioned national ACEs survey.[127] Despite the critical role of gender in how individuals manage trauma and engage with religion, studies specifically exploring these gender differences within the Saudi cultural context are severely lacking. Understanding these differences is essential for developing gender-sensitive interventions that effectively support all individuals affected by CM.

For all those reasons, we aim to investigate the independent association between experiences of CM and frequency of finding comfort in religion, as well as examine potential gender differences in this association using nationally representative data from the Saudi National Mental Health Survey (SNMHS). We hypothesize that experiences of CM are positively associated with participant's frequency of seeking comfort in religion in adulthood, and risk estimates are expected to be more elevated among female participants. This research is crucial as it could deepen our understanding of the impact of CM on the role of religion as a significant coping mechanism, potentially guiding more effective prevention and treatment strategies for combating CM and mental illness in SA.

Methods

Sampling and participants

The SNMHS is a part of the World Health Organization's (WHO) World Mental Health (WMH) survey initiative.[163] The SNMHS is a nationally representative survey of Arabic-speaking Saudi households between the ages of 15 and 65 from 11 out of 13 administrative areas in SA.[163] Two Southern areas, Jazan and Najran, were excluded due to security concerns as a result of the political conflict along the Saudi-Yemeni borders at the time of the survey. The survey was conducted face-to-face through trained interviewers from 2011 through 2016 using a computer-assisted personal interview (CAPI) mode and an audio computer-assisted self-interviewing (ACASI) methods for specific sensitive sections.[163] A multistage clustered probability sampling was employed based on the 2010 Saudi population census from the General Authority for Statistics. The sampling and weight creation were described in detail elsewhere.[164] One male and one female from each household were selected across primary sampling units within the 11 distinct strata. The survey instrument was divided into two parts: (Part I) involved sections on core Mental Health Disorders (MHD) and was administered to all participants (N=4,004), while (Part II) included a subset of (Part I) to address additional, non-core sections and a wide range of related determinants of mental health (N=1,981). This subset included two groups: all individuals who reported any core MHD in PART I, and a probability subsample of those who did not report any MHDs in the core sections (selected with a 0.25 probability). Specific weights were developed for both parts I and II, taking into account the intricacies of the multistage and individual-weight sampling procedures.[163]

Our analyses were restricted to participants aged 18 years and older to ensure comparability with a companion article, which records relevant study outcomes among adults. This is in line with our adoption of a life-course approach to investigate the relationship between childhood exposures and adult outcomes. The final analytic sample for this study was drawn from Part II (N=1,793) participants as Part I didn't address

relevant determinants of mental health, and thus only weights for Part II were applied in our analyses. Written informed consent was obtained in written form prior to the interviews. All procedures regarding the fieldwork and consent were approved by the Institutional Review Board committee at the King Faisal Specialist Hospital & Research Centre in Riyadh (RAC#: 2091093).[163]

Instruments

Similar to other World Mental Health (WMH) surveys, the Saudi National Mental Health Survey (SNMHS) employed the third version of the World Health Organization's Composite International Diagnostic Interview (CIDI).[163] The CIDI, a fully structured survey instrument widely utilized in community surveys, implements a stem-branch technique to determine both lifetime and 12-month prevalence of various MHDs. For the Saudi context, the CIDI 3.0 underwent translation, adaptation, and preliminary testing specific to the Saudi population.[165] Additionally, certain sections were incorporated into the Saudi version of CIDI 3.0 to gather data relevant to the local context, including aspects like religiosity, polygamy, and attitudes towards alcohol consumption. The survey, conducted by trained lay interviewers, primarily used CAPI as well as ACASI methods for specific sensitive sections such as those concerning substance and alcohol use. In the SNMHS, mental health diagnoses were derived from the CIDI 3.0 data using the criteria of the Diagnostic and Statistical Manual for Mental Disorders, fourth edition (DSM-IV)[163], to enable comparison of the findings with other WMH survey results.

Measures

Exposure

The primary exposure for this study are the three forms of child maltreatment as measured individually (physical maltreatment, sexual maltreatment, neglect), globally (any form of child maltreatment), and in terms of number of co-occurring forms of child maltreatment

experienced. These outcomes were measured as part of the SNMHS family-related Adverse Childhood Experiences (ACEs) measure.

Physical abuse was assessed by asking participants, "When you were growing up, how often did someone in your household do any of the things (on list A) to you?" List A included: pushed, grabbed or shoved, threw something, slapped or hit. Responses were recorded on a 4-point Likert scale (often, sometimes, rarely, never). We operationalized this variable as binary (yes, no), categorizing those who reported "never" as not having experienced physical abuse, while those who reported otherwise were considered to have experienced it. Those who reported "don't know" or "refused" were treated as missing values.

Sexual abuse was assessed with questions about experiencing rape or sexual assault under the age of 18 and having this occur three or more times. This was the only ACE where the survey did not collect information on the perpetrator's identity in terms of being a family member or a stranger. We operationalized this measure as a binary variable, classifying those who reported "never having been raped or sexually assaulted under the age of 18" as not having experienced sexual abuse, while those who reported otherwise were considered to have experienced it.

Neglect was assessed with questions about the frequency of not having adequate food, clothing, or medical care, receiving inadequate supervision, and having to perform age-inappropriate chores. Similar to physical abuse, neglect responses were recoded on a 4-point Likert scale (often, sometimes, rarely, never). We operationalized this variable as binary (yes, no), classifying those who reported "never" or "rarely" as not having experienced neglect, while those who reported otherwise were considered to have experienced it.

The aforementioned measures were assessed using questions adapted from scales and instruments that had been validated in prior studies. However, these questions had not been specifically validated for the study population of the SNMHS.

Outcomes

The main outcome of interest is the participant's level of comfort in religiosity. This measure was assessed by asking participants, "When you have problems or difficulties in your family, work, or personal life, how often do you seek comfort through religious or spiritual means, such as praying, meditating, attending a religious or spiritual service, or talking to a religious or spiritual?" Responses were coded on a 4-point Likert scale (often, sometimes, rarely, never). We operationalized this variable as binary (yes, no), such that those who reported "rarely" or "never" are considered to have low levels of comfort in religion, while those who reported otherwise are considered to have a higher level of comfort in religion. Those who reported "don't know" or "refused" will be treated as missing values.

Covariates

Effect Modifier

We included participants' gender as an effect modifier, that we operationalized as binary variable (male, female).

Confounders

Based on prior research and data limitations,[81,144] we considered controlling for several personal and family-related confounders linked to experiences of CM and religiosity in adulthood. We included the age at interview to account for potential recall bias and generational differences. We also adjusted for participants' educational attainment,

marital status, and income as indicators of socioeconomic status, which may influence an individual's religious orientation in adulthood. Specifically, in contexts of lower educational attainment, individuals may face higher rates of unemployment or economic hardship, challenges that can lead to an increased reliance on religion as a coping mechanism.[141] We also controlled for the presence of any chronic illness and any lifetime mental illness as research indicate that people suffering from physical or mental illness are more likely to turn to religion for meaning and solace.

Regarding family background indicators, we included the following: household/parental religiosity, history of parental maladjustment, parents' divorce status, and whether the child lives with a single parent or both biological parents. We controlled for these potential confounders because CM often arises in families that exhibit signs of dysfunction or instability.[104] In facing these hardships, individuals frequently turn to religion as a form of solace and support. Additionally, parental religiosity could influence their offspring's religiosity in adulthood. We also found in a prior study that parental religiosity is linked to lower risk of co-occurring forms of CM.

Participants' educational attainment was assessed by asking respondents about the number of years of school they have completed. Reponses ranged from 0 to 16 years or more. We categorized the responses of 12 years or less as having completed high school or les, and responses beyond 12 years as having a college degree or more. Participants' marital status was categorized as Married, Never Married, Separated/Divorced and Widowed. Income was assessed as a ratio of income per capita to the median of the sample, the income per capita is a composite variable that synthesizes the personal income, spouse’s income, and family’s income. The income was classified as (low if the ratio is below 0.5, low-average if between 0.5 and 1, high- average if between 1.1 to 2, and high if the ratio is bigger than 2). Chronic illness was measured by asking participants

if they have any chronic conditions, including cancer, arthritis or rheumatism, chronic back or neck problems, headaches, any other chronic pain, high blood pressure, heart disease, asthma, any other chronic lung disease, like COPD, tuberculosis or emphysema. Similarly, any lifetime mental illness was measured based on the presence of at least one DSM-IV disorder during the participant's lifetime. This includes a broad range of mental health conditions, namely: anxiety disorders (i.e., panic disorder, agoraphobia without panic disorder, social phobia, generalized anxiety disorder, post-traumatic stress disorder, obsessive–compulsive disorder, and separation anxiety disorder), mood disorders (i.e., major depressive disorder, bipolar I–II disorders [BPD]), eating disorders (i.e., anorexia nervosa, bulimia nervosa, binge-eating disorder), disruptive behavior disorders (i.e., attention-deficit/hyperactivity disorder, conduct disorder, oppositional-defiant disorder, intermittent explosive disorder), and substance use disorders (i.e., alcohol and drug abuse and dependence). The previous two comorbidity variables were operationalized as binary (yes, no). Household religiosity is used as a proxy for parental religiosity during childhood as offspring's religiosity positively correlates with perceived parental religiosity.[86,166] Parental religiosity during the respondent's childhood was assessed in the survey by asking participants a single question: "How religious was your household when you were a child?" and recorded on a 4-point Likert scale (very religious, somewhat religious, not very religious, and not at all religious). In our study, we operationalized this variable as binary, with two categories: highly religious or weakly religious. Participants who reported being "very religious" or "somewhat religious" were classified as highly religious, while those who reported "not very religious" or "not at all religious" were classified as weakly religious. "Don't know" and "refused" responses were treated as missing values. Parental maladjustment was assessed by asking respondents about three elements: history of family violence, symptoms of parental mental illness during respondents' childhood (particularly for depression, anxiety and panic disorders), and if the father had alcohol drinking or substance use problems. If the respondent affirmatively reported one of the

previous parental maladjusted elements, we recorded that as "yes", and "no" if reported otherwise. Parents' divorce status was also included as a binary variable. Living with one or both biological parents was assessed by asking respondent if they were living with one or both biological parents until the age of 16. Responding affirmatively was recorded as "yes", and "no" otherwise.

Statistical analysis

We included the sample from the part II non-core section of the SNMHS as some anxiety disorders and all of the sociodemographic and relevant determinants of mental health were not included in part I. All study analyses took survey design effects and weights for part II into account using STATA 18 survey analysis functions (syv).[170]

Descriptive analyses

We described the sociodemographic characteristics of the study population as a whole and by CM types collectively and individually for part II using means and standard deviations (SD) for continuous variables, and unweighted frequencies and weighted percentages for categorical ones. Standard errors (SE) were also estimated and presented for all types of variables. After that, we presented the unweighted frequencies, weighted prevalences, and SEs of the frequency of seeking comfort in religion in the total population and as further stratified by gender and the three forms of child maltreatment as measured globally (any form of child maltreatment), individually (physical abuse, sexual abuse, neglect), and in terms of number of co-occurring forms of child maltreatment experienced (0, 1, 2 or more).

Inferential analyses:

Bivariable and multivariable regression

To examine the independent association between any, each individual, and the number of the three co-occurring childhood maltreatment forms and how often individuals seek comfort in religion in adulthood, and given the commonality of this binary outcomes, we fitted a modified Poisson regression model with robust variance estimation to estimate crude and adjusted RRs and their 95% Confidence Intervals (CIs). We also examined interaction by constructing interaction terms between each of our CM exposure variables with the participant's gender separately. The interaction term was examined in two models: 1) model 1 with the main effect and interaction term only to generate crude RRs, and 2) model 2 will be model 1 adjusted for important confounders.

Assessment of Multicollinearity

We assessed for the presence of multicollinearity among the independent variables in the multivariable models using the Variance Inflation Factors (VIFs). VIFs are a diagnostic measure to identify multicollinearity among the predictors, with a VIF value greater than 10 typically indicating significant multicollinearity. The results of the VIF analysis indicated that the individual VIF values ranged from 1.02 to 2.57. These results suggest that multicollinearity is not a concern in our models, as all VIF values were well below the threshold of 10. (Supplemental Table 1)

Power analysis

For the association between Any CM and the individual's frequency of seeking comfort in religion, we calculate that the minimal detectable risk estimates for seeking comfort in religion is 1.95 at 80% power and 0.05 significance level, given a prevalence of 20% of any CM and 90% of the study population reporting higher levels of comfort in religions.

Sensitivity Analysis

To address the issue of small sample sizes for certain CM types—specifically sexual abuse (n=38) and neglect (n=59)—we initially limited the number of covariates included in the multivariable models to preserve statistical power. By focusing on key confounders identified in the literature, we aimed to achieve a balance between adequately controlling for potential biases and managing the limitations imposed by these small sample sizes. In addition, we conducted pooled analyses by combining different CM types into a single variable, namely: any form of CM exposure, and examining the cumulative number of co-occurring CM types. This approach allowed us to increase the sample sizes for our analyses, thereby enhancing statistical power and enabling a more reliable estimation of associations.

We also explored the use of propensity score (PS) calculations to estimate the likelihood of exposure to sexual abuse and neglect, as we did in Aim 1, with the goal of reducing the number of confounders in the models. However, due to the small sample sizes for sexual abuse and neglect, and the even smaller cell sizes when stratified by baseline characteristics (Supplemental Table 2), this approach proved unfeasible.

To further address these challenges, we conducted a sensitivity analysis to assess the robustness of our findings. The purpose of this sensitivity analysis was to evaluate how the associations between different types of CM and seeking comfort in religion change when adjusting for various sets of confounders. This step helps to determine whether the observed associations are consistent or if they are substantially altered by the inclusion or exclusion of specific variables, particularly given the potential instability caused by small cell sizes in the multivariable models. We created seven models for each CM type, progressively adjusting for different sets of confounders, as shown in Supplemental Table 3. Model 1 represents the crude association, while Models 2 through 7 sequentially add more confounders to examine their impact on the estimates. Specifically:

- **Model 2** adjusted for basic sociodemographic factors such as age at interview, participant's level of education, and income.
- **Model 3** further included any lifetime mental illness.
- **Model 4** incorporated chronic illness history.
- **Model 5** added household/parental religiosity, which is a critical factor in the context of this study.
- **Model 6** adjusted for the history of parental maladjustment.
- **Model 7** included additional family characteristics, such as parental divorce status and living arrangements with single or both biological parents.

Results

Description of the study population

Table 1 shows that the study sample consisted of 1,793 participants, with 19.07% reporting any form of CM. The breakdown of CM types included 17.18% cases of physical abuse, 2.12% of sexual abuse, and 3.29% of neglect. Additionally, the distribution of co-occurring forms of CM revealed 80.93% of participants with no CM, 15.84% with one form of CM, and 3.23% with two or more forms.

The average age of participants at the time of the interview was 34.19 years, with a nearly balanced gender distribution (48.75% (N=1,044) female participants). This gender distribution shifts significantly among those reporting any CM and physical abuse, where females constitute 36.5% and 29.92%, respectively. They also tended to report lower numbers of co-occurring forms of CM. Furthermore, individuals with a history of CM tended to be slightly younger on average, particularly those reporting sexual abuse, who had the lowest mean age of 29.04 years, possibly indicating differing periods of vulnerability or reporting tendencies based on the type of abuse. On average, participants across all forms of CM reported having 7.52 siblings. Educational levels varied, with

59.29% (N=1,059) having completed high school or less and 40.71% (N=734) having achieved a college education or higher. This educational distribution shifts slightly in the context of CM, with those experiencing any form of maltreatment or specific types like physical abuse and neglect, showing a higher propensity towards lower educational attainment compared to their non-maltreated peers. However, 76.69% of those who reported sexual abuse had a college or some advanced education. Economic disparities were also evident in our sample, as 11.27% of the entire cohort reported having received public assistance, with this figure rising to 16%, among those who experienced any form of CM and physical abuse. The highest proportions were among those who reported sexual abuse, neglect, and 2 or more co-occurring forms of CM.

The prevalence of any chronic illness among the study participants was notably high, with 78.14% reporting such conditions. This prevalence was significantly higher among those who experienced any form of childhood maltreatment (CM), with 84.50% of participants with CM histories reporting chronic illnesses ($p = 0.002$). Specifically, participants who experienced physical abuse (84.42%, $p = 0.003$), sexual abuse (97.37%, $p = 0.004$), and neglect (89.83%, $p = 0.03$) also showed elevated rates of chronic illness compared to those without such experiences. The presence of any lifetime mental illness followed a similar trend. Nearly half of the total population (48.24%) reported having a lifetime mental illness. However, the prevalence was significantly higher among those with a history of any CM (74.56%, $p < 0.001$). This elevated prevalence was consistent across specific types of CM, with 74.35% of those physically abused, 84.21% of those sexually abused, and 84.75% of those neglected reporting lifetime mental illnesses (all $p < 0.001$). The data indicates a particularly high risk among those who experienced multiple forms of CM, where 71.48% reported any lifetime mental illness, and this was even higher for those with two or more forms of CM (89.66%, $p < 0.001$).

Parental education also varied, with 40.63% (N=690) of fathers and 62.63% (N=1,133) of mothers having no education. Reported parents with some collage or advanced education across all the different forms of CM constituted the smallest portions of sample with proportions ranging from 9.03% to 13.67% for fathers, and 0.00% to 6.48% for mothers. Notably, 51.52% of those who reported having experienced sexual abuse had fathers who attained middle or high school education. Employment history during the participants' childhood showed that 66.02% (N=1,182) reported their father being employed for most or all of their childhood, while a significant majority, 86.06% (N=1,522), reported their mother as not employed or only a little during their childhood. The study also explored parental religiosity, finding that a vast majority of 96.08% (N=1,715) described their parents as highly religious. Parental maladjustment was reported by 11.18% (N=274) of the sample. This figure significantly increased across different forms of CM ranging from 23.53% to 63.87%. Figures for those reported having experienced 2 or more forms of CM (63.87%), neglect (42.29%), and physical abuse (32.56%) were the highest. A similar trend was observed in participants who reported parental divorce, with proportions ranging between 2.83% and 4.78%. The highest proportions of parental divorce were noted among individuals reporting two or more forms of CM (4.78%), followed by those experiencing neglect (4.24%) and sexual abuse (4.11%). Additionally, a small fraction of the sample, 3.00% (N=61), reported the death of one or both parents, and the majority, 93.91%, lived with at least one biological parent. Interestingly, this proportion decreased markedly to 78.30% among those reporting neglect, whereas it slightly increased to 91.84% among those reporting sexual abuse.

The sample was distributed across various areas of living, with 50.85% (N=690) residing in large cities, 15.72% (N=320) in suburbs or small cities, and 33.35% (N=502) in towns, villages, or rural areas. This distribution was consistent across all forms of CM. Regionally, the largest portion of the study sample resided in the Western region (34.59%, N=535),

followed by Central (30.40%), then Eastern (17.89%) regions. Those who reported any forms of CM were significantly higher in the Central (36.50%), Western (24.76%), and Southern (17.85%) regions. A similar trend was also observed among those reporting physical abuse. A slight deviation from this trend was observed among those who reported 2 or more forms of CM, with the Eastern region being the third highest.(Table 1)

Table 1. Personal and family background sociodemographic characteristics of the study participants in the total population and by CM experience

Variables	Total N=1,793		Any CM Yes, N=342			Physical abuse Yes, N=308			Sexual abuse Yes, N=38			Neglect Yes, N=59			No of co-occurring forms of CM						
															No CM N=1,451		One CM N=284		2 or more CM N=58		
	N (%)	SE	N (%)	SE	p	N (%)	SE	p	N (%)	SE	p	N (%)	SE	p	N (%)	SE	N (%)	SE	N (%)	SE	p
Age at interview (Mean)	34.19	0.56	32.52	0.84	0.03	32.09	0.74	0.01	29.04	2.17	0.53	35.72	2.56	0.53	34.53	0.61	32.75	0.91	31.10	1.58	0.05
Age at interview **18 – 25** **26 – 35** **36 – 50** **51 – 65**	491 (32.42) 574 (26.14) 543 (30.00) 177 (11.44)	2.40 2.29 2.76 1.49	101 (29.53) 110 (32.16) 115 (33.63) 16 (4.68)	4.19 3.76 3.69 1.64	0.004	87 (28.25) 102 (33.12) 106 (34.42) 13(4.22)	3.99 4.42 3.76 1.87	0.003	15 (39.47) 14 (36.84) 7 (18.42) 2 (5.26)	13.97 10.15 4.75 4.13	0.17	14 (23.73) 23 (38.98) 17 (28.81) 5 (8.47)	9.11 7.82 12.27 2.03	0.70	393 (27.68) 465 (31.83) 432 (30.57) 161 (9.92)	2.58 2.62 2.59 1.85	87 (23.73) 84 (38.98) 101 (28.81) 12 (8.47)	4.52 4.30 4.13 1.79	14 (27.55) 26 (32.07) 14 (30.51) 4 (9.87)	8.63 8.57 5.05 3.40	0.03
Female gender	1044 (48.75)	1.51	197 (36.50)	4.53	0.003	128 (29.92)	3.81	<0.001	22 (61.71)	11.82	0.98	34 (48.42)	10.79	0.98	896 (61.75)	1.65	115 (40.49)	5.22	33 (56.90)	7.68	0.01
Number of siblings Mean± SD	7.52 ±4.14	0.22	7.48 ± 4.05	0.35	0.88	7.57 ± 3.99	0.34	0.89	7.49 ± 3.44	0.911	0.74	7.88 ± 5.67	7.88	0.74	7.74 ± 4.31	0.24	7.90 ± 4.82	0.34	7.69 ± 4.42	1.02	0.35
Marital status **Single** **Married** **Divorced/separated** **Widow**	511 (37.47) 1150 (55.56) 75 (4.00) 57 (2.97)	2.16 2.33 0.71 0.81	96 (37.47) 225 (55.56) 17 (4.00) 4 (2.97)	4.29 4.38 1.82 0.69	0.50	86 (39.22) 203 (56.75) 16 (3.53) 3 (0.50)	4.29 4.35 1.18 0.29	0.19	11 (61.28) 24 (23.97) 3 (9.48) 0 (5.26)	17.57 14.65 12.09 0	0.31	13 (25.58) 43 (69.01) 2 (1.87) 1 (3.67)	10.81 10.51 1.42 3.48	0.44	415 (37.40) 925 (55.37) 58 (3.89) 53 (3.34)	2.32 2.54 0.76 0.95	83 (37.64) 184 (56.47) 13 (4.64) 4 (1.26)	4.38 4,66 2.07 0.82	13 (39.02) 41 (57.02) 4 (3.97) 0 (0.00)	11.37 11.16 2.04 0.00	0.83
Patriciana's education level **High school or less** **Collage or more**	1,059 (59.29) 734 (40.71)	2.77 2.77	204 (53.07) 142 (46.93)	4.49 4.49	0.16	188 (55.65) 124 (44.35)	4.93 4.93	0.45	13 (23.31) 25 (76.69)	7.52 7.52	<0.001	40 (57.83) 19 (42.17)	11.55 11.55	0.89	2,053 (60.52) 1,239 (39.48)	3.19 3.19	169 (53.32) 119 (46.68)	4.86 4.86	35 (51.53) 23 (48.47)	9.90 9.90	0.28
Participant's income **Low** **Low average** **High average** **High**	697 (40.96) 176 (10.06) 287 (17.39) 633 (31.60)	2.25 1.45 1.66 2.34	117 (39.38) 32 (7.25) 55 (19.71) 138 (33.66)	4.77 2.13 4.94 4.51	0.59	104 (41.87) 28 (5.78) 50 (16.91) 126 (35.44)	5.09 1.53 3.54 4.40	0.31	12 (21.14) 1 (0.81) 6 (31.70) 19 (46.36)	7.05 0.85 16.60 16.19	0.12	26 (38.11) 6 (13.58) 9 (16.38) 18 (30.92)	11.59 9.12 10.18 9.88	0.97	580 (41.27) 144 (10.61) 232 (16.93) 495 (31.19)	2.47 1.53 1.55 2.47	93 (39.17) 29 (8.17) 47 (21.18) 115 (31.49)	5.04 2.39 5.88 5.08	24 (40.71) 3 (1.46) 8 (10.39) 23 (47.43)	9.54 0.88 7.25 9.62	0.45
Received public assistance (yes)	217 (11.27)	1.76	56 (16.47)	2.98	0.008	49 (16.01)	3.03	0.03	9 (23.68)	12.73	0.03	14 (24.14)	11.24	0.005	161 (11.21)	1.77	42 (14.84)	3.01	14 (24.56)	10.44	<0.001
Any chronic illness (yes)	1401 (78.14)	2.59	289 (84.50)	4.20	0.002	260 (84.42)	4.53	0.003	37 (97.37)	2.34	0.004	53 (89.83)	9.01	0.03	1112 (76.64)	2.88	233 (82.04)	4.63	56 (96.55)	0.76	<0.001
Any lifetime mental illness (yes)	865 (48.24)	2.12	255 (74.56)	4.03	<0.001	229 (74.35)	3.95	<0.001	32 (84.21)	5.09	<0.001	50 (84.75)	11.86	<0.001	610 (42.04)	2.09	203 (71.48)	4.55	52 (89.66)	4.63	<0.001
Father education: **No education** **Elementary** **Middle/high school** **College or more**	690 (40.63) 484 (26.52) 447 (23.54) 172 (9.30)	2.45 2.04 2.12 1.45	123 (35.57) 105 (29.63) 82 (24.10) 36 (10.71)	4.19 3.03 3.98 2.38	0.54	111 (35.41) 93 (30.51) 74 (22.14) 34 (11.94)	3.73 3.12 3.55 2.63	0.32	9 (14.03) 12 (21.94) 12 (51.52) 5 (12.50)	6.45 6.62 13.59 7.39	0.76	27 (44.41) 15 (30.87) 11 (15.11) 6 (9.61)	11.23 10.55 6.39 4.89	0.76	571 (39.35) 379 (26.12) 365 (25.16) 136 (9.37)	2.59 2.24 2.36 1.64	97 (34.15) 91 (32.04) 68 (23.94) 26 (9.86)	4.67 3.51 4.29 2.59	22 (37.93) 14 (24.14) 14 (24.14) 8 (13.79)	7.14 9.29 8.20 6.46	0.76
Mother education: **No education** **Elementary** **Middle/high school** **College or more**	1133 (62.63) 384 (18.54) 209 (14.42) 67 (4.40)	2.66 1.45 2.31 0.79	211 (60.02) 79 (22.68) 43 (11.69) 13 (5.62)	4.45 3.33 2.59 2.16	0.38	193 (58.56) 70 (24.42) 37 (10.53) 12 (6.48)	4.69 3.99 2.51 2.47	0.12	13 (44.47) 13 (22.26) 10 (28.98) 2 (4.29)	14.22 9.14 12.03 3.68	0.50	38 (68.95) 13 (21.24) 8 (9.82) 0 (0.00)	9.66 7.02 4.83 0.00	0.50	926 (63.82) 305 (21.02) 166 (11.44) 54 (3.72)	2.88 1.56 2.62 0.79	176 (61.97) 62 (21.83) 34 (11.97) 12 (4.23)	4.66 3.41 2.87 2.44	31 (53.45) 17 (29.31) 9 (15.52) 1 (1.72)	9.32 8.36 6.12 2.99	0.41

N = unweighted frequencies of observations. This cell presents either counts for categorical variables or means for continuous variable.

% = weighted column percentages of observations. This cell presents % of the number observations for the corresponding categorical variable.

SE = standard error, P = p-value.

Continue Table 1. Personal and parental sociodemographic characteristics of the study participants in the total population and by parental religiosity

Variables	Total N=1,793		Any CM N=342			Physical abuse N=308			Sexual abuse N=38			Neglect N=59			No CM N=1,451		One CM N=284		2 or more CM N=58		
	N (%)	SE	N (%)	SE	p	N (%)	SE	p	N (%)	SE	p	N (%)	SE	p	N (%)	SE	N (%)	SE	N (%)	SE	p
How much of childhood father was employed? Not at all/ a little Some Most/ all childhood	217 (14.09) 339 (19.89) 1182 (66.02)	1.47 1.56 1.88	41 (10.90) 54 (17.76) 239 (71.34)	2.24 3.30 3.53	0.30	40 (12.57) 47 (16.89) 214 (70.54)	2.55 3.35 3.45	0.48	1 (2.33) 7 (15.66) 30 (82.01)	2.39 5.82 6.31	0.85	7 (16.54) 7 (23.41) 41 (60.05)	8.32 10.01 10.56	0.85	176 (12.54) 285 (20.30) 943 (67.17)	1.71 1.72 2.31	35 (12.54) 47 (16.85) 197 (70.61)	2.42 3.67 4.14	6 (10.91) 7 (12.73) 42 (76.36)	10.34 8.03 10.05	0.40
How much of childhood mother was employed? Not at all/ a little Some Most/ all childhood	1522 (86.06) 90 (5.29) 158 (8.66)	1.47 0.94 1.42	277 (78.74) 19 (6.20) 43 (15.06)	5.55 2.58 5.43	0.14	251 (81.83) 18 (6.86) 36 (11.31)	4.27 2.93 3.62	0.49	33 (68.06) 2 (6.60) 3 (25.35)	16.63 4.90 17.69	<0.001	36 (57.42) 4 (9.10) 18 (33.47)	12.56 7.17 12.30	<0.001	1,245 (87.00) 71 (4.96) 115 (8.04)	1.56 0.99 1.39	239 (84.75) 14 (4.96) 29 (10.28)	5.08 2.25 4.83	38 (66.67) 5 (8.77) 14 (24.56)	11.67 9.33 11.40	0.04
Parental religiosity: Highly religious Weakley religious	1,715 (96.08) 70 (3.92)	1.07 1.07	317 (92.69) 25 (7.31)	2.24 2.24	<0.001	286 (92.86) 22 (7.14)	1.07 1.07	<0.001	35 (92.11) 3 (7.89)	12.08 12.08	0.20	55 (93.22) 4 (6.78)	2.08 2.08	0.25	1,398 (96.07) 45 (3.93)	1.24 1.24	262 (92.28) 22 (7.72)	2.54 2.54	55 (95.83) 3 (4.17)	2.60 2.60	0.19
Parental maladjustment (Yes)	274 (11.18)	1.02	125 (29.03)	3.77	<0.001	117 (32.56)	4.19	<0.001	16 (31.20)	12.40	<0.001	35 (42.29)	9.50	<0.001	150 (7.64)	0.96	86 (23.53)	3.842	38 (63.87)	9.17	<0.001
Parents divorced (Yes)	39 (1.41)	0.34	18 (3.09)	1.02	0.01	15 (2.93)	1.08	0.04	3 (4.11)	2.81	0.04	7 (4.24)	2.39	0.04	21 (1.07)	0.33	11 (2.83)	1.12	7 (4.78)	2.508	0.01
One or both parents died (yes)	61 (3.00)	0.64	14 (3.93)	1.43	0.46	13 (3.84)	1.52	0.54	2 (1.71)	1.33	0.12	4 (7.46)	4.17	0.12	47 (2.82)	0.72	10 (3.65)	1.621	4 (5.68%)	3.299	0.58
Living with biological parents (Yes)	1646 (93.91)	0.87	302 (90.38)	2.45	0.06	275 (92.65)	1.87	0.46	33 (91.84)	4.64	0.003	45 (78.30)	9.25	0.003	1,344 (94.61)	0.92	255 (90.46)	2.745	47 (89.85)	4.195	0.98
Area of living: Large city Suburbs/small city Town/Village/Rural Moved around	690 (50.85) 320 (15.72) 502 (33.35) 3 (0.08)	4.19 1.94 4.82 0.05	187 (51.15) 53 (13.26) 102 (35.59) 0 (0.00)	6.38 2.81 7.13 0.00	0.69	169 (50.83) 49 (14.91) 90 (34.26) 0 (0.00)	5.68 3.06 6.13 0.00	0.94	31 (65.39) 4 (4.81) 3 (29.81) 0 (0.00)	19.19 2.96 20.10 0.00	0.31	29 (53.64) 7 (6.21) 23 (40.14) 0 (0.00)	10.99 3.03 11.00 0.00	0.31	773 (50.79) 265 (16.21) 400 (32.90) 3 (0.09)	4.16 2.18 4.59 0.06	149 (49.37) 46 (14.06) 89 (36.57) 0	6.698 3.246 7.175	38 (62.42) 7 (8.17) 13 (29.41) 0	10.63 3.858 10.83	0.76
Region of living: Northern Central Eastern Western Southern	213 (5.54) 589 (30.40) 248 (17.89) 535 (34.59) 208 (11.58)	0.77 3.05 4.54 3.61 1.64	126 (4.42) 45 (36.50) 36 (16.48) 48 (24.76) 53 (17.85)	1.06 5.00 6.49 4.64 3.40	0.02	32 (4.91) 109 (35.75) 42 (15.21) 84 (25.44) 45 (18.69)	1.15 4.91 4.63 4.49 3.77	0.02	3 (1.69) 18 (44.98) 4 (30.23) 12 (21.91) 1 (1.19)	1.12 15.68 20.03 9.66 1.24	0.27	25 (5.55) 8 (30.40) 4 (17.89) 6 (34.59) 16 (11.58)	0.53 11.85 9.15 9.65 8.59	0.27	177 (5.77) 467 (29.19) 203 (18.17) 444 (36.54) 160 (10.34)	0.85 3.16 4.33 3.89 1.67	34 (5.02) 99 (34.65) 36 (15.81) 71 (24.56) 44 (19.97)	1.224 5.113 5.873 5.147 3.88	2 (0.63) 23 (48.19) 9 (20.70) 20 (26.04) 4 (4.45)	.4715 11.01 11.20 8.014 2.44	0.006

N = unweighted frequencies of observations. This cell presents either counts for categorical variables or means for continuous variable.

% = weighted column percentages of observations. This cell presents % of the number observations for the corresponding categorical variable.

SE = standard error, P = p-value

Prevalence of CM among those seeking comfort in religion

Table 2 shows that, more than half of the participants (53.26%) reported often seeking comfort in religion, while 27.72% did so sometimes, 11.08% rarely, and 7.95% never sought religious comfort.

Significant gender differences were observed in religious comfort-seeking behaviors (p=0.007). Among those who often sought religious comfort, women represented a higher proportion (54.53%) compared to men (45.47%). However, men showed higher proportions in the "sometimes" category (61.09% vs. 38.91%).

When examining CM experiences, 15.14% of those who often sought religious comfort reported experiencing any form of CM. Physical abuse was the most prevalent form (12.85%), followed by neglect (3.87%) and sexual abuse (1.29%). Although not statistically significant (p=0.090), those who sometimes sought religious comfort reported the highest prevalence of any CM (21.21%).

Regarding co-occurrence of CM types, the majority of participants across all religious comfort-seeking categories reported no CM experiences. Among those who often sought religious comfort, 12.34% experienced one type of CM, while 2.81% experienced two or more types. The highest prevalence of experiencing one type of CM was observed among those who sometimes sought religious comfort (19.26%).

Table 2. Weighted prevalence of seeking comfort in religion in the total population of SNMHS and stratified by gender and CM experience

	Seeking comfort on religion								
	Often		Sometimes		Rarely		Never		
	N (%)	SE	N (%)	SE	N (%)	SE	N (%)	SE	p-value
Total	**1,037 (53.26)**	1.98	**465 (27.72)**	2.18	**152 (11.08)**	1.71	**131 (7.945)**	1.23	NA
Gender									-
Male	373 (45.47)	1.52	217 (61.09)	1.70	72 (50.76)	1.11	85 (57.08)	0.98	0.007
Females	664 (54.53)	1.58	248 (38.91)	0.94	80 (49.24)	1.09	46 (42.92)	0.74	
CM experiences									-
Any CM (Yes)	191 (15.14)	1.02	98 (21.21)	0.78	37 (17.47)	0.53	15 (8.38)	0.25	0.090
Physical abuse (Yes)	170 (12.85)	0.88	88 (17.67)	0.74	34 (14.99)	0.47	15 (8.38)	0.25	0.191
Sexual abuse (Yes)	21 (1.29)	0.18	13 (3.56)	0.47	3 (2.48)	0. 26	1 (0.29)	0.02	0.201
Neglect (Yes)	44 (3.87)	0.53	9 (2.58)	0.35	4 (1.52)	0.10	2 (0.47)	0.03	0.196
No of co-occurred CM types									-
None	846 (84.86)	1.77	367 (78.79)	2.05	115 (82.53)	1.72	116 (91.62)	1.19	0.08
1	150 (12.34)	0.92	88 (19.26)	0.75	33 (15.95)	0.54	12 (7.62)	0.25	
2 or more	41 (2.81)	0.34	10 (1.96)	0.23	4 (1.52)	0.10	3 (0.77)	0.04	

SE: standard error, N= unweighted frequencies, (%)= weighted percentages, The percentages shown are column percentages.

Association between CM and seeking comfort in religion

Table 3 displays a generally weak, positive association between CM experiences and the frequency of seeking comfort in religion. The crude RR for participants reporting any form of CM is 1.05 (95% CI: 0.95–1.16), indicating a slight increase in the likelihood of seeking religious comfort compared to those without CM experiences. After adjusting for key confounders, the association decreases to an adjusted RR of 1.02 (95% CI: 0.93–1.11), suggesting a marginally positive but non-statistically significant relationship between overall CM experience and the frequency of seeking comfort in religion.

This trend remains consistent across specific forms of CM. For instance, physical abuse shows a minor decrease in the association after adjustment, moving from a crude RR of 1.04 (95% CI: 0.94–1.14) to an adjusted RR of 1.00 (95% CI: 0.90–1.11). Similarly, the association for sexual abuse remains largely unchanged, with the crude RR of 1.05 (95% CI: 0.79–1.39) slightly decreasing to 1.03 (95% CI: 0.87–1.23) in the adjusted model. These results indicate that experiencing physical or sexual abuse does not significantly influence the likelihood of seeking comfort in religion, and any observed associations are likely confounded by other variables.

Neglect, however, exhibits a slightly different pattern. The crude RR of 1.15 (95% CI: 1.06–1.26) indicates a stronger association with a higher frequency of seeking comfort in religion. This association diminishes substantially after adjustment, with the adjusted RR dropping to 1.04 (95% CI: 0.92–1.18), nearly reaching the null. This finding underscores the potential influence of confounding factors such as family dynamics, parental religiosity, and other social determinants, which appear to explain much of the observed relationship between neglect and seeking religious comfort.

When examining the number of co-occurring types of CM, a weak trend of increasing RRs is observed as the number of CM forms experienced increases. However, this trend does not reach statistical significance, as shown by the crude RR of 1.05 (95% CI: 0.98–1.12) and the adjusted RR of 1.01 (95% CI: 0.95–1.08). This suggests that although individuals with multiple forms of CM may be slightly more likely to seek comfort in religion, the association is not robust and is likely influenced by other underlying factors.

Sensitivity Analysis of the Association between Childhood Maltreatment (CM) and Seeking Comfort in Religion

Supplemental Table 3 presents the results of the sensitivity analysis examining the association between various forms of CM and the frequency of seeking comfort in religion, using different

sets of confounders in adjusted models. This analysis was conducted to evaluate the robustness of our findings, particularly given the small sample sizes for certain CM types, such as sexual abuse (n=38) and neglect (n=59).

For any form of CM, the crude model (Model 1) showed a weak association with seeking comfort in religion (RR = 1.05, 95% CI: 0.95 – 1.16). This association remained stable across all adjusted models, with minor fluctuations in the point estimates, such as in Model 7 (adjusted RR = 1.02, 95% CI: 0.93 – 1.11), indicating that the relationship is not sensitive to the inclusion of additional covariates.

The associations for physical abuse, sexual abuse, and the number of co-occurring CM types followed a similar pattern to that of any CM. For physical abuse, the crude RR was 1.04 (95% CI: 0.94 – 1.14) and remained consistent at 1.00 (95% CI: 0.90 – 1.11) in Model 7. Similarly, for sexual abuse, the crude RR of 1.05 (95% CI: 0.79 – 1.40) showed little change after adjustment, with an adjusted RR of 1.03 (95% CI: 0.87 – 1.23) in Model 7. The association for co-occurring CM types was also relatively stable, with a crude RR of 1.05 (95% CI: 0.98 – 1.12), which decreased slightly to 1.01 (95% CI: 0.95 – 1.08) in the fully adjusted model. These results suggest that the associations for any CM, physical abuse, sexual abuse, and co-occurring CM types are not significantly influenced by the inclusion of additional covariates, highlighting the relative robustness of these estimates.

In contrast, the association for neglect exhibited a distinct pattern. The crude model showed a modest positive association with seeking comfort in religion (RR = 1.15, 95% CI: 1.06 – 1.26). However, this association attenuated substantially across the adjusted models, with the adjusted RR dropping to 1.04 (95% CI: 0.92 – 1.18) in Model 7. This attenuation suggests that the initial crude association may have been largely explained by confounding factors such as household/parental religiosity and family structure, rather than a direct effect of neglect itself.

Gender differences in the association between CM and seeking comfort in religion

For males, the crude relative risk (RR) estimates suggest a modestly increased likelihood of frequently seeking comfort in religion among those who experienced any form of CM, including physical abuse, sexual abuse, or neglect. The strongest associations were observed for sexual abuse (RR = 1.21, 95% CI: 1.11 – 1.33) and neglect (RR = 1.21, 95% CI: 1.11 – 1.32), both of which were statistically significant. Additionally, the presence of two or more co-occurring types of CM was significantly associated with an increased likelihood of seeking comfort in religion (RR = 1.10, 95% CI: 1.02 – 1.19). After adjusting for key covariates—including sociodemographic factors, health history, and family dynamics—the associations slightly attenuated, with all adjusted RRs becoming non-significant. For example, the adjusted RR for sexual abuse decreased to 1.07 (95% CI: 0.94 – 1.22), and for neglect, it decreased to 1.12 (95% CI: 0.99 – 1.26). These changes suggest that the initial crude associations might be partially influenced by the considered confounders, such as parental religiosity and family structure.

Conversely, females exhibited a different pattern. None of the CM forms showed a significant increase in the likelihood of seeking comfort in religion in the crude analysis. Notably, physical abuse (RR = 0.91, 95% CI: 0.76 – 1.10) and any CM experience (RR = 0.95, 95% CI: 0.79 – 1.13) were associated with a lower likelihood of frequently seeking religious comfort, although these associations were not statistically significant. This suggests that, unlike males, females exposed to CM may not rely on religious comfort as a coping mechanism. After adjustment, this pattern largely persisted. For instance, the adjusted RR for any CM was 0.91 (95% CI: 0.80 – 1.05), and for physical abuse, it was 0.88 (95% CI: 0.74 – 1.04), indicating that even after accounting for potential confounders, the associations remained non-significant.

Interestingly, the adjusted RR for sexual abuse in females showed a slight increase to 1.00 (95% CI: 0.75 – 1.35), suggesting that adjustment for covariates may have altered the direction of the

association, though it remained non-significant. Additionally, for females, neglect had a crude RR of 1.09 (95% CI: 0.92 – 1.31), which decreased to 0.99 (95% CI: 0.81 – 1.21) after adjustment, further indicating that other factors likely influence the relationship between neglect and seeking religious comfort.

Table 3. Crude and adjusted Poisson Relative Risks (RR) examining the association between CM experience and seeking comfort in religion.

Exposures	Model 1 - Crude	Model 2 - Adjusted
	RR (95%CI)	RR (95%CI)
Any CM	1.05 (0.95 – 1.16)	1.02 (0.93 – 1.11)
Physical abuse	1.04 (0.94 – 1.14)	1.00* (0.90 – 1.11)
Sexual abuse	1.05 (0.79 – 1.39)	1.03** (0.87 – 1.23)
Neglect	1.15 (1.06 – 1.26)	1.04*** (0.92 – 1.18)
No. of co-occurring CM	1.05 (0.98 – 1.12)	1.01 (0.95 – 1.08)

RR = relative risk, CI = confidence interval.
Model 2: adjusted for the following: age at interview, participant's level of education, participant's marital status, participant's income, history of any chronic illness, history of any lifetime mental illness, household/parental religiosity, history of parental maladjustment, parents' divorce status, and living with a single or both biological parents.
*We also adjusted for sexual abuse and neglect, **We also adjusted for physical abuse and neglect,
***We also adjusted for physical and sexual abuse.

Table 4. Crude and adjusted Poisson Relative Risks examining the association between CM forms and finding comfort in religion by gender.

Outcomes	Model 1 - Crude	Model 2 - Adjusted
	RR (95% CI)	RR (95% CI)
Males		
Any CM	1.12 (0.99 – 1.26)	1.09 (0.97 – 1.23)
Physical abuse	1.11 (0.98 – 1.25)	1.07 (0.94 – 1.21)
Sexual abuse	1.21 (1.11 – 1.33)	1.07 (0.94 – 1.22)
Neglect	1.21 (1.11 – 1.32)	1.12 (0.99 – 1.26)
No. of co-occurring CM	1.10 (1.02 – 1.19)	1.07(0.98 – 1.15)
Females		
Any CM	0.95 (0.79 – 1.13)	0.91 (0.80 – 1.05)
Physical abuse	0.91 (0.76 – 1.10)	0.88 (0.74 – 1.04)
Sexual abuse	0.94 (0.58 – 1.54)	1.00 (0.75 – 1.35)
Neglect	1.09 (0.92 – 1.31)	0.99 (0.81 – 1.21)
No. of co-occurring CM	0.96 (0.85 – 1.09)	0.93 (0.84 – 1.03)

RR = relative risk, CI = confidence interval.

Model 2: adjusted for the following: age at interview, participant's level of education, participant's marital status, participant's income, history of any chronic illness, history of any lifetime mental illness, household/parental religiosity, history of parental maladjustment, parents' divorce status, and living with a single or both biological parents.

[*] We also adjusted for sexual abuse and neglect, [**] We also adjusted for physical abuse and neglect,

[***] We also adjusted for physical and sexual abuse.

Discussion

This study aims to leverage data from the SNMHS to investigate the independent associations between CM experiences collectively, individually, as well as cumulatively, and the frequency of seeking comfort in religion during adulthood, as a psychosocial means of improving mental health and behavioral outcomes in a nationally representative sample of Saudi adults. This is the first population-based study in SA and one of the very few studies that examine the relationship between CM and religious coping in a non-Western, Muslim-majority context, like SA. The main findings in our study are: 1) contrary to our hypothesis, we found no significant positive association between CM experiences and frequency of seeking religious comfort. 2) there was no significant gender differences in the association between CM and frequency of seeking comfort in religion.

Our data did not show a significant association between CM experiences and the frequency seeking religious comfort in adulthood. This finding is inconsistent with our hypothesis, anticipating increased risk for frequent religious comfort seeking behavior. This in turn suggests that CM experiences may not significantly impact how Saudi households perceive God and their overall religiosity in adulthood. Our finding do not support neither negate either of the two theories, [141] proposing two opposing coping behaviors following exposure to CM: 1) blaming God for the abuse, resulting in reduced religiosity and potentially complete alienation, 2) turning to God to seek comfort, solace and meaning through religious activities, resulting in increased religiosity. The Western literature on Judeo-Christian denominations examining the changes in religiosity during and after CM experiences reported mixed findings, with more studies indicating reduced religiosity.[210,211] (see Walker et el. for a review). Our findings align with Western research that found no direct links between CM experiences and adult religiosity and speirituality.[81,212] Specifically, our findings align with Bierman's study on a nationally representative U.S. adult sample, which found no significant impact of maternal abuse on increased adult religiosity and no gender differences in that association.[81] However, Bierman identified a significant negative

association when fathers were the abusers, suggesting that the abuser's gender could influence religiosity trajectories into adulthood, a factor that may hold particular relevance in Saudi culture due to distinct gender socialization. However, due to the lack of detailed information on the gender of CM perpetrator, we were unable to investigate this in greater depth in our study.

Similar studies in SA and the Middle East are almost nonexistent, which hindered meaningful comparisons with more relevant literature for better and more nuanced understanding of the findings at hand. Nonetheless, we identified a contrasting trend in a study conducted among Muslim college students in Afghanistan.[81] This study revealed that individuals who had suffered childhood abuse, particularly sexual, exhibited lower levels of religiosity and spirituality, and were less inclined towards positive religious coping in adulthood. Such findings are in stark contrast to the weak positive association our study has suggested. This discrepancy could be attributed to several factors: The Afghan study focused on Muslim university students in Afghanistan, while our study is based on Saudi households. Both contexts are deeply religious, but cultural and societal norms may influence how religious coping is reported and understood. For example, geopolitical differences between Afghanistan and SA are significant. Unlike SA, Afghanistan has faced prolonged periods of both external and internal conflicts, involving Islamic factions with ultra-conservative interpretations of Islamic laws and teachings. Additionally, the Afghan study specifically looked at childhood sexual abuse, whereas our study examined various forms of CM, including physical abuse and neglect. Therefore, our study provides a valuable contribution to the literature by expanding on previous research through examining multiple forms of CM using a larger sample size of Arab Muslim participants in a different cultural setting than those previously studied. This broader approach allows for a more comprehensive understanding of the role CM experiences on the Saudi Muslim households' behavior of seeking comfort in religion. Indeed, more studies on the links between religiosity and CM experiences across different populations and cultures are needed for a better understanding of the interplay between culture, CM experiences, and religiosity.

Research findings from studies addressing various types of stressors and trauma –including physical and mental illness,[213] living in war zones, and loss of loved one— among different sample from multiple sittings in SA[40,44,214] and other regional countries like Palestine,[154,215] Iran,[95] and Pakistan[216-218] consistently report significantly increased reliance on positive religious coping strategies,[41] that correlated positively with overall well-being.[213] This suggests that Muslims generally maintain positive perceptions of God, seeing Him as caring and benevolent, which encourages them to turn to God in times of need regardless of the nature of the trauma or stressful event. In other words, our study suggests that the reported religious coping behavior is not specific to CM and neglect experiences. As such, the majority of participants, more than 84%, reported frequently seeking comfort in religion, regardless of their CM exposure status. Additionally, although crude estimates for neglect and experiencing multiple forms of CM initially showed a significant association with seeking religious comfort more frequently, this significance disappeared after adjusting for personal and family-related confounders. These findings do not support research suggesting that specific types of CM impact adult religiosity and spirituality differently or that there is a dose-response relationship between CM and adult religiosity.[219] A possible explanation for this discrepancy could be the different tools used to measure CM experiences in our study compared to others. Additionally, our study focused on religiosity, while the other study examined spirituality, which, although related, are distinct concepts. This lack of specificity in our study suggests that religiosity in this context may be more reflective of deeply ingrained religious beliefs, cultural norms, and daily practices rather than solely being a coping mechanism for past trauma. Therefore, therapists, healthcare professionals, and policymakers should strongly leverage religious coping mechanisms to improve mental health outcomes and overall well-being.

The sensitivity analysis conducted in this study further supports the robustness of these main findings, despite the small sample sizes for certain CM types (e.g., sexual abuse, n=38; neglect,

n=59). We observed that for any CM, physical abuse, sexual abuse, and the number of co-occurring CM types, the associations with seeking comfort in religion were consistently weak and non-significant, even after adjusting for various sets of confounders such as socioeconomic status, parental characteristics, and mental and physical health conditions. This stability suggests that the inclusion of additional covariates did not meaningfully alter the observed relationships, indicating that the associations are not heavily confounded by other variables.

The similar trends for any CM, physical abuse, sexual abuse, and co-occurring CM types may indicate shared pathways through which these experiences influence adult behaviors. It is possible that these forms of maltreatment contribute to a generalized coping response that manifests as seeking comfort in religion, regardless of the specific nature or combination of CM types. This observation aligns with the notion that religious coping may serve as a common, culturally acceptable strategy for managing the long-term effects of childhood adversity in Saudi households.

However, the sensitivity analysis revealed a relatively distinct pattern for neglect, where the initial positive association observed in the crude model attenuated notably after adjusting for confounders such as household/parental religiosity and parental maladjustment. This attenuation suggests that family context and religious upbringing play a significant role in shaping the relationship between neglect and religious coping, and the initial association may have been confounded by these factors.

One possible explanation for the lack of association between CM and religious comfort could be the time gap between when the abuse occurred and when the data were collected. In our study, the majority of participants were in their mid 20 and 30s, suggesting that their experiences of maltreatment likely occurred many years before the survey was conducted. It is possible that individuals may initially turn to religion as a coping mechanism during childhood or adolescence

following maltreatment, but these effects may not persist into adulthood. Additionally, considering that physical abuse was the most commonly reported type of CM in our study, it is possible that this reported abuse during childhood was not severe enough to require coping mechanisms into adulthood. Especially that survey participants may have reported mild physical punishment, that was often seen as a normative and commonly used method of discipline around the time the participants were children,[77] rather than actual physical abuse. This is because the survey questions assessing physical abuse were derived from Western-developed questionnaires with a significantly lower threshold for what constitutes physical abuse and were not adequately culturally adapted to reflect the meaning of abuse in the Saudi context. Specifically, the questions listed a limited range of typical forms of physical punishment without clarifying whether they resulted in psychological or physical harm, such as bruises, cuts, bleeding, or falls, which were likely the perceived definition of physical abuse at that time. Additionally, there was no formal, clear definition of CM in SA, and even after the establishment of the Child Protection Law in 2014,[220] the definition of physical abuse remains vague. This lack of clarity might have led participants to report mild physical punishment experiences, rather than severe abuse, which may not necessarily require emotional coping or result in negative feeling towards religion.

Contrary to our expectations, our analysis revealed no significant gender differences in the association between CM and finding comfort in religion. This suggests that both men and women may reflect comparable levels of religiosity in general when it comes to coping with stressful life events, regardless of their CM exposure status. Our findings diverge from research on Saudi hemodialysis patients, which indicated that males were more religious than females,[40] and studies on infertile men and women, which found that women reported higher religiosity in terms of using religious coping compared to men.[42] This discrepancy could be explained by variations in how religiosity and religious coping were measured across studies, which can lead to differing findings. Additionally, the early life nature of CM might have led our study

participants to resort to religious coping during childhood and adolescence, but not adulthood. This contrasts with chronic illnesses and infertility, which often occur later in life and may prompt individuals to seek continuous religious comfort. Most importantly, cultural norms and societal expectations in SA may shape how men and women engage with their faith in response to different stressors. Further research is needed to explore these factors in more detail to provide a nuanced understanding of how gender, type of stressor, and cultural context interact to shape religious coping behaviors in SA. Despite these discrepancies, our finding aligns with previous research indicating no significant gender differences in religiosity in Muslim countries overall, and in the context of coping with mental health stressors in particular.[121,207,221] According to Pew research center that conducted studies on "the Gender Gap in Religion Around the World" including over 80 countries, Muslim men and women display similar levels of religious commitment across most measures. The notable exception is the frequency of attendance at worship services, where Muslim men attend mosque services more frequently than Muslim women due to religious norms.

Despite the absence of significant gender differences in our main association of interest in this study, we noticed that the direction of the observed association, albeit very weak (ranging from RR of 0.72 to 1.21), was not as we had hypothesized. That is, our study suggests that Saudi male households who were exposed to CM or neglect seemed to be more likely to seek comfort in religion, as opposed to women. Random error might account for the inconsistently observed trend in the females' effect estimates. This is suggested by the considerable variation in the female sample, as reflected by the notably wider confidence intervals relative to those of males. The variation could be due to smaller sample sizes or greater heterogeneity within the female group, which introduces more variability and less precision in the estimates. Another potential explanation is that public religious practices might be perceived as prestigious for Muslim men, providing social status and community acceptance, resulting in increased religiosity and reporting of religious activities.

Strength and limitations

This study leverages data from Saudi Arabia's most extensive national survey on mental health and its correlates to date. To the best of our knowledge, this research stands as the first population-based investigation focusing on the independent association between CM experiences and religious comfort-seeking behavior in SA, a topic that is rarely investigated in SA and the ME region due to cultural sensitivities. This research is the first of its kind to draw on data from a nationally representative survey of Saudi households, utilizing probability sampling and a complex survey framework to achieve accurate representation and inform future research and policy initiatives. The study contributes to the severely limited local and regional literature on CM and psycho-social research and offers a basis for future investigations in SA in this field. Our findings clearly indicate that CM and neglect experiences do not significantly influence religious coping behavior or overall religiosity levels in Saudi households, both men and women. This finding reinforces the prevailing notion that religion is beneficial for mental health and overall well-being. Therefore, efforts should continue to harness religion and religiosity as preventive and coping mechanisms for CM and consequent mental illness.

Our study acknowledges several limitations. A significant challenge is the generalizability of our findings to the broader Saudi population due to differences in demographic and socioeconomic characteristics between our study sample and national census data from 2010 and 2022. For example, while females constituted nearly half of the total population in our study and in earlier censuses, they represented only one-third of those reporting any type of abuse and specifically physical abuse in our study. Conversely, females comprised 61% of those reporting sexual abuse. Additionally, the prevalence of individuals who had ever received public assistance was notably higher among those reporting sexual abuse (23.68%), neglect (24.14%), and multiple forms of CM (24.56%), compared to the total study population (16.67%) and the 2010 national average (13%) upon which our survey weights were based. Furthermore, the socioeconomic landscape in SA has shifted significantly, with the proportion of low-income individuals decreasing from

40% in 2010 to 30% in 2022, and high-income individuals increasing from 15% to 20%. Educational attainment has also improved, with those holding a university degree or higher rising from 30% in 2010 to 40% in 2022. These changes suggest that our study population may not fully capture the current socioeconomic and educational distribution, potentially influencing the outcomes and limiting their applicability to the contemporary Saudi context. This discrepancy underscores the need for caution when extrapolating our findings to the general population and highlights the importance of using updated data for future research.

Another significant limitation of this study is the small sample sizes for specific types of CM, particularly for sexual abuse (n=38) and neglect (n=59). These small cell sizes pose challenges in multivariable modeling, such as reduced statistical power, increased variability in the estimates, and difficulties in adequately adjusting for confounding factors. The limited sample sizes can lead to imprecise effect estimates and wider confidence intervals, as seen in the sensitivity analysis results, which may obscure true associations or produce unstable estimates that hinder the interpretation of findings. Additionally, the presence of small cell sizes may prevent models from converging, resulting in convergence failures or biased estimates, particularly when examining subgroups or interaction effects as you will see in the study for Aim 3. The small sample sizes for sexual abuse and neglect limit our ability to draw definitive conclusions about the relationships between these forms of CM and seeking comfort in religion in adulthood. The lack of statistically significant associations in some cases may not necessarily indicate the absence of a relationship but rather reflect a lack of statistical power due to the small number of cases. This constraint emphasizes the need for cautious interpretation of the results and highlights the importance of considering sample size limitations when designing and analyzing similar studies in the future.

From a public health research perspective, the findings suggest that small samples for less common forms of CM such as sexual abuse and neglect can make it difficult to produce reliable

estimates, which has direct implications for evidence-based policy and program development. It underscores the importance of using larger datasets, conducting pooled analyses (like we did when we collapsed all types of CM under one variable assessing having had experienced any form of CM or the number of co-occurring CM), or utilizing alternative statistical methods such as Bayesian modeling to obtain more robust and reliable estimates in studies with similar constraints.

In the context of public health practice, these limitations indicate that interventions and resources may need to be tailored and prioritized based on the prevalence and distribution of CM types within the population. Policymakers and healthcare providers should recognize that the low number of reported cases does not imply a lack of need for targeted support services. Instead, our findings call for more comprehensive data collection strategies and a focus on identifying and supporting individuals who have experienced rarer forms of maltreatment, even when these groups are underrepresented in research.

Despite our efforts to adjust for a key confounders, several sources of residual confounding may persist, potentially biasing our findings. For example, Religiosity wasn't adequately measured in the survey. Positive religious coping, which includes our outcome of finding comfort in religion, wasn't measured using a validated tool for Muslims, thus lacking comprehensive measurement. Additionally, measures for negative religious coping were entirely missing from the survey, further limiting the understanding of the full spectrum of religious coping behaviors.

The identity of the abuser, whether maternal or paternal, was not documented for all types of CM and neglect. Western research on Christian populations indicates that those maltreated by their fathers exhibit significantly decreased levels of religiosity in adulthood.[81,144] This may be due to viewing God as a father figure, resulting in reduced religiosity and potential alienation. Conversely, individuals maltreated by their mothers often show increased religiosity, potentially

as a way to compensate for the absence of a caretaker figure in their lives. It would be valuable to investigate whether these patterns also hold true in Muslim populations.

Social desirability bias is a potential issue, likely to have contributed to the lower reported prevalence of CM experiences in our sample. This bias may arise because reporting instances of CM might be viewed as shameful and stigmatizing by participants and their families, influencing participants to respond in a way that reflects more favorably on them and their families, especially given the collectivistic nature of the Saudi culture.[96,222] Furthermore, our sample exhibits considerable homogeneity regarding our primary outcome of interest. This is expected, given the central role of religion in the everyday life of Saudis. This context, as explained earlier, could account for the high frequency of reported religious comfort-seeking behavior and might also suggest a potential social desirability bias. Specifically, individuals who are not particularly religious might still report frequent religious coping to align with cultural norms and present themselves more favorably.

Lastly, the survey data were collected before the major economic and social reforms driven by Vision 2030 were implemented. The Vision plan, launched in 2016, aims to diversify the economy, enhance social development, and promote cultural and religious openness. These reforms include increased women's rights, improved access to education, and expanded economic opportunities, all of which could influence societal behaviors and attitudes, including those related to CM and religious practices. Consequently, our findings may not fully capture the current context and the impact of these reforms on CM experiences and religiosity in SA.

Conclusion

Our study investigated the association between CM experiences and the frequency of finding comfort in religion in adulthood among a nationally representative sample of Saudi households. The analysis did not find a significant association nor gender differences between CM

experiences and increased frequency of seeking religious comfort. This suggests that CM experiences might not significantly influence perceptions of God or overall religiosity among Saudi adults, potentially due to deeply ingrained cultural and religious practices that promote religious comfort-seeking behavior regardless of CM exposure.

These findings hold significant implications for shaping policies and programs in SA. Better integration of religious and cultural elements into mental health and child welfare services could enhance their effectiveness. Mental health professionals and social workers should collaborate with religious leaders to promote positive coping strategies rooted in Islamic values, emphasizing compassion, empathy, and resilience. Religious leaders can utilize events like Friday or Eid sermons to convey these messages, ensuring that the community receives consistent and culturally resonant guidance on coping with childhood adversities. To address the vagueness in the definitions of CM, particularly physical abuse, within existing laws, policymakers should work towards clear, comprehensive legislation that outlines specific behaviors constituting CM. This can help in better identification, reporting, and intervention.

Our study underscores the need to address cultural norms and misconceptions that may influence religious coping and mental health outcomes. Misinterpreted religious teachings that justify harsh discipline or neglect, and the underreporting of certain types of abuse, remain significant challenges. Resources should be allocated toward nationwide campaigns to raise awareness about these misconceptions and their detrimental impacts on individuals' well-being throughout their life course. Educational programs in schools, community centers, and online platforms should focus on promoting positive coping mechanisms and highlighting the harmful effects of maladaptive coping strategies.

For researchers, conducting longitudinal studies to understand the long-term impact of CM on mental health and religiosity is essential. This can help in establishing causal relationships and

identifying critical periods for intervention. Implementing qualitative research to gain deeper insights into the experiences of CM victims and their coping mechanisms can provide a more nuanced understanding of how religiosity and culture intersect with CM. Researchers should also compare findings from SA with other cultural contexts to understand the unique and common factors influencing CM and religiosity, aiding in the development of universally applicable and culturally specific interventions. Encouraging interdisciplinary research that combines insights from sociology, psychology, religious studies, and public health can uncover the multifaceted nature of CM and its impacts. Systematically evaluating the effectiveness of current child protection and mental health programs can help identify best practices and areas needing improvement, ensuring interventions are evidence-based and effective. Future research should focus on understudied populations within SA, such as rural communities or marginalized groups, to ensure findings and interventions are inclusive and representative. Such studies would contribute to a more comprehensive understanding of the interplay between religiosity, cultural norms, and CM, ultimately informing more effective prevention and intervention strategies.

In conclusion, our study highlights the complex interplay between CM and religiosity within the Saudi cultural context, offering valuable insights for both policymakers and researchers. By integrating cultural sensitivity into interventions, strengthening legal frameworks, and conducting comprehensive research, we can better understand and address the impact of CM on mental health and religiosity, ultimately fostering a healthier, more supportive environment for all children and families in Saudi Arabia.

Supplemental table 1. Collinearity assessment

	VIF				
Exposure / Variables	Any CM	Physical abuse	Sexual abuse	Neglect	No. of co-occurring CM
Main exposure	1.15	1.20	1.04	1.13	1.19
Age at interview					
18 – 25	-	-	-	-	-
26 – 35	2.21	2.21	2.21	2.21	2.21
36 – 50	2.56	2.57	2.57	2.57	2.56
51 – 65	1.86	1.86	1.86	1.86	1.86
Participant's education					
Collage or more	1.07	1.08	1.08	1.08	1.07
Income					
Low	-	-	-	-	-
Low average	2.18	1.16	1.16	1.16	1.15
High average	1.26	1.22	1.22	1.22	1.22
High	1.38	1.41	1.41	1.41	1.41
Marital status					
Never married	-	1.93	1.93	1.93	1.93
Married	2.18	-	-	-	-
Divorced/separated	1.26	1.06	1.06	1.06	1.06
Widowed	1.38	1.12	1.12	1.12	1.12
Any chronic illness (Yes)	1.04	1.05	1.05	1.05	1.05
Any Mental illness (Yes)	1.16	1.16	1.16	1.16	1.16
Household/parental religiosity					
Highly religious	1.02	1.02	1.02	1.02	1.02
parental maladjustment (Yes)	1.17	1.20	1.20	1.20	1.19
Parents divorced (Yes)	1.40	1.40	1.40	1.40	1.40
Living with biological parents (Yes)	1.41	1.42	1.42	1.42	1.41
Physical abuse (Yes)	-	-	1.20	1.20	-
Sexual abuse (Yes)	-	1.04	-	1.04	-
Neglect (Yes)	-	1.13	1.13	-	-
Mean VIF	1.46	1.38	1.38	1.38	142

Supplemental table 2: Cell sizes for sexual abuse and neglect by any depressive and anxiety disorders and groups of seeking comfort in religion.

	Any depressive disorders	Any anxiety disorders
Frequently seeking comfort in religion	**N**	**N**
Sexual abuse	12	9
Neglect	8	13
Rarely seeking comfort in religion		
Sexual abuse	0	1
Neglect	0	1

Supplemental Table 3. Sensitivity analysis of the adjusted Poisson Relative Risks (RR) examining the association between child maltreatment and seeking comfort in religion using different sets of confounders.

Exposure	Any CM	Physical abuse	Sexual abuse	Neglect	No. of co-occurring CM
Model	**RR (95%CI)**	**RR (95%CI)**	**RR (95%CI)**	**RR (95%CI)**	**RR (95%CI)**
Model 1 – crude	1.05 (0.95 – 1.16)	1.04 (0.94 – 1.14)	1.05 (0.79 – 1.40)	1.15 (1.06 – 1.26)	1.05 (0.98 – 1.12)
Model 2	1.05 (0.95 – 1.16)	1.03 (0.93 – 1.14)	1.05 (0.80 – 1.39)	1.12 (1.01 – 1.23)	1.05 (0.98 – 1.12)
Model 3	1.03 (0.93 – 1.13)	1.01 (0.91 – 1.12)	1.02 (0.78 – 1.33)	1.09 (0.98 – 1.21)	1.03 (0.96 – 1.09)
Model 4	1.02 (0.92 – 1.12)	1.00 (0.90 – 1.12)	1.00 (0.76 – 1.31)	1.08 (0.97 – 1.20)	1.02 (0.96 – 1.09)
Model 5	1.03 (0.94 – 1.13)	1.01 (0.92 – 1.12)	1.04 (0.87 – 1.24)	1.07 (0.96 – 1.19)	1.03 (0.97 – 1.09)
Model 6	1.02 (0.93 – 1.12)	1.00 (0.90 – 1.11)	1.03 (0.87 – 1.23)	1.06 (0.94 – 1.18)	1.02 (0.95 – 1.08)
Model 7	1.02 (0.93 – 1.11)	1.00 (0.90 – 1.11)	1.03 (0 .87 – 1.23)	1.04 (0.92 – 1.18)	1.01 (0.95 – 1.08)

Model 1: crude
Model 2: adjusted for: age at interview, participant's level of education, participant's income.
Model 3: same as model 2 + any lifetime mental illness
Model 4: same as model 3 + any chronic illness
Model 5: same as model 4 + household/parental religiosity
Model 6: same as model 5 + history of parental maladjustment
Model 7: same as model 6 + parents' divorce status, and living with a single or both biological parents.

CHAPTER 4
The Association between Child Maltreatment and Adult-Onset Depression and Anxiety Disorders and the Moderating Role of Religiosity among a Nationally Representative Sample of Saudi Households

Introduction

Childhood maltreatment (CM), which includes physical, emotional, sexual abuse, and neglect, often occurs during critical developmental periods from early childhood to adolescence and is linked to adverse health outcomes in adulthood.[60,100] CM significantly increases the risk of adult mental health disorders such as depression and anxiety.[60,100] A wealth of research has examined the impact of CM on mental illness globally.[100,145,146,223] For instance, Kessler and colleagues explored the relationships between 12 childhood adversities, including various forms of CM and neglect, and the first onset of common mental disorders across 21 countries. The findings highlighted that maladaptive family dynamics, specifically parental mental illness, child abuse, and neglect, were consistent predictors of various mental disorders, including mood, anxiety, behavior, and substance disorders across all life-course stages. Further, Hughes and systematically reviewed 37 observational studies on the impact of multiple adverse childhood experiences (ACEs) on adult health and found that individuals with four or more ACEs were at a substantially increased risk for all examined health outcomes, particularly mental illnesses, compared to those with no ACEs.[100] Another systematic review and meta-analysis by Li and colleagues on CM's long-term effects showed that any form of maltreatment significantly raised the odds of developing adult depression (OR=2.03, [95% CI 1.37–3.01]) and anxiety (OR=2.70, [95% CI 2.10–3.47]), with sexual abuse being the most damaging, followed by physical abuse and neglect. They estimated that over half of global depression and anxiety cases could be attributed to CM.[145] These findings underscore the profound impact of CM on mental health and the critical need for effective prevention and treatment

strategies globally, as reinforced by Gardner and colleagues in a recent systematic review and meta-analysis focusing on population-based samples.[146]

In Saudi Arabia (SA), only a limited number of studies have investigated the relationship between CM and adult-onset depression and anxiety. Almuneef and colleagues reported that Saudi adults with four or more ACEs had nearly five times higher odds of depression compared to those with no exposure to ACEs.[33] The study also examined gender differences in the impact of ACEs on adult mental health, finding that women with four or more ACEs had the highest likelihood of developing internalizing disorders, particularly depression and anxiety, compared to those who reported no exposure to ACEs. In contrast, men were more likely to experience externalizing disorders, such as drug and alcohol abuse. In a follow-up report examining child sexual abuse (CSA) specifically, Almuneef found that individuals who reported CSA had higher odds of adult depression, anxiety, and other mental illnesses compared to those who did not report CSA.[147] Other forms of CM have not been assessed for their unique effects on adult depression and anxiety among Saudi individuals. Although these findings are concerning, they may underestimate the true impact of CM on adult mental health due to several methodological limitations. For instance, Almuneef and colleagues assessed only previously diagnosed anxiety and depression among the sample participants, which could lead to underreporting. Additionally, the convenience sampling approach may result in selection bias by systematically excluding relevant populations, such as individuals with disabilities. Furthermore, the investigators did not account for design effects in their analyses thereby challenging the reliability of their findings. More nationally representative studies are needed to address these limitations and produce more reliable estimates.

The moderating effect of religion on various physical, social, and psychological stressful events, including its role as a positive coping mechanism during times of distress, is well-documented in the literature.[148] However, empirical research exploring the intersection between CM, religion, and mental health remains limited.[144,149,150] For instance, Gall and colleagues found in their study of 101 men and women survivors of CSA that those who believed in a benevolent God were less likely to exhibit negative moods.[150] Similarly, Dervic and colleagues analyzed 119 depressed inpatients who had experienced childhood abuse and found that religious beliefs were associated with a reduced likelihood of suicidal ideation.[149] More recently, a study demonstrated that religious salience—defined as the relative importance of religion in one's life[151] —buffered the adverse effects of CM on emotional well-being over time.[144] However, these studies primarily focus on Judeo-Christian denominations within Western societies, limiting the generalizability of their findings to other religions and cultures.

Research in the Muslim world is even scarcer and mostly involving population affected by geopolitical conflicts. Ghorbani and colleagues, for example, studied 200 Afghani university students, including 122 who had experienced CSA. They found that individuals who suffered from such abuse reported lower levels of religiosity and spirituality and engaged less in positive religious coping than those who did not experience abuse. Their analysis further revealed that, after controlling for negative religious coping—defined as strategies involving tension, conflict, or struggles with a higher power or religious community[153]—positive religious coping, which promotes a connection with a higher power and a supportive religious community[153], was associated with better mental health.[152] This underscores the importance of how religious beliefs are framed and the types of religious coping mechanisms used. Additionally, Abu-Raiya and Jamal's study of 132 Israeli-Muslims who had lost a loved one showed a positive correlation between positive religious coping and both life satisfaction and positive affect,

highlighting the potential benefits of effective religious coping mechanisms in dealing with profound personal loss.[154] These findings collectively highlight the generally positive impact of religious beliefs and coping mechanisms on the psychiatric consequences of CM and trauma in general, indicating a crucial area for further research and application in diverse cultural contexts.

However, it is unclear whether those findings on the role of religious coping on mental illness still hold for all types of stressors, including the different forms of CM and neglect. It is also unclear if they hold for prevalent adult mental illnesses, such anxiety and depressive disorders. Additionally, the studies conducted to date, despite having been conducted in highly religious Muslim populations, were mainly conducted in areas plagued with longstanding internal conflicts and were therefore also experiencing heightened daily stressors, rendering it difficult to generalize the results to other Muslim communities with more stable geopolitical climates such as that in SA.

For the aforementioned reasons, we aim to investigate the independent associations between CM experiences and the onset of adult depressive and anxiety disorders, utilizing nationally representative data from the Saudi National Mental Health Survey (SNMHS). This survey was rigorously conducted, accounting for complex survey design, and included individuals with disabilities, who were often overlooked in previous surveys investigating CM and mental illnesses. Additionally, this survey is the only one to date that collected data on certain religious aspects relevant to mental illness, allowing us to examine how the frequency of seeking comfort in religion may moderate the associations of interest. Our hypotheses are twofold: 1) CM is positively associated with the development of adult-onset depressive and anxiety disorders, and 2) those who frequently seek and derive comfort from religious practices will exhibit lower risk estimates for these disorders. By identifying and understanding these relationships, our

findings could contribute to enriching the local and reginal literature in this area of study, increase our understanding of the relationship at hand, and inform more targeted interventions to enhance the effectiveness of mental health prevention and treatment strategies for the Saudi Muslim population.

Methods

Sampling and participants

The SNMHS is a part of the World Health Organization's (WHO) World Mental Health (WMH) survey initiative.[163] The SNMHS is a nationally representative survey of Arabic-speaking Saudi households between the ages of 15 and 65 from 11 out of 13 administrative areas in SA.[163] Two Southern areas, Jazan and Najran, were excluded due to security concerns as a result of the political conflict along the Saudi-Yemeni borders at the time of the survey. The survey was conducted face-to-face through trained interviewers from 2011 through 2016 using a computer-assisted personal interview (CAPI) mode and an audio computer-assisted self-interviewing (ACASI) methods for specific sensitive sections.[163] A multistage clustered probability sampling was employed based on the 2010 Saudi population census from the General Authority for Statistics. The sampling and weight creation were described in detail elsewhere.[164] One male and one female from each household were selected across primary sampling units within the 11 distinct strata. The survey instrument was divided into two parts: (Part I) involved sections on core Mental Health Disorders (MHD) and was administered to all participants (N=4,004), while (Part II) included a subset of (Part I) to address additional, non-core sections and a wide range of related determinants of mental health (N=1,981). This subset included two groups: all individuals who reported any core MHD in PART I, and a probability subsample of those who did not report any MHDs in the core sections (selected with a 0.25 probability). Specific weights were developed for both parts I and II,

taking into account the intricacies of the multistage and individual-weight sampling procedures.[163]

Our analyses were restricted to participants aged 18 years and older to ensure comparability with a companion article, which records relevant study outcomes among adults. This is in line with our adoption of a life-course approach to investigate the relationship between childhood exposures and adult outcomes. The final analytic sample for this study was drawn from Part II (N=1,793) participants as Part I didn't address relevant determinants of mental health, and thus only weights for Part II were applied in our analyses. Written informed consent was obtained in written form prior to the interviews. All procedures regarding the fieldwork and consent were approved by the Institutional Review Board committee at the King Faisal Specialist Hospital & Research Centre in Riyadh (RAC#: 2091093).[163]

Instruments

Similar to other World Mental Health (WMH) surveys, the Saudi National Mental Health Survey (SNMHS) employed the third version of the World Health Organization's Composite International Diagnostic Interview (CIDI).[163] The CIDI, a fully structured survey instrument widely utilized in community surveys, implements a stem-branch technique to determine both lifetime and 12-month prevalence of various MHDs. For the Saudi context, the CIDI 3.0 underwent translation, adaptation, and preliminary testing specific to the Saudi population.[165] Additionally, certain sections were incorporated into the Saudi version of CIDI 3.0 to gather data relevant to the local context, including aspects like religiosity, polygamy, and attitudes towards alcohol consumption. The survey, conducted by trained lay interviewers, primarily used CAPI as well as ACASI methods for specific sensitive sections such as those concerning substance and alcohol use. In the SNMHS, mental health diagnoses were derived from the CIDI 3.0 data using the criteria of the

Diagnostic and Statistical Manual for Mental Disorders, fourth edition (DSM-IV)[163], to enable comparison of the findings with other WMH survey results.

Measures

Exposure

The primary exposure for this study are the three forms of child maltreatment as measured individually (physical maltreatment, sexual maltreatment, neglect), globally (any form of child maltreatment), and in terms of number of co-occurring forms of child maltreatment experienced. These outcomes were measured as part of the SNMHS family-related ACEs measure.

Physical abuse was assessed by asking participants, "When you were growing up, how often did someone in your household do any of the things (on list A) to you?" List A included: pushed, grabbed or shoved, threw something, slapped or hit. Responses were recorded on a 4-point Likert scale (often, sometimes, rarely, never). We operationalized this variable as binary (yes, no), categorizing those who reported "never" as not having experienced physical abuse, while those who reported otherwise were considered to have experienced it. Those who reported "don't know" or "refused" were treated as missing values.

Sexual abuse was assessed with questions about experiencing rape or sexual assault under the age of 18 and having this occur three or more times. This was the only ACE where the survey did not collect information on the perpetrator's identity in terms of being a family member or a stranger. We operationalized this measure as a binary variable, classifying those who reported "never having been raped or sexually assaulted under the age of 18" as not having experienced sexual abuse, while those who reported otherwise were considered to have experienced it.

Neglect was assessed with questions about the frequency of not having adequate food, clothing, or medical care, receiving inadequate supervision, and having to perform age-inappropriate chores. Similar to physical abuse, neglect responses were recoded on a 4-point Likert scale (often, sometimes, rarely, never). We operationalized this variable as binary (yes, no), classifying those who reported "never" or "rarely" as not having experienced neglect, while those who reported otherwise were considered to have experienced it.

The aforementioned measures were assessed using questions adapted from scales and instruments that had been validated in prior studies. However, these questions had not been specifically validated for the study population of the SNMHS.

Outcomes

The primary outcomes are first onset of adult lifetime anxiety and depressive disorders measured using the CIDI 3.0. The anxiety disorder outcome is composite variable that included any of the following anxiety disorders: panic disorder, agoraphobia without panic disorder, social phobia, generalized anxiety disorder, post-traumatic stress disorder, obsessive–compulsive disorder, and separation anxiety disorder, and age of onset of the earliest onset of any of these anxiety disorders will be considered the time to onset. Similarly, the depressive disorders outcome is a composite variable that included any of the following mood disorders: major depressive disorder, bipolar I disorder and bipolar II disorder. The earliest age of onset of any of these mood disorders will be considered the time to onset. Both anxiety and depressive disorders variables will be operationalized as binary (yes, no).

Covariates

Effect modifier

We examined the participant's level of comfort in religion as a potential effect modifier. This measure was assessed by asking participants, "When you have problems or difficulties in your family, work, or personal life, how often do you seek comfort through religious or spiritual means, such as praying, meditating, attending a religious or spiritual service, or talking to a religious or spiritual?" Responses were coded on a 4-point Likert scale (often, sometimes, rarely, never). We operationalized this variable as binary (yes, no), such that those who reported "rarely" or "never" are considered to have low levels of comfort in religion, while those who reported otherwise are considered to have a higher level of comfort in religion. Those who reported "don't know" or "refused" will be treated as missing values.

Confounders

On the basis of prior literature, theoretical links, and data availability,[32,126,155] we controlled for several personal and family-related confounders linked to experiences of CM and anxiety and depressive disorders. We included the age at interview in years to account for potential recall bias and generational differences, participants' gender (male, female), marital status, educational attainment, income level and history of any chronic illness, household/parental religiosity, history of parental maladjustment. We also adjusted for depressive disorders in models where anxiety is the outcome, and vice versa, due to the highly comorbid nature of both disorders.

Participants' marital status was categorized as Married, Never Married, Separated/Divorced and Widowed. Educational attainment was assessed by asking respondents about the number of years of school they have completed. Reponses ranged from 0 to 16 years or more. We categorized the responses of 12 years or less as having completed high school or less, and responses beyond 12 years as having a college degree

or more. Income was assessed as a ratio of income per capita to the median of the sample, the income per capita is a composite variable that synthesizes the personal income, spouse's income, and family's income. The income was classified as (low if the ratio is below 0.5, low-average if between 0.5 and 1, high- average if between 1.1 to 2, and high if the ratio is bigger than 2). History of any chronic illnesses was assessed by asking participants if they have any chronic conditions, including cancer, arthritis or rheumatism, chronic back or neck problems, headaches, any other chronic pain, high blood pressure, heart disease, asthma, any other chronic lung disease, like COPD, tuberculosis or emphysema. The variable was operationalized as binary (yes if the participant responded affirmatively, no if responded otherwise).

As for the family back ground indicators, household religiosity is used as a proxy for parental religiosity during childhood as offspring's religiosity positively correlates with perceived parental religiosity.[86,166] Parental religiosity during the respondent's childhood was assessed in the survey by asking participants a single question: "How religious was your household when you were a child?" and recorded on a 4-point Likert scale (very religious, somewhat religious, not very religious, and not at all religious). In our study, we operationalized this variable as binary, with two categories: highly religious or weakly religious. Participants who reported being "very religious" or "somewhat religious" were classified as highly religious, while those who reported "not very religious" or "not at all religious" were classified as weakly religious. "Don't know" and "refused" responses were treated as missing values. Parental maladjustment was assessed by asking respondents about three elements: history of family violence, symptoms of parental mental illness during respondents' childhood (particularly for depression, anxiety and panic disorders), and if the father had alcohol drinking or substance use problems. If the respondent affirmatively reported one of the previous parental maladjusted elements, we recorded that as "yes", and "no" if reported otherwise.

Statistical Analysis

We included the sample from the part II non-core section of the SNMHS as some anxiety disorders and all of the sociodemographic and relevant determinants of mental health were not included in part I. All study analyses took survey design effects and weights for part II into account using STATA 18 survey analysis functions (syv).[170]

Descriptive analyses

We described the sociodemographic characteristics of the study population as a whole and by CM types collectively and individually for part II using means and standard deviations (SD) for continuous variables, and unweighted frequencies and weighted percentages for categorical ones. Standard errors (SE) were also estimated and presented for all types of variables. The results are reported in the previous chapter for Aim 2. After that, we presented the unweighted frequencies, weighted prevalences, and SEs of the frequency of seeking comfort in religion in the total population and as further stratified by gender and the three forms of CM as measured globally (any form of child maltreatment), individually (physical abuse, sexual abuse, neglect), and in terms of number of co-occurring forms of child maltreatment experienced (0, 1, 2 or more).

Inferential analyses:

Bivariable and multivariable regression

To examine the independent association between any, each individual, and the number of the three co-occurring CM forms and adult-onset anxiety and adult mood disorders, we fitted a discrete-time survival model with person-year as unit of analysis to estimate crude and adjusted hazard ratios (HR) and their 95% Confidence Intervals (CIs). We also examined interaction by constructing interaction terms between participant's level of comfort in religion with each of our CM exposure variables, separately. The interaction

term was examined in two models: 1) model 1 with the main effect and interaction term only to generate crude HRs, and 2) model 2 will be model 1 adjusted for important confounders.

Assessment of Multicollinearity

We assessed for the presence of multicollinearity among the independent variables in the multivariable models using the Variance Inflation Factors (VIFs). VIFs are a diagnostic measure to identify multicollinearity among the predictors, with a VIF value greater than 10 typically indicating significant multicollinearity. The results of the VIF analysis indicated that individual VIF values ranged from 1.02 to 3.39. These results suggest that multicollinearity is not a concern in our models, as all VIF values were well below the threshold of 10. (supplemental tables 1 and 2)

Study power

Power calculations were performed using the powerSurvEpi package in R. We used the (powerEpiInt.default1) function for power calculation testing interaction effect for Cox Proportional Hazards regression.

We calculated power for adult depressive disorders because they are less than anxiety disorders (10% vs. 12%). For the association between child maltreatment and time of onset of adult depressive disorders, we calculated that the minimal detectable risk estimate for depressive disorders among participants who reported any form of child maltreatment and high levels of comfort in religion is 0.11 at 80% power and 0.05 significance level, given a 10% prevalence of adult depressive disorders, and that 7% of the study population didn't report any CM but reported low levels of comfort in religion (P_{00}), 74% didn't report any CM but have high levels of comfort in religion (P_{01}), 1%

reported any CM but low levels of comfort in religion (P_{10}), and 18% reported any CM and high levels of comfort in religion (P_{11}).

This risk estimate aligns with findings from Miller et al study that examined the association of personal importance of religion or spirituality with major depression in a population of adults with history of parental depression. The study found that there is a significantly strong inverse relationship between high levels of religion importance and adult depression (adjusted OR=0.01, P<0.05).[83] Similarly, Kleiman et al found a strong protective effect of religious service attendance against death by suicide, a symptom of severe depression, in a nationally representative sample US adults (HR = 0.06, 95% CI = 0.01–0.54).[224] Based on that, we conclude that our study has enough power to detect meaningful difference.

Sensitivity Analysis

To address the issue of small sample sizes for certain CM types—specifically sexual abuse (n=38) and neglect (n=59)—we initially limited the number of covariates included in the multivariable models to preserve statistical power. By focusing on key confounders identified in the literature, we aimed to achieve a balance between adequately controlling for potential biases and managing the limitations imposed by these small sample sizes. In addition, we conducted pooled analyses by combining different CM types into a single variable, namely: any form of CM exposure, and examining the cumulative number of co-occurring CM types. This approach allowed us to increase the sample sizes for our analyses, thereby enhancing statistical power and enabling a more reliable estimation of associations.

We also explored the use of propensity score (PS) calculations to estimate the likelihood of exposure to sexual abuse and neglect, as we did in Aim 1, with the goal of reducing the

number of confounders in the models. However, due to the small sample sizes for sexual abuse and neglect, and the even smaller cell sizes when stratified by baseline characteristics (Supplemental Table 3), this approach proved unfeasible.

To further address these challenges, we conducted a sensitivity analysis to assess the robustness of our findings. The purpose of this sensitivity analysis was to evaluate how the associations between individual types of childhood maltreatment (CM) and adult-onset depressive and anxiety disorders change when adjusting for various sets of confounders. This step helps to determine whether the observed associations are consistent or if they are substantially altered by the inclusion or exclusion of specific variables, particularly given the potential instability caused by small cell sizes in the multivariable models. We created six models for each CM type, progressively adjusting for different sets of confounders, as shown in Supplemental Table 4. **Model 1** represents the crude association, while Models 2 through 6 sequentially add more confounders to examine their impact on the estimates. Specifically:

- **Model 2:** Adjusted for basic sociodemographic factors, including age at interview, gender, marital status, education level, and income.
- **Model 3:** Further adjusted for the other types of CM exposures (physical abuse, sexual abuse, and neglect) to account for co-occurring forms of maltreatment.
- **Model 4:** Included adjustments for chronic illness history, given its potential influence on adult mental health outcomes.
- **Model 5:** Incorporated lifetime anxiety (for depressive disorder outcomes) or lifetime depressive disorders (for anxiety disorder outcomes) to control for baseline mental health status.
- **Model 6:** Added family characteristics such as household/parental religiosity and history of parental maladjustment.

Results

Description of the study population

Table 1 shows that the study sample consisted of 1,793 participants, with 19.07% reporting any form of CM. The breakdown of CM types included 17.18% cases of physical abuse, 2.12% of sexual abuse, and 3.29% of neglect. Additionally, the distribution of co-occurring forms of CM revealed 80.93% of participants with no CM, 15.84% with one form of CM, and 3.23% with two or more forms.

The average age of participants at the time of the interview was 34.19 years, with a nearly balanced gender distribution (48.75% (N=1,044) female participants). This gender distribution shifts significantly among those reporting any CM and physical abuse, where females constitute 36.5% and 29.92%, respectively. They also tended to report lower numbers of co-occurring forms of CM. Furthermore, individuals with a history of CM tended to be slightly younger on average, particularly those reporting sexual abuse, who had the lowest mean age of 29.04 years, possibly indicating differing periods of vulnerability or reporting tendencies based on the type of abuse. On average, participants across all forms of CM reported having 7.52 siblings. Educational levels varied, with 59.29% (N=1,059) having completed high school or less and 40.71% (N=734) having achieved a college education or higher. This educational distribution shifts slightly in the context of CM, with those experiencing any form of maltreatment or specific types like physical abuse and neglect, showing a higher propensity towards lower educational attainment compared to their non-maltreated peers. However, 76.69% of those who reported sexual abuse had a college or some advanced education. Economic disparities were also evident in our sample, as 11.27% of the entire cohort reported having received public assistance, with this figure rising to 16%, among those who experienced any form of CM and physical abuse. The highest proportions were among those who reported sexual abuse, neglect, and 2 or more co-occurring forms of CM.

The prevalence of any chronic illness among the study participants was notably high, with 78.14% reporting such conditions. This prevalence was significantly higher among those who experienced any form of childhood maltreatment (CM), with 84.50% of participants with CM histories reporting chronic illnesses ($p = 0.002$). Specifically, participants who experienced physical abuse (84.42%, $p = 0.003$), sexual abuse (97.37%, $p = 0.004$), and neglect (89.83%, $p = 0.03$) also showed elevated rates of chronic illness compared to those without such experiences. The presence of any lifetime mental illness followed a similar trend. Nearly half of the total population (48.24%) reported having a lifetime mental illness. However, the prevalence was significantly higher among those with a history of any CM (74.56%, $p < 0.001$). This elevated prevalence was consistent across specific types of CM, with 74.35% of those physically abused, 84.21% of those sexually abused, and 84.75% of those neglected reporting lifetime mental illnesses (all $p < 0.001$). The data indicates a particularly high risk among those who experienced multiple forms of CM, where 71.48% reported any lifetime mental illness, and this was even higher for those with two or more forms of CM (89.66%, $p < 0.001$).

Parental education also varied, with 40.63% (N=690) of fathers and 62.63% (N=1,133) of mothers having no education. Reported parents with some collage or advanced education across all the different forms of CM constituted the smallest portions of sample with proportions ranging from 9.03% to 13.67% for fathers, and 0.00% to 6.48% for mothers. Notably, 51.52% of those who reported having experienced sexual abuse had fathers who attained middle or high school education. Employment history during the participants' childhood showed that 66.02% (N=1,182) reported their father being employed for most or all of their childhood, while a significant majority, 86.06% (N=1,522), reported their mother as not employed or only a little during their childhood. The study also explored parental religiosity, finding that a vast majority of 96.08% (N=1,715)

described their parents as highly religious. Parental maladjustment was reported by 11.18% (N=274) of the sample. This figure significantly increased across different forms of CM ranging from 23.53% to 63.87%. Figures for those reported having experienced 2 or more forms of CM (63.87%), neglect (42.29%), and physical abuse (32.56%) were the highest. A similar trend was observed in participants who reported parental divorce, with proportions ranging between 2.83% and 4.78%. The highest proportions of parental divorce were noted among individuals reporting two or more forms of CM (4.78%), followed by those experiencing neglect (4.24%) and sexual abuse (4.11%). Additionally, a small fraction of the sample, 3.00% (N=61), reported the death of one or both parents, and the majority, 93.91%, lived with at least one biological parent. Interestingly, this proportion decreased markedly to 78.30% among those reporting neglect, whereas it slightly increased to 91.84% among those reporting sexual abuse.

The sample was distributed across various areas of living, with 50.85% (N=690) residing in large cities, 15.72% (N=320) in suburbs or small cities, and 33.35% (N=502) in towns, villages, or rural areas. This distribution was consistent across all forms of CM. Regionally, the largest portion of the study sample resided in the Western region (34.59%, N=535), followed by Central (30.40%), then Eastern (17.89%) regions. Those who reported any forms of CM were significantly higher in the Central (36.50%), Western (24.76%), and Southern (17.85%) regions. A similar trend was also observed among those reporting physical abuse. A slight deviation from this trend was observed among those who reported 2 or more forms of CM, with the Eastern region being the third highest.(Table 1)

Table 1. Personal and family background sociodemographic characteristics of the study participants in the total population and by CM experience

Variables	Total N=1,793		Any CM Yes, N=342			Physical abuse Yes, N=308			Sexual abuse Yes, N=38			Neglect Yes, N=59			No of co-occurring forms of CM						
															No CM N=1,451		One CM N=284		2 or more CM N=58		
	N (%)	SE	N (%)	SE	p	N (%)	SE	p	N (%)	SE	p	N (%)	SE	p	N (%)	SE	N (%)	SE	N (%)	SE	p
Age at interview (Mean)	34.19	0.56	32.52	0.84	0.03	32.09	0.74	0.01	29.04	2.17	0.53	35.72	2.56	0.53	34.53	0.61	32.75	0.91	31.10	1.58	0.05
Age at interview **18 – 25** **26 – 35** **36 – 50** **51 – 65**	491 (32.42) 574 (26.14) 543 (30.00) 177 (11.44)	2.40 2.29 2.76 1.49	101 (29.53) 110 (32.16) 115 (33.63) 16 (4.68)	4.19 3.76 3.69 1.64	0.004	87 (28.25) 102 (33.12) 106 (34.42) 13(4.22)	3.99 4.42 3.76 1.87	0.003	15 (39.47) 14 (36.84) 7 (18.42) 2 (5.26)	13.97 10.15 4.75 4.13	0.17	14 (23.73) 23 (38.98) 17 (28.81) 5 (8.47)	9.11 7.82 12.27 2.03	0.70	393 (27.68) 465 (31.83) 432 (30.57) 161 (9.92)	2.58 2.62 2.59 1.85	87 (23.73) 84 (38.98) 101 (28.81) 12 (8.47)	4.52 4.30 4.13 1.79	14 (27.55) 26 (32.07) 14 (30.51) 4 (9.87)	8.63 8.57 5.05 3.40	0.03
Female gender	1044 (48.75)	1.51	197 (36.50)	4.53	0.003	128 (29.92)	3.81	<0.001	22 (61.71)	11.82	0.98	34 (48.42)	10.79	0.98	896 (61.75)	1.65	115 (40.49)	5.22	33 (56.90)	7.68	0.01
Number of siblings Mean± SD	7.52 ±4.14	0.22	7.48 ± 4.05	0.35	0.88	7.57 ± 3.99	0.34	0.89	7.49 ± 3.44	0.911	0.74	7.88 ± 5.67	7.88	0.74	7.74 ± 4.31	0.24	7.90 ± 4.82	0.34	7.69 ± 4.42	1.02	0.35
Marital status **Single** **Married** **Divorced/separated** **Widow**	511 (37.47) 1150 (55.56) 75 (4.00) 57 (2.97)	2.16 2.33 0.71 0.81	96 (37.47) 225 (55.56) 17 (4.00) 4 (2.97)	4.29 4.38 1.82 0.69	0.50	86 (39.22) 203 (56.75) 16 (3.53) 3 (0.50)	4.29 4.35 1.18 0.29	0.19	11 (61.28) 24 (23.97) 3 (9.48) 0 (5.26)	17.57 14.65 12.09 0	0.31	13 (25.58) 43 (69.01) 2 (1.87) 1 (3.67)	10.81 10.51 1.42 3.48	0.44	415 (37.40) 925 (55.37) 58 (3.89) 53 (3.34)	2.32 2.54 0.76 0.95	83 (37.64) 184 (56.47) 13 (4.64) 4 (1.26)	4.38 4,66 2.07 0.82	13 (39.02) 41 (57.02) 4 (3.97) 0 (0.00)	11.37 11.16 2.04 0.00	0.83
Patriciana's education **High school or less** **Collage or more**	1,059 (59.29) 734 (40.71)	2.77 2.77	204 (53.07) 142 (46.93)	4.49 4.49	0.16	188 (55.65) 124 (44.35)	4.93 4.93	0.45	13 (23.31) 25 (76.69)	7.52 7.52	<0.001	40 (57.83) 19 (42.17)	11.55 11.55	0.89	2,053 (60.52) 1,239 (39.48)	3.19 3.19	169 (53.32) 119 (46.68)	4.86 4.86	35 (51.53) 23 (48.47)	9.90 9.90	0.28
Participant's income **Low** **Low average** **High average** **High**	697 (40.96) 176 (10.06) 287 (17.39) 633 (31.60)	2.25 1.45 1.66 2.34	117 (39.38) 32 (7.25) 55 (19.71) 138 (33.66)	4.77 2.13 4.94 4.51	0.59	104 (41.87) 28 (5.78) 50 (16.91) 126 (35.44)	5.09 1.53 3.54 4.40	0.31	12 (21.14) 1 (0.81) 6 (31.70) 19 (46.36)	7.05 0.85 16.60 16.19	0.12	26 (38.11) 6 (13.58) 9 (16.38) 18 (30.92)	11.59 9.12 10.18 9.88	0.97	580 (41.27) 144 (10.61) 232 (16.93) 495 (31.19)	2.47 1.53 1.55 2.47	93 (39.17) 29 (8.17) 47 (21.18) 115 (31.49)	5.04 2.39 5.88 5.08	24 (40.71) 3 (1.46) 8 (10.39) 23 (47.43)	9.54 0.88 7.25 9.62	0.45
Received public assistance (yes)	217 (11.27)	1.76	56 (16.47)	2.98	0.008	49 (16.01)	3.03	0.03	9 (23.68)	12.73	0.03	14 (24.14)	11.24	0.005	161 (11.21)	1.77	42 (14.84)	3.01	14 (24.56)	10.44	<0.001
Any chronic illness (yes)	1401 (78.14)	2.59	289 (84.50)	4.20	0.002	260 (84.42)	4.53	0.003	37 (97.37)	2.34	0.004	53 (89.83)	9.01	0.03	1112 (76.64)	2.88	233 (82.04)	4.63	56 (96.55)	0.76	<0.001
Any lifetime mental illness (yes)	865 (48.24)	2.12	255 (74.56)	4.03	<0.001	229 (74.35)	3.95	<0.001	32 (84.21)	5.09	<0.001	50 (84.75)	11.86	<0.001	610 (42.04)	2.09	203 (71.48)	4.55	52 (89.66)	4.63	<0.001
Father education: **No education** **Elementary** **Middle/high school** **College or more**	690 (40.63) 484 (26.52) 447 (23.54) 172 (9.30)	2.45 2.04 2.12 1.45	123 (35.57) 105 (29.63) 82 (24.10) 36 (10.71)	4.19 3.03 3.98 2.38	0.54	111 (35.41) 93 (30.51) 74 (22.14) 34 (11.94)	3.73 3.12 3.55 2.63	0.32	9 (14.03) 12 (21.94) 12 (51.52) 5 (12.50)	6.45 6.62 13.59 7.39	0.76	27 (44.41) 15 (30.87) 11 (15.11) 6 (9.61)	11.23 10.55 6.39 4.89	0.76	571 (39.35) 379 (26.12) 365 (25.16) 136 (9.37)	2.59 2.24 2.36 1.64	97 (34.15) 91 (32.04) 68 (23.94) 26 (9.86)	4.67 3.51 4.29 2.59	22 (37.93) 14 (24.14) 14 (24.14) 8 (13.79)	7.14 9.29 8.20 6.46	0.76

N = unweighted frequencies of observations. This cell presents either counts for categorical variables or means for continuous variable.

% = weighted column percentages of observations. This cell presents % of the number observations for the corresponding categorical variable.

SE = standard error, P = p-value.

Continue Table 1. Personal and parental sociodemographic characteristics of the study participants in the total population and by parental religiosity

Variables	Total N=1,793		Any CM N=342			Physical abuse N=308			Sexual abuse N=38			Neglect N=59			No CM N=1,451		One CM N=284		2 or more CM N=58		
	N (%)	SE	N (%)	SE	p	N (%)	SE	p	N (%)	SE	p	N (%)	SE	p	N (%)	SE	N (%)	SE	N (%)	SE	p
Mother education:																					
No education	1133 (62.63)	2.66	211 (60.02)	4.45		193 (58.56)	4.69		13 (44.47)	14.22		38 (68.95)	9.66		926 (63.82)	2.88	176 (61.97)	4.66	31 (53.45)	9.32	
Elementary	384 (18.54)	1.45	79 (22.68)	3.33		70 (24.42)	3.99	0.12	13 (22.26)	9.14	0.50	13 (21.24)	7.02	0.50	305 (21.02)	1.56	62 (21.83)	3.41	17 (29.31)	8.36	0.41
Middle/high school	209 (14.42)	2.31	43 (11.69)	2.59	0.38	37 (10.53)	2.51		10 (28.98)	12.03		8 (9.82)	4.83		166 (11.44)	2.62	34 (11.97)	2.87	9 (15.52)	6.12	
College or more	67 (4.40)	0.79	13 (5.62)	2.16		12 (6.48)	2.47		2 (4.29)	3.68		0 (0.00)	0.00		54 (3.72)	0.79	12 (4.23)	2.44	1 (1.72)	2.99	
How much of childhood father was employed?																					
Not at all/ a little	217 (14.09)	1.47	41 (10.90)	2.24		40 (12.57)	2.55		1 (2.33)	2.39		7 (16.54)	8.32		176 (12.54)	1.71	35 (12.54)	2.42	6 (10.91)	10.34	
Some	339 (19.89)	1.56	54 (17.76)	3.30	0.30	47 (16.89)	3.35	0.48	7 (15.66)	5.82	0.85	7 (23.41)	10.01	0.85	285 (20.30)	1.72	47 (16.85)	3.67	7 (12.73)	8.03	0.40
Most/ all childhood	1182 (66.02)	1.88	239 (71.34)	3.53		214 (70.54)	3.45		30 (82.01)	6.31		41 (60.05)	10.56		943 (67.17)	2.31	197 (70.61)	4.14	42 (76.36)	10.05	
How much of childhood mother was employed?																					
Not at all/ a little	1522 (86.06)	1.47	277 (78.74)	5.55		251 (81.83)	4.27		33 (68.06)	16.63		36 (57.42)	12.56		1,245 (87.00)	1.56	239 (84.75)	5.08	38 (66.67)	11.67	
Some	90 (5.29)	0.94	19 (6.20)	2.58	0.14	18 (6.86)	2.93	0.49	2 (6.60)	4.90	<0.001	4 (9.10)	7.17	<0.001	71 (4.96)	0.99	14 (4.96)	2.25	5 (8.77)	9.33	0.04
Most/ all childhood	158 (8.66)	1.42	43 (15.06)	5.43		36 (11.31)	3.62		3 (25.35)	17.69		18 (33.47)	12.30		115 (8.04)	1.39	29 (10.28)	4.83	14 (24.56)	11.40	
Parental religiosity:																					
Highly religious	1,715 (96.08)	1.07	317 (92.69)	2.24	<0.001	286 (92.86)	1.07	<0.001	35 (92.11)	12.08	0.20	55 (93.22)	2.08	0.25	1,398 (96.07)	1.24	262 (92.28)	2.54	55 (95.83)	2.60	0.19
Weakley religious	70 (3.92)	1.07	25 (7.31)	2.24		22 (7.14)	1.07		3 (7.89)	12.08		4 (6.78)	2.08		45 (3.93)	1.24	22 (7.72)	2.54	3 (4.17)	2.60	
Parental maladjustment (Yes)	274 (11.18)	1.02	125 (29.03)	3.77	<0.001	117 (32.56)	4.19	<0.001	16 (31.20)	12.40	<0.001	35 (42.29)	9.50	<0.001	150 (7.64)	0.96	86 (23.53)	3.842	38 (63.87)	9.17	<0.001
Parents divorced (Yes)	39 (1.41)	0.34	18 (3.09)	1.02	0.01	15 (2.93)	1.08	0.04	3 (4.11)	2.81	0.04	7 (4.24)	2.39	0.04	21 (1.07)	0.33	11 (2.83)	1.12	7 (4.78)	2.508	0.01
One or both parents died (yes)	61 (3.00)	0.64	14 (3.93)	1.43	0.46	13 (3.84)	1.52	0.54	2 (1.71)	1.33	0.12	4 (7.46)	4.17	0.12	47 (2.82)	0.72	10 (3.65)	1.621	4 (5.68%)	3.299	0.58
Living with biological parents (Yes)	1646 (93.91)	0.87	302 (90.38)	2.45	0.06	275 (92.65)	1.87	0.46	33 (91.84)	4.64	0.003	45 (78.30)	9.25	0.003	1,344 (94.61)	0.92	255 (90.46)	2.745	47 (89.85)	4.195	0.98
Area of living:																					
Large city	690 (50.85)	4.19	187 (51.15)	6.38		169 (50.83)	5.68		31 (65.39)	19.19		29 (53.64)	10.99		773 (50.79)	4.16	149 (49.37)	6.698	38 (62.42)	10.63	
Suburbs/small city	320 (15.72)	1.94	53 (13.26)	2.81	0.69	49 (14.91)	3.06	0.94	4 (4.81)	2.96	0.31	7 (6.21)	3.03	0.31	265 (16.21)	2.18	46 (14.06)	3.246	7 (8.17)	3.858	0.76
Town/Village/Rural	502 (33.35)	4.82	102 (35.59)	7.13		90 (34.26)	6.13		3 (29.81)	20.10		23 (40.14)	11.00		400 (32.90)	4.59	89 (36.57)	7.175	13 (29.41)	10.83	
Moved around	3 (0.08)	0.05	0 (0.00)	0.00		0 (0.00)	0.00		0 (0.00)	0.00		0 (0.00)	0.00		3 (0.09)	0.06	0		0		
Region of living:																					
Northern	213 (5.54)	0.77	126 (4.42)	1.06		32 (4.91)	1.15		3 (1.69)	1.12		25 (5.55)	0.53		177 (5.77)	0.85	34 (5.02)	1.224	2 (0.63)	.4715	
Central	589 (30.40)	3.05	45 (36.50)	5.00		109 (35.75)	4.91		18 (44.98)	15.68		8 (30.40)	11.85		467 (29.19)	3.16	99 (34.65)	5.113	23 (48.19)	11.01	
Eastern	248 (17.89)	4.54	36 (16.48)	6.49	0.02	42 (15.21)	4.63	0.02	4 (30.23)	20.03	0.27	4 (17.89)	9.15	0.27	203 (18.17)	4.33	36 (15.81)	5.873	9 (20.70)	11.20	0.006
Western	535 (34.59)	3.61	48 (24.76)	4.64		84 (25.44)	4.49		12 (21.91)	9.66		6 (34.59)	9.65		444 (36.54)	3.89	71 (24.56)	5.147	20 (26.04)	8.014	
Southern	208 (11.58)	1.64	53 (17.85)	3.40		45 (18.69)	3.77		1 (1.19)	1.24		16 (11.58)	8.59		160 (10.34)	1.67	44 (19.97)	3.88	4 (4.45)	2.44	

N = unweighted frequencies of observations. This cell presents either counts for categorical variables or means for continuous variable.

% = weighted column percentages of observations. This cell presents % of the number observations for the corresponding categorical variable.

SE = standard error, P = p-value

Prevalence of adult-onset lifetime depressive and anxiety disorders

In Table 2, we present the weighted prevalence of adult onset depressive and anxiety disorders in the total population of our study, and as stratified by frequency of seeking comfort in religion, gender, and experiences of CM.

The overall prevalence of adult-onset depressive disorders was 5.76%, while the prevalence of adult-onset anxiety disorders was 12.37%. Gender differences were statistically significant for depressive disorders (p=0.002), with females showing a higher prevalence (64.02%, SE=4.76) compared to males (35.98%, SE=4.76). For anxiety disorders, the gender difference was not statistically significant (p=0.18), although females still showed a higher prevalence (57.51%, SE=6.08) compared to males (42.49%).

The frequency of seeking comfort in religion was not significantly associated with either depressive (p=0.51) or anxiety disorders (p=0.59). For depressive disorders, 60.63% of individuals reported often seeking comfort in religion, 25.47% sometimes, 9.50% rarely, and 4.41% never.. Similarly, for anxiety disorders, 59.06% of individuals reported often seeking comfort in religion, 22.39% sometimes, 8.89% rarely, and 9.66% never.

Regarding CM experiences, individuals who reported any form of CM had significantly higher prevalence of both depressive (28.65%, p=0.008) and anxiety disorders (27.72%, p<0.001) compared to those without CM experiences. Specifically:

- Physical abuse was associated with higher prevalence of both depressive (22.38%, SE=4.03, p=0.02) and anxiety disorders (21.80%, p=0.01).
- Sexual abuse was strongly associated with depressive disorders (12.71%, SE=4.89, p<0.001) but not significantly associated with anxiety disorders (p=0.16).
- Neglect was significantly associated with anxiety disorders (6.41%, p=0.04) but not with depressive disorders (p=0.29).

The number of co-occurring CM types showed a significant association with both depressive ($p<0.001$) and anxiety disorders ($p=0.002$). For depressive disorders, 19.94% reported one type of CM, and 8.71% reported two or more types. For anxiety disorders, 23.05% reported one type of CM, and 4.67% reported two or more types.

Table 2. Weighted prevalence of adult onset depressive and anxiety disorders in the total population of SNMHS and stratified by gender and CM experience, N=1,793

	Any Depressive disorders (Yes) (N=213)			Any anxiety disorders (Yes) (N=296)		
	N (%)	**SE**	**p-value**	**N (%)**	**SE**	**p-value**
Total	213 (5.76)	0.72	NA	296 (12.37)	1.11	NA
Gender	-	-		-	-	-
Male	71 (35.98)	4.76	0.002	94 (42.49)	6.08	0.18
Females	142 (64.02)	4.76		202 (57.51)	6.08	
Frequency of seeking comfort in religion	-	-	-	-	-	-
Often	138 (60.63)	0.47	0.51	191 (59.06)	0.81	0.59
Sometimes	48 (25.47)	0.34		60 (22.39)	0.69	
Rarely	14 (9.50)	0.27		26 (8.89)	0.35	
Never	12 (4.41)	0.09		18 (9.66)	0.58	
Child maltreatment experiences	-	-	-	-	-	-
Any CM, (Yes)	49 (28.65)	5.34	0.008	83 (27.72)	4.45	<0.001
Physical abuse, (Yes)	44 (22.38)	4.03	0.02	75 (21.80)	3.89	0.01
Sexual abuse, (Yes)	12 (12.71)	4.89	<0.001	10 (4.23)	2.31	0.16
Neglect, (Yes)	8 (4.87)	2.44	0.296	14 (6.41)	2.65	0.04
No of co-occurred CM types	-	-	-	-	-	-
None	164 (71.35)	5.34	<0.001	213 (72.28)	4.45	0.002
1	36 (19.94)	5.08		68 (23.05)	4.07	
2 or more	13 (8.71)	3.23		15 (4.67)	1.77	

SE: standard error, N= unweighted frequencies, (%)= weighted percentages, The percentages shown are column percentages.

Association between CM and adult-onset depressive and anxiety disorders

The results from Table 2 elucidate the relationship between experiences of CM and the subsequent development of depressive and anxiety disorders in adulthood.

The results indicate that any experience of CM significantly increases the risk of both depressive and anxiety disorders in the crude models, with HRs of 2.16 (95% CI: 1.25 – 3.74) for depressive disorders and 2.99 (95% CI: 1.81 – 4.96) for anxiety disorders. After adjusting for confounders, the association with depressive disorders becomes non-significant (HR = 1.06, 95% CI: 0.57 – 1.97). However, the adjusted association with anxiety disorders remains significant, though reduced (HR = 2.64, 95% CI: 1.67 – 4.17).

The frequency of seeking comfort in religion emerged as an important factor. Among individuals diagnosed with depressive disorders, 95.59% reported frequently seeking comfort in religion, while only 4.41% reported never or infrequently seeking comfort in religion. This difference approached statistical significance ($p = 0.08$). Similarly, for anxiety disorders, 90.34% of those diagnosed frequently sought comfort in religion, compared to 9.66% who sought it rarely or never, though this difference was not statistically significant ($p = 0.63$). These findings suggest that individuals who frequently seek comfort in religion are disproportionately represented among those with mental health conditions.

Looking at specific types of CM, physical abuse showed a significant increase in risk for both depressive and anxiety disorders in crude estimates (HR for depressive disorders = 1.89, 95% CI: 1.15 – 3.11; HR for anxiety disorders = 2.54, 95% CI: 1.51 – 4.28). However, these associations substantially weaken and become non-significant upon adjustment (HR for depressive disorders = 0.92, 95% CI: 0.52 – 1.61; HR for anxiety disorders = 2.31, 95% CI: 1.26 – 4.23). On the other hand, sexual abuse exhibited a particularly strong crude

HR for depressive disorders (10.90, 95% CI: 4.09 – 29.06), which decreases yet remains significant after adjustment (HR = 3.72, 95% CI: 1.61 – 8.57). The influence on anxiety disorders decreases from a significant crude estimate (HR = 3.83, 95% CI: 1.15 – 12.83) to a non-significant adjusted HR (HR = 0.87, 95% CI: 0.26 – 2.89). Neglect was associated with a significantly increased risk of anxiety disorders in the crude model; however, this risk was reduced and became non-significant after adjustment (adjusted HR = 2.03, 95% CI: 0.85 – 4.86). Similarly, the risk for depressive disorders was elevated in the crude model, but like anxiety disorders, it decreased and did not reach statistical significance upon adjustment (adjusted HR = 0.90, 95% CI: 0.37 – 2.19).

The analysis of the number of co-occurring CM revealed significant findings regarding the development of adult-onset depressive and anxiety disorders. For depressive disorders, the crude model showed a HR of 2.17 (95% CI: 1.45 – 3.27), indicating that individuals with multiple forms of CM were more than twice as likely to develop depressive disorders compared to those with no CM. However, after adjusting for potential confounders, this association was no longer significant (adjusted HR=1.27, 95% CI: 0.79 – 2.04). Conversely, for anxiety disorders, the crude model demonstrated a HR of 2.14 (95% CI: 1.58 – 2.91), suggesting a strong association between multiple forms of CM and the risk of anxiety disorders. This association remained significant even after adjustment (adjusted HR = 1.81, 95% CI: 1.35 – 2.44), underscoring a robust relationship between co-occurring CM and anxiety disorders that persists despite accounting for various confounding factors.

Table 2. Crude and adjusted hazard ratios (HR) examining the association between CM experience and adult-onset depressive and anxiety disorders

Exposures	Any depressive disorders		Any anxiety disorders	
	Model 1 - Crude	Model 2 - Adjusted	Model 1 - Crude	Model 2 - Adjusted
	HR (95%CI)	HR (95%CI)	HR (95%CI)	HR (95%CI)
Any CM	2.16 (1.25 – 3.74)	1.06 (0.57 – 1.97)	2.99 (1.81 – 4.96)	2.64 (1.67 – 4.17)
Physical abuse[1]	1.89 (1.15 – 3.11)	0.92 (0.52 – 1.61)	2.54 (1.51 – 4.28)	2.31 (1.26 – 4.23)
Sexual abuse[2]	10.90 (4.09 – 29.06)	3.72 (1.61 – 8.57)	3.83 (1.15 – 12.83)	0.87 (0.26 – 2.89)
Neglect[3]	1.64 (0.58 – 4.63)	0.90 (0.37 – 2.19)	3.04 (1.21 – 7.63)	2.03 (0.85 – 4.86)
No. of co-occurring CM	2.17 (1.45 – 3.27)	1.27 (0.79 – 2.04)	2.14 (1.58 – 2.91)	1.81 (1.35 – 2.44)

Model 2: includes the following confounders as adjustment variables: age at interview, gender, participant's level of education, participant's income level, participant's marital status, history of any chronic illnesses, household/parental religiosity, and parental maladjustment.

[1] We also adjusted for sexual abuse and neglect in the adjusted models.

[2] We also adjusted for physical abuse and neglect in the adjusted models.

[3] We also adjusted for physical and sexual abuse in the adjusted models.

We also adjusted for lifetime anxiety disorders when the outcome was any depressive disorders, and for lifetime depressive disorders when the outcome was any anxiety disorders.

Sensitivity Analysis

Supplemental Table 4 presents the results of a sensitivity analysis examining how the associations between specific types of CM and adult-onset depressive and anxiety disorders change when adjusting for different sets of confounders. his analysis was conducted to evaluate the robustness of our findings, particularly given the small sample sizes for certain CM types, such as sexual abuse (n=38) and neglect (n=59). The sensitivity analysis included six models: the crude model (Model 1) and five sequentially adjusted models (Models 2–6).

For adult-onset depressive disorders, the crude model indicated strong positive associations for physical abuse (HR = 1.89, 95% CI: 1.15–3.11) and sexual abuse (HR = 10.89, 95% CI: 4.09–29.06), whereas neglect was not significantly associated (HR = 1.64, 95% CI: 0.58–4.63). After adjusting for sociodemographic factors in Model 2, the hazard ratios (HRs) for physical abuse and sexual abuse slightly increased to 2.10 (95% CI: 1.22–3.62) and 8.23 (95% CI: 3.43–19.78), respectively, while the association for neglect remained non-significant. Further adjustments for chronic illness, lifetime anxiety, and family characteristics (Models 3–6) led to a progressive reduction in the strength of associations for physical and sexual abuse. For instance, the HR for sexual abuse decreased to 3.72 (95% CI: 1.61–8.57) in the fully adjusted model (Model 6), suggesting that part of the initial association was explained by these additional confounders. The final HR for physical abuse also attenuated to 0.92 (95% CI: 0.52–1.61), indicating a lack of statistical significance after full adjustment.

For adult-onset anxiety disorders, the crude associations were also significant for physical abuse (HR = 2.54, 95% CI: 1.51–4.28), sexual abuse (HR = 3.83, 95% CI: 1.15–12.83), and neglect (HR = 3.04, 95% CI: 1.21–7.63). Similar to the findings for depressive disorders, these associations were attenuated after adjusting for additional confounders. For

example, in the fully adjusted model (Model 6), the HR for physical abuse decreased to 2.31 (95% CI: 1.26–4.23), while the HR for sexual abuse dropped to 0.87 (95% CI: 0.26–2.89), losing statistical significance. The association for neglect also attenuated in the fully adjusted model (HR = 2.03, 95% CI: 0.85–4.86), suggesting that the initial associations observed in the crude models were influenced by sociodemographic, health-related, and familial factors.

Differences by Levels of comfort in religion

Table 3 presents the associations between various forms of CM and the onset of depressive and anxiety disorders in adulthood, differentiated by the levels of comfort in religion.

Individuals who rarely or never sought comfort in religion and reported exposure to any form of CM exhibited dramatically higher risks for both disorders compared to those who did not report exposure to any form of CM in the crude models, especially for depressive disorders (depressive disorder HR = 8.23, 95% CI: .98 – 34.61, anxiety disorder HR = 6.08, 95% CI: 1.84 – 20.04). Adjustments for confounders notably diminished these associations, however, they were significant only for anxiety (adjusted HR = 3.52, 95% CI: 1.29 – 9.66), but not depressive disorders (adjusted HR = 3.14, 95% CI: 0.91 – 10.85).

Regarding individual forms of CM, the association between physical abuse and both depressive and anxiety disorders showed a modest increase in the crude analysis, with a more pronounced effect on anxiety disorders. This association was significant primarily among those who frequently or sometimes seek comfort in religion. However, these associations diminished after adjusting for confounders. Notably, the differential impact based on religious comfort seeking was particularly evident in anxiety disorders, where the risk remained elevated in the adjusted model, unlike in depressive disorders.

Nonetheless, none of the associations in the adjusted models reached statistical significance. Sexual abuse showed the most dramatic associations, particularly for those rarely seeking religious comfort, with a staggering HR of 135.40 (95% CI: 25.65 – 714.62) in the crude model for depressive disorders. Adjusted models showed a significant reduction in HR, yet the associations remained highly significant. However, the drastically wide confidence intervals in both crude and adjusted models indicate that those estimates are highly variable and unstable. As for neglect, data were limited for depressive disorder due to insufficient observation, but available results for anxiety disorders showed increased risks which were somewhat mitigated after adjustments, however, not statistically significant.

For individuals experiencing multiple forms of CM, we found notable differences based on the frequency of seeking comfort in religion. Among individuals who frequently seek comfort in religion, the crude HR for any depressive disorder associated with multiple forms of CM was 1.96 (95% CI: 1.24 – 3.12), but this association became non-significant after adjustment (HR = 1.19, 95%CI: 0.71 – 2.01). In contrast, among those who rarely seek comfort in religion, the crude HR for any depressive disorder was significantly higher at 4.24 (95% CI: 1.92 – 9.36), yet also became non-significant after adjustment (HR = 1.99, 95% CI: 0.85 – 4.65). For anxiety disorders, individuals frequently seeking comfort in religion had a crude HR of 1.99 (95% CI: 1.42 – 2.78), which remained significant after adjustment (HR = 2.17, 95% CI: 1.08 – 4.38). Similarly, those rarely seeking comfort in religion had a crude HR of 4.11 (95% CI: 2.02 – 8.35), which also remained significant after adjustment (HR = 3.21, 95% CI: 1.51 – 6.86).

Table 3. Crude and adjusted Hazard ratios (HR) examining the association between CM forms and adult-onset depressive and anxiety disorders by frequency of seeking comfort in religion.

Outcomes	Any depressive disorders		Any anxiety disorders	
	Model 1 - Crude	Model 2 - Adjusted	Model 1 - Crude	Model 2 - Adjusted
	HR (95% CI)	HR (95% CI)	HR (95% CI)	HR (95% CI)
Frequently seeking comfort in religion				
Any CM	1.86 (0.96 – 2.93)	0.86 (0.64 – 1.61)	2.66 (1.57 – 4.52)	2.52 (1.56 – 4.06)
Physical abuse[1]	1.89 (1.08 – 3.30)	0.95 (0.54 – 1.67)	2.56 (1.43 – 4.56)	1.99 (0.68 – 5.89)
Sexual abuse[2]	6.79 (2.64 – 17.45)	2.51 (0.93 – 6.82)	1.57 (0.47 – 5.25)	NA (too few observations)
Neglect[3]	NA (too few observations)	NA (too few observations)	3.01 (1.16 – 7.77)	2.10 (0.86 – 5.10)
No. of co-occurring CM	1.96 (1.24 – 3.12)	1.19 (0.71 – 2.01)	1.99 (1.42 – 2.78)	2.17 (1.08 – 4.38)
Rarely seeking comfort in religion				
Any CM	8.23 (1.98 – 34.61)	3.14 (0.91 – 10.85)	6.08 (1.84 – 20.04)	3.52 (1.29 – 9.66)
Physical abuse[1]	1.89 (0.60 – 5.97)	0.77 (0.22 – 2.69)	2.49 (0.84 – 7.33)	1.73 (0.59 – 5.03)
Sexual abuse[2]	135.40 (25.65 – 714.62)	18.75 (4.25 – 82.74)	59.00 (23.80 – 146.25)	NA (too few observations)
Neglect[3]	NA (too few observations)	NA (too few observations)	2.65 (0.52 – 13.37)	0.90 (0.11 – 7.29)
No. of co-occurring CM	4.24 (1.92 – 9.36)	1.99 (0.85 – 4.65)	4.11 (2.02 – 8.35)	3.21 (1.51 – 6.86)

Model 2: includes the following confounders as adjustment variables: age at interview, gender, participant's level of education, participant's income level, participant's marital status, history of any chronic illnesses, household/parental religiosity, and parental maladjustment.

[1] We also adjusted for sexual abuse and neglect in the adjusted models.

[2] We also adjusted for physical abuse and neglect in the adjusted models.

[3] We also adjusted for physical and sexual abuse in the adjusted models.

We also adjusted for lifetime anxiety disorders when the outcome was any depressive disorders, and for life time depressive disorders when the outcome was any anxiety disorders.

Discussion

This study is the first to utilize nationally representative data of adult Saudi households using probability sampling to explore the independent associations between various forms of CM – collectively, individually, as well as cumulatively— and the subsequent onset of anxiety and depressive disorders in adulthood. It is also the first to investigate the role of religious coping within this context. The survey is unique in that it's the first to assess undiagnosed DSM-IV anxiety and depressive disorders in a representative sample of Saudi households which can help in overcoming the limitation of underreporting due to underdiagnosed cases. Our main findings are as follows: 1) Bivariate analyses generally indicated a positive association between all types of CM and the onset of anxiety and depressive disorders in adulthood. However, after adjusting for important confounders, sexual abuse was specifically associated with a significantly increased risk of adult-onset depressive disorders, while physical abuse was strongly linked to an increased risk of adult-onset anxiety disorders. We also found a dose-response relationship between the number of co-occurring CM and the risk of anxiety in adulthood, but not with depressive disorders. 2) The frequency of seeking comfort in religion significantly moderated the relationship between exposure to a single form of CM, particularly sexual abuse, and the onset of adult-onset depressive disorders, while it moderated the effect of being exposed to any form of CM, particularly singular form exposure, and adult-onset anxiety disorders.

Consistent with our hypothesis and previous research, our bivariate analyses revealed significant associations between all forms of CM and increased risks of developing depressive and anxiety disorders in adulthood; underscoring the long-term detrimental effects of CM on mental health among Saudis.[100,145,146,223,225] However, neglect did not reach statistical significance, likely due to the small number of respondents reporting neglect among those diagnosed with DSM-IV depressive (N=8) and anxiety disorders (N=14). This finding suggests that while neglect may still contribute to adverse mental health outcomes, the limited sample size may have reduced our power to detect a statistically significant association in this population, therefore, caution is advised when interpreting this finding. After controlling for important confounders, our data showed some evidence of specificity. Specifically, we observed a strong positive association between sexual abuse and adult-onset depressive disorders (crude HR = 10.90, 95% CI: 4.09–29.06; adjusted HR = 3.72, 95% CI: 1.61–8.57), but no significant association with

anxiety disorders. The marked reduction in the hazard ratio after adjustment suggests that while sexual abuse significantly increases the risk of depression, other factors contribute to this relationship. Our sensitivity analysis (Supplemental Table 4) further illustrated that this association weakened as more confounders were accounted for. For example, when adjusting for the participant's socioeconomic status (Model 2), the HR decreased to 8.23 (95% CI: 3.43–19.78). Subsequent adjustments for comorbid physical abuse, neglect, chronic illness, and mental health disorders (Model 5) led to a further reduction in the HR to 3.96 (95% CI: 1.58–9.93). Adding family characteristics in the final model (Model 6) did not significantly alter this estimate. These findings suggest that the participant's socioeconomic and health-related characteristics partially explain the relationship between sexual abuse and depressive disorders, indicating the complex interplay of multiple factors in shaping mental health outcomes. However, caution is required when interpreting these findings due to the wide confidence intervals, which suggest a substantial degree of uncertainty in the estimates. This may be attributed to variability in the data, potentially driven by small sample sizes or heterogeneity in the reporting and experiences of sexual abuse. Such variability can undermine the precision of the effect estimates and may limit the generalizability of the findings.

Similarly, physical abuse was significantly associated with a twofold increased risk of any anxiety disorders compared to those did not report such abuse (crude HR = 2.54, 95% CI: 1.51 – 4.28, adjusted HR = 2.31, 95% CI: 1.26 – 4.23), but not depressive disorders. Additionally, experiencing more than one form of CM was significantly associated with increased risk of adult-onset anxiety disorders (crude HR = 2.14, 95% CI: 1.58 – 2.91, adjusted HR = 1.81, 95% CI: 1.35 – 2.44), but not depressive disorders. Such specificity was not reported nor adequately explored in previous studies in SA. For instance, a previous large-scale survey among Saudis has reported a general dose response relationship between increased number of reported adverse childhood events (ACEs) and increased risk of either or both lifetime clinically diagnosed anxiety and depressive disorders, but didn't investigate individual ACEs, including CM. Similarly, using data from the same survey, a sperate study focusing only on sexual abuse also reported increased risk of either or both disorders among those who reported sexual abuse. The other forms of CM and neglect weren't explored for their potential specific effect on anxiety and depressive disorders in adulthood. The global literature suggests a relative specificity of different forms of CM to specific mental disorders,

particularly anxiety and depressive disorders; however, there is no consensus on which specific CM subtype most strongly influences the development of adult anxiety and depressive disorders.[188,226-229] While some studies have indicated that sexual and physical abuse frequently predict depressive disorders, others have pointed to emotional abuse or neglect. This lack of consensus has led some researchers to question the notion of specificity, yet it clearly highlights the complex interplay between various types of CM and the resulting impact on mental health.

Our previous findings regarding the specificity of impact of CM can be better understood through both cultural and neurobiological lenses. In SA, where cultural norms deeply value family honor and the preservation of modesty, the psychological and emotional impacts of childhood abuse could manifest distinctly depending on the type of abuse. That is, sexual abuse often leads to profound feelings of shame, guilt, and betrayal, intensifying the stigma and potentially leading to social isolation and depression. This internalization of trauma, exacerbated by cultural perceptions that might discourage seeking support, can significantly impact mood regulation areas such as the hippocampus and prefrontal cortex, resulting in depressive symptoms.[229] In contrast, physical abuse and experiencing multiple forms of CM may trigger heightened vigilance and anxiety as victims learn to anticipate threats, affecting areas like the amygdala that process fear, thereby increasing anxiety responses. While physical abuse can also carry stigma, it is more likely to be recognized as victimization, possibly eliciting sympathy rather than shame and influencing the development of anxiety rather than depression. These neurobiological changes, combined with the societal context and varying coping mechanisms highlight the complex interplay of factors influencing mental health outcomes following different types of abuse in a conservative cultural setting like SA.

Our study suggests that religious coping may moderate the relationship between CM experiences and psychiatric outcomes, potentially offering some protective benefits. Generally, the risk estimates among those who reported frequently seeking comfort in religion were considerably lower than their counterparts who rarely or never did so. However, none of these were statistically significant, except for those who reported sexual abuse and rarely or never sought comfort in religion. Particularly, upon adjustment, the risk of developing depressive disorders in adulthood among those who rarely or never

sought comfort in religion and reported CSA was 18 times as high compared to those without such experiences, while it was 3 times as high in the other group that sought comfort in religion more frequently. This could indicate that individuals who do not or infrequently engage in religious coping might lack a vital source of emotional support or meaning-making, which could exacerbate the negative psychological consequences of such trauma. Indeed, existing research supports that CSA is particularly linked with the highest risk of depressive disorders in adulthood, more so than other types of CM and neglect.[145] Our findings suggest that while frequently seeking comfort in religion helps lower the risk, it does not provide complete protection against developing depressive disorders in adulthood for those who reported experiencing sexual abuse in SA as the HR is still larger than 1. One potential explanation is that CSA, being one of the most invasive and traumatic forms of maltreatment, breaches fundamental trust, leading to intense feelings of betrayal, shame, and guilt, which are strongly linked to depressive disorders. These symptoms often arise from persistent feelings of worthlessness and the internalization of the trauma, making this type of abuse especially damaging to an individual's mental health compared to other forms of CM like physical abuse or neglect. In the Saudi context, where religious and social norms heavily influence individual behaviors and coping mechanisms, the lack of religious coping can make individuals particularly vulnerable. That is, the absence of or frequent positive religious coping can leave emotional and psychological scars from CSA abuse severely unmitigated, significantly impacting adult mental health. Moreover, the cultural stigma surrounding mental health issues, along with the implications of sexual abuse for victims and their families—such as reluctance to disclose abuse or seek help from mental health professionals— can exacerbate depressive symptoms among those who rarely or do not engage in religious coping.

With regards to anxiety disorders in adulthood, our results are consistent with our hypothesis and prevailing literature. Our data do show lower risks of developing adult anxiety disorders among those who reported higher frequency of seeking comfort in religion, relative to the other less frequent group. However, the effect of religious coping is not totally protective as the HRs are still all larger than one. This suggests that religious coping alone may not prevent or markedly mitigate the risk of anxiety disorders in adulthood. This is particularly evident from the significantly increased risk of developing anxiety disorders in adulthood among those exposed to at least one form of CM, regardless of the specific type.

This increased risk is observed in both groups of religious comfort seekers—those who seek it frequently and those who seldom or never do—with a higher magnitude among the latter. Additionally, the specific forms of CM and neglect also show increased risk of adult anxiety, that is slightly lower in the group reporting higher frequency of seeking comfort in religion, however, these association are not statistically significant. Studies similar to ours are nonexistent in SA and the broader region. However, we did find a relevant study conducted on a Lebanese sample that assessed the moderating effect of religiosity and social support on the relationship between CM and feelings of entrapment.[82] The latter is defined as "a psychological phenomenon in which an individual becomes imprisoned in a cycle of thoughts about an issue and is unable to break free from it", which can lead to negative mental health outcomes, such as depression and suicidal ideation. Our findings align with this Lebanese study, which reported that high levels of religiosity and social support can help mitigate the severity of entrapment. However, these factors are not strong enough to reverse the association between CM and entrapment. Notably, the study did not document the participants' religion, and religiosity was measured through a single question about the centrality of religion in their lives. This limitation makes it unclear whether the findings are applicable to Muslims or if the participants were engaging in religious coping. Despite these limitations, the cultural context of the study is similar to that of SA. Together with our results, these findings offer valuable insight into the joint impact of religious and social support coping strategies on mental well-being following CM and neglect, particularly in similar cultural settings. However, more research is needed to explore the nuanced interactions between religious coping mechanisms, social support, and professional mental health services. Future studies should focus on how these factors work together to influence mental health outcomes, as well as the cultural contexts that shape coping behaviors and the effectiveness of different interventions.

Findings from the Western literature also further support our understanding of the current study results. A longitudinal study using a nationally representative U.S. sample found that religiosity primarily buffers the effects of childhood adversity on positive affect (such as feelings of happiness and peacefulness), rather than on negative affect (such as feelings of hopelessness and nervousness).[144] This suggests that religion may enhance positive aspects of mental health without necessarily reducing negative mental health aspects at the same time. This insight helps explain the lack of a significant, yet weakly protective

effect on developing depressive disorders in adulthood in our study. It also accounts for the slight reduction in the increased risk of adult-onset anxiety disorders among those who frequently seek religious comfort compared to those who rarely or never do. This nuanced understanding indicates that while religiosity may foster positive mental health outcomes, it may not be as effective alone in reducing negative mental health consequences, especially adult anxiety, following CM in SA. This suggest that religious coping mechanisms should be better utilized or complemented with other means to achieve better mental health outcomes.

Considering the specific type of religious coping mechanism used in times of distress can also provide another relevant explanation for our previous finding regarding the moderating effect of religious coping. Religious coping is multifaceted and may involve both beneficial and detrimental aspects. For instance, while some individuals find solace and meaning in religious practices (positive religious coping), others may experience spiritual struggles or fear of divine retribution (negative religious coping), which could exacerbate stress rather than alleviate it. Notably, research has suggested that in Middle Eastern Muslim samples, positive and negative religious coping are positively correlated, indicating that Muslims may employ both types of coping mechanisms simultaneously during distress, in contrast to Christian samples where these coping strategies typically show an orthogonal relationship.[41,154,230] Both coping mechanisms have been found in a few studies to correlate positively with maladjustment and psychological distress among Muslims, similar to our finding of increased risk of adult anxiety among both frequent and infrequent seekers of comfort in religion, a finding that was particularly unexpected for positive religious coping.[215,231] A possible explanation for this is that individuals may engage in religious coping passively, without actively trying to contemplate and seek meaning from hardships or pursue improvements in their lives through the religious and social means adopted to cope with distress. This is particularly relevant given the importance of Islam in SA, which influences every aspect of the country's core values, legislation, and the people's daily life. The pervasive nature of Islamic teachings and values in SA may lead individuals, even those who are weakly or not particularly religious, to engage in religious practices passively, without actively using them as reflective or proactive coping strategies. In our study, the absence of detailed more granular data on the practices of religious coping in the SNMHS limited our ability to conduct nuanced analyses to recognize the potentially specific psychological impacts of different religious coping

practices. More studies are required to research this aspect of religious coping in greater detail among Saudis. This is crucial for understanding religiously oriented psycho-therapeutic interventions, whether targeted or universal.

An important aspect of our findings worth discussing in the context of the effect modification analyses is the markedly large effect sizes, along with their wide 95% confidence intervals, for sexual abuse—particularly among individuals who reported never or infrequently seeking comfort in religion. This suggests a potential amplification of risk in this subgroup and may have also contributed to the lack of statistical significance in our study. Conversely, the models for neglect, both crude and adjusted, failed to converge, especially in those diagnosed with depressive disorders. A likely explanation for these issues is the presence of small cell sizes, which can significantly affect the statistical power of our study, constraining our ability to control for multiple confounders, and detecting reliable and robust estimates leading to unstable model estimates and convergence failures.

Upon closer examination (supplemental Table 3), indeed the cell sizes for neglect and sexual abuse among those rarely seeking comfort in religion were exceedingly small, with zero or very few cases in some instances. This very likely contributed to both the convergence problems and the imprecision observed in the large effect estimates, as reflected in the wide confidence intervals. These limitations underscore the need for caution when interpreting the results and highlight the necessity for larger sample sizes or alternative statistical approaches to adequately assess these associations.

In attempt to address these challenges, we conducted a sensitivity analysis to assess the robustness of our findings by examining how the associations between different types of CM and adult-onset depressive and anxiety disorders change when adjusting for various sets of confounders (Supplemental Table 4). The sensitivity analysis revealed that the estimates for physical abuse and neglect were relatively stable across the models, indicating that the associations between these forms of CM and adult-onset depressive and anxiety disorders were not as sensitive to the inclusion or exclusion of additional confounders. This suggests that the relationship between these types of CM and mental health outcomes may be more direct, with fewer confounding factors affecting the observed associations. In contrast, for

sexual abuse, the inclusion of different sets of confounders substantially influenced the HRs as discussed earlier in the beginning of this section, highlighting the complexity of the relationship between sexual abuse and mental health outcomes.

Given these challenges, future research should aim to oversample such groups to ensure better representation, adequate study power, better control for the influence of confounding variables, and enhance the reliability and generalizability of the findings. Researchers should consider methods such as snowballing and giving incentives when oversampling to identify and attract participants that are weakly religious or areligious, and more support for those experienced sexual abuse or neglect. Additionally, employing advanced statistical techniques that can account for small sample sizes, such as Bayesian methods,[192] can improve the reliability of the results.

The small sample sizes observed in subgroups reporting experiences of sexual abuse and neglect have significant public health implications. These limitations in statistical power reduce our ability to detect robust and reliable associations between these forms of CM and mental health outcomes. As a result, the true prevalence and impact of sexual abuse and neglect on long-term mental health may be underestimated. This underestimation poses a risk that public health policies and interventions will not fully address the needs of individuals affected by these specific types of CM, leaving vulnerable populations underserved and unsupported.

One key concern arising from these limitations is the potential for misallocation of resources. If the prevalence and impact of sexual abuse, neglect, and religiosity levels are not accurately captured, mental health services, health promotion and prevention programs, and support systems may be underfunded or inadequately tailored to address these critical issues. Public health initiatives relying on incomplete or imprecise data—such as the wide confidence intervals observed in some of our estimates—may fail to prioritize interventions for at-risk groups, particularly those affected by rare or underreported types of CM. This not only risks exacerbating health inequities among survivors but also undermines the effectiveness of interventions. These challenges underscore the need for larger, adequately powered, and

more comprehensive epidemiological studies to provide robust data and more reliable estimates, enabling the design of programs that are better tailored to the needs of survivors.

Furthermore, the compromised ability to control for multiple confounders in our study due to the small sample sizes emphasizes the complexity of understanding the relationships between CM and mental health outcomes. Public health strategies need to account for the multifactorial nature of mental health disorders and CM and ensure that future research employs robust methods for controlling confounding factors. Without these adjustments, public health policies and interventions risk overlooking key variables that influence the mental health of CM survivors, potentially leading to incomplete or misguided solutions.

In light of these limitations, the importance of prioritizing prevention and early intervention in public health efforts becomes clear. Even in the absence of definitive statistical associations, public health programs should focus on preventive measures and early support services for individuals exposed to any form of CM, including sexual abuse and neglect primarily because of the sheer gravity of the traumatic experience itself that no child should ever have to endure. Early intervention can help mitigate the potential long-term mental and physical health consequences of CM and break the cycle of maltreatment in future genrations, even if current statistical models struggle to capture the full scope of these associations. This proactive approach is essential to addressing the complex and multifaceted effects of CM on mental health.

Strength and limitations

This study contributes to a largely underexplored area that involves the intersection of three highly sensitive topics in SA and the surrounding region, namely: CM, religiosity and adult mental illness. It leverages data from Saudi Arabia's first national survey on mental health to uncover the prevalence of undiagnosed mental health disorders and their socio-demographic attributes among the general, non-institutionalized population. To the best of our knowledge, this research is the first population-based study focusing on the independent associations between CM experiences, adult-onset anxiety and depressive disorders, and the moderating role of religious comfort-seeking behavior in SA. The results

of this study provide a culturally oriented understanding of the potential long-term impact of CM on mental health outcomes among Saudi households and how religious coping could influence this relationship. Our findings have significant implications for future research, public health policies, and mental health services in SA and similar cultural settings. They underscore the importance of religious coping mechanism, and the need to enhance the utilization of religious coping mechanisms among the Saudi households or complement them with other means to ensure better mental health outcomes in adulthood.

Nonetheless, our study acknowledges several limitations. A significant challenge is the generalizability of our findings to the broader Saudi population due to differences in demographic and socioeconomic characteristics between our study sample and national census data from 2010 and 2022. For example, while females constituted nearly half of the total population in our study and in earlier censuses, they represented only one-third of those reporting any type of abuse and specifically physical abuse in our study. Conversely, females comprised 61% of those reporting sexual abuse. Additionally, the prevalence of individuals who had ever received public assistance was notably higher among those reporting sexual abuse (23.68%), neglect (24.14%), and multiple forms of CM (24.56%), compared to the total study population (16.67%) and the 2010 national average (13%) upon which our survey weights were based. Furthermore, the socioeconomic landscape in SA has shifted significantly, with the proportion of low-income individuals decreasing from 40% in 2010 to 30% in 2022, and high-income individuals increasing from 15% to 20%. Educational attainment has also improved, with those holding a university degree or higher rising from 30% in 2010 to 40% in 2022. These changes suggest that our study population may not fully capture the current socioeconomic and educational distribution, potentially influencing the outcomes and limiting their applicability to the contemporary Saudi context. This discrepancy underscores the need for caution when extrapolating our findings to the general population and highlights the importance of using updated data for future research.

Another important aspect of our results that warrants discussing is the lack of statistical significance, which may highlight several limitations in our study and calls for caution when interpreting the findings. One of the main potential reasons for the lack of statistical significance, especially in the adjusted models, is the small sample sizes in certain subgroups. Table 4 highlights several instances where data points

were insufficient ("NA – too few observations") to conduct robust statistical analyses, especially for subgroups involving neglect and sexual abuse. Small sample sizes reduce the study's statistical power, increasing the likelihood of Type II errors (failing to detect a true association). This is particularly problematic in the context of rare exposures or outcomes, such as specific types of CM or lower religiosity levels in a generally religious population like SA. Additionally, the wide CIs observed for many HRs indicate substantial variability and uncertainty in the effect estimates. For example, in Table 2, the crude HR for sexual abuse and depressive disorders is 10.90 (95% CI: 4.09 – 29.06), which is dramatically reduced after adjustment (adjusted HR = 3.72, 95% CI: 1.61 – 8.57). The wide CIs suggest that the estimates are imprecise and highly variable, likely due to the small number of cases or the variability in reporting CM experiences. Wide CIs reduce the ability to achieve statistical significance and reflect underlying instability in the data. Future research should take into account this limitation and consider reliable innovative methods to oversample hard to reach population, such as those exposed to sexual abuse, to produce more accurate and reliable estimates. Therefore, our findings should be interpreted with caution.

Another possible explanation for the lack of statistical significance is measurement error or misclassification of key variables. Self-reported measures of CM and religious coping are susceptible to recall bias and social desirability bias, particularly in culturally sensitive contexts like SA, where stigma and social norms may influence reporting. These biases can lead to non-differential misclassification, which dilutes the strength of associations by biasing results toward the null. As a result, it becomes more challenging to detect statistically significant relationships between CM and mental health outcomes. In addition to recall bias, the definitions of CM used in this study were not fully culturally adapted, further exacerbating misclassification. For example, the definition of physical abuse was derived from Western-developed questionnaires, which may not reflect the cultural nuances or norms in Saudi Arabia. This could have led to incorrect reporting of physical abuse, with some participants either over- or under-reporting their experiences based on an inadequate understanding of the term as applied in their cultural context. Misclassification of exposure, particularly when it is non-differential, reduces the observed strength of associations and, in turn, the likelihood of achieving statistical significance. Moreover, the definition of sexual abuse was not comprehensive enough to capture the full range of experiences in this cultural context. Without a detailed exploration of the different forms and contexts of sexual abuse that

are culturally specific, cases may have been misclassified or missed entirely. This incomplete reporting further weakens the statistical power of the study by limiting the accuracy of exposure measurement, contributing to the failure to detect significant associations.

Despite the comprehensive adjustments, residual confounding may still be present. Unmeasured variables, such as forms of cultural social support, and individual coping strategies could still influence the associations observed. For example, family and friends as well as local communities, including religious or neighborhood groups, often provide emotional or material support, which might buffer against the adverse effects of stress or childhood trauma. These forms of support were not measured in the SNMHS, which can result in residual confounding that could attenuate the observed associations, leading to non-significant results.

Another important limitation is the lack of granular data on religiosity and CM indicators. Specifically, there is no information on various aspects of religious coping mechanisms to understand the specific impact of each coping mechanism, measures of emotional abuse for more comprehensive understanding, the timing and duration of CM and neglect experiences to assess severity and account for time gab, or details about the parent perpetrator, such as their gender, history of CM exposure, and relationship to the victim, particularly in cases of sexual abuse. The latter is of particular importance in the current study, as previous research in Western populations has shown that maternal and paternal abuse can differentially impact a child's religiosity and their use of religious coping mechanisms in adulthood. These differences in religious engagement and coping strategies can, in turn, significantly influence their mental health outcomes. Similar research is lacking in SA and the Arab world, which constitutes an important gab in knowledge that calls for the need for more research for deeper understanding. Similarly, in terms of CM forms, emotional abuse, which is a key form of CM known to have significant psychological impacts, was not measured at all in this study. The omission of this critical component limits our understanding of the full spectrum of maltreatment experiences and their potential mental health outcomes. Without a comprehensive assessment of all forms of CM, our ability to draw robust and culturally relevant conclusions about the associations between CM and mental health in the Saudi context is hindered.

Recall bias is a potential limitation in this study, as it relies on participants' self-reported experiences of CM and mental health outcomes. Participants may have difficulty accurately remembering or may misremember details of events that occurred in their childhood, likely due to the longer time gap, and the severity of the abuse. That is, those who were frequently exposed to abuse and neglect are more likely to recall the abuse in greater detail than those who were infrequently abused. This can lead to either underreporting or overreporting of CM incidents. Recall bias can affect the validity of the findings, as inaccurate recollections may distort the true associations between CM experiences and adult-onset mental health disorders. To mitigate this, future research could incorporate methods such as cross-referencing self-reported data with medical or school records where possible, although such records may not always be available or comprehensive.

Social desirability bias is another limitation that could impact the study's findings. Participants may alter their responses to align with what they perceive to be socially acceptable or desirable, particularly regarding sensitive topics like CM, mental health issues, and religious practices. In the context of SA, where cultural and social norms heavily influence individual behavior and disclosure, participants might underreport experiences of CM or mental health problems due to stigma or fear of judgment. They may also overreport their engagement in religious comfort-seeking behaviors to conform to social expectations. This bias can lead to an underestimation of the prevalence of CM and mental health disorders, as well as an overestimation of the role of religious coping mechanisms. Future studies should consider employing indirect questioning techniques to reduce the impact of social desirability bias.

Lastly, the survey data were collected before the major economic and social reforms driven by Vision 2030 were implemented. The Vision plan, launched in 2016, aims to diversify the economy, enhance social development, and promote cultural and religious openness. These reforms include increased women’s rights, improved access to education, and expanded economic opportunities, all of which could influence societal behaviors and attitudes, including those related to CM and religious practices. Consequently, our findings may not fully capture the current context and the impact of these reforms on CM experiences and mental health in SA.

Conclusion

In conclusion, this study underscores the significant impact of CM on the development of depressive and anxiety disorders in adulthood, particularly within the cultural context of SA. Our findings highlight the importance of addressing specific forms of CM, such as sexual and physical abuse, which showed strong associations with mental health outcomes even after adjusting for various confounders.

Policymakers should prioritize the development, improvement, and implementation of culturally sensitive, evidence-based prevention and intervention programs for CM and mental illness in SA. Efforts should include fostering interdisciplinary collaboration between mental health professionals, religious scholars, social workers, and public health experts to develop comprehensive approaches to tackling CM and promoting mental health, leveraging religious and cultural strengths to improve the well-being of Saudi children and families. Additionally, enhancing data collection systems to obtain reliable, comprehensive and granular information on CM, sociodemographic characteristics, including religiosity, parenting styles, and specific cultural practices, as well as mental illness which is crucial for identifying at-risk populations and tailoring interventions effectively. Nationwide public awareness campaigns should be conducted to challenge deeply ingrained societal attitudes and misconceptions about CM and to promote positive parenting practices.

Our findings also suggest that religious coping plays a significant role in moderating the effects of CM on mental health, albeit not completely preventative. Therefore, future policies should aim to integrate religious and cultural elements into mental health and child welfare services, leveraging these factors to enhance the effectiveness of interventions and provide more holistic, culturally attuned care. The Saudi government is already working to incorporate faith healers into the formal mental health care model, acknowledging the popularity of this traditional help-seeking behavior. By integrating faith healers, who are often the first point of contact for individuals seeking help to avoid stigma, the government aims to create a more holistic and culturally sensitive mental health care system and regulate such practices for safer outcomes.[232] To ensure the success of this model, facilitating access to such services is essential. Promoting the utilization of tele-mental health for example would be a key strategy, given the high internet and social media penetration rates in SA.[233] Integrating digital platforms into mental health initiatives can significantly increase their reach and impact. Collaboration with religious leaders can

further promote positive parenting practices and religious coping mechanisms rooted in Islamic values, emphasizing compassion, empathy, and non-violence. Religious leaders can use events like Friday or Eid sermons to convey these messages, ensuring that the community receives consistent and culturally resonant guidance on parenting. Establishing support groups within mosques and community centers, or even virtually, facilitated by trained counselors, can provide safe spaces for sharing experiences and coping strategies. Educational materials and programs should draw on religious texts and teachings that emphasize kindness, protection, and nurturing of children, as well as positive coping strategies in times of need and distress. Finally, establishing robust monitoring and evaluation frameworks will help assess the effectiveness of interventions and enable continuous improvement.

Future research should prioritize adequately powered studies to detect meaningful and reliable differences and collect more granular information to uncover nuanced relationships at the intersection of religiosity, cultural norms, and mental health. This approach will contribute to a deeper understanding of these complex relationships. Researchers should also work toward developing standardized definitions and measurements of CM within the Saudi context to enhance the comparability and reliability of findings. Longitudinal studies would be valuable for tracking the long-term impact of CM and monitoring changes in cultural attitudes and behaviors over time, ensuring that interventions remain relevant and effective. Additionally, qualitative research exploring the lived experiences of individuals affected by CM will provide deeper insights into the cultural, familial, and religious dynamics that shape these experiences. Emphasizing these areas will help build a comprehensive understanding of CM and its impacts, leading to better-targeted interventions, informed policies, and ultimately improved mental health outcomes for individuals in SA.

Supplemental table 1: Collinearity Assessment for Depressive disorders models

	VIF				
Variables \ **Exposure**	**Any CM**	**Physical abuse**	**Sexual abuse**	**Neglect**	**No. of co-occurring CM**
Main exposure	1.20	1.26	1.04	1.12	1.21
Age at interview					
18 – 25	-	-	-	-	-
26 – 35	2.70	2.70	2.70	2.70	2.69
36 – 50	3.34	3.34	3.34	3.34	3.34
51 – 65	2.72	2.72	2.72	2.72	2.71
Gender (female)	1.22	1.22	1.22	1.22	1.20
Marital status					
Never married	1.87	1.87	1.87	1.87	1.87
Widowed	1.16	1.16	1.16	1.16	1.16
Divorced/separated	1.05	1.05	1.05	1.05	1.05
Married	-	-	-	-	-
participant's level of education **High school or less**	1.16	1.17	1.17	1.17	1.16
participant's income level					
Low	1.53	1.53	1.53	1.53	1.53
Low average	1.20	1.20	1.20	1.20	1.20
High average	1.25	1.25	1.25	1.25	1.25
High	-	-	-	-	-
history of any chronic illnesses (Yes)	1.07	1.08	1.08	1.08	1.08
Lifetime anxiety disorders (Yes)	1.11	1.11	1.11	1.11	1.11
Household/parental religiosity **Highly religious**	1.03	1.03	1.03	1.03	1.02
parental maladjustment (Yes)	1.15	1.18	1.18	1.18	1.17
Physical abuse (Yes)	-	-	1.26	1.26	-
Sexual abuse (Yes)	-	1.04	-	1.04	-
Neglect (Yes)	-	1.12	1.12	-	-

Supplemental table 2: Collinearity Assessment for anxiety disorders models

	VIF				
Variables \ **Exposure**	**Any CM**	**Physical abuse**	**Sexual abuse**	**Neglect**	**No. of co-occurring CM**
Main exposure	1.18	1.24	1.06	1.13	1.20
Age at interview					
18 – 25	-	-	-	-	-
26 – 35	2.71	2.71	2.71	2.71	2.71
36 – 50	3.39	3.40	3.40	3.40	3.39
51 – 65	2.72	2.72	2.72	2.72	2.72
Gender (female)	1.21	1.21	1.21	1.21	1.20
Marital status					
Never married	1.89	1.89	1.89	1.89	1.89
Widowed	1.16	1.16	1.16	1.16	1.16
Divorced/separated	2.04	2.05	2.05	2.05	2.04
Married	-	-	-	-	-
participant's level of education High school or less	1.16	1.17	1.17	1.17	1.16
participant's income level					
Low	1.53	1.53	1.53	1.53	1.53
Low average	1.20	1.20	1.20	1.20	1.20
High average	1.25	1.25	1.25	1.25	1.25
High	-	-	-	-	-
history of any chronic illnesses (Yes)	1.08	1.08	1.08	1.08	1.08
Household/parental religiosity Highly religious	1.03	1.03	1.03	1.03	1.02
parental maladjustment (Yes)	1.13	1.17	1.17	1.17	1.16
lifetime depressive disorder (Yes)	1.04	1.05	1.05	1.05	1.04
Physical abuse (Yes)	-	-	1.24	1.24	-
Sexual abuse (Yes)	-	1.06	-	1.06	-
Neglect (Yes)	-	1.13	1.13	-	-

Supplemental table 3: Cell sizes for sexual abuse and neglect by any depressive and anxiety disorders and groups of seeking comfort in religion.

	Any depressive disorders	Any anxiety disorders
Frequently seeking comfort in religion	**N**	**N**
Sexual abuse	12	9
Neglect	8	13
Rarely seeking comfort in religion		
Sexual abuse	0	1
Neglect	0	1

Supplemental Table 4: Sensitivity analysis examining the impact of different sets of confounders on the association between individual CM and adult-onset depressive and anxiety disorders

Models	Any depressive disorders			Any anxiety disorders		
	Physical abuse	Sexual abuse	Neglect	Physical abuse	Sexual abuse	Neglect
	HR (95%CI)	HR (95%CI)	HR (95%CI)	HR (95%CI)	HR (95%CI)	HR (95%CI)
Model 1 – crude	1.89 (1.15 – 3.11)	10.89 (4.09 – 29.06)	1.64 (0.58 – 4.63)	2.54 (1.51 – 4.28)	3.83 (1.15 – 12.83)	3.04 (1.21 – 7.63)
Model 2	2.10 (1.22 – 3.62)	8.23 (3.43 – 19.78)	1.81 (0.65 – 5.07)	3.26 (1.91 – 5.57)	2.14 (.59 – 7.86)	3.72 (1.82 – 7.59)
Model 3	1.69 (1.028 – 2.80)	6.96 (3.04 – 15.94)	1.31 (0.52 – 3.31)	2.81 (1.57 – 5.04)	1.49 (0.39 – 5.59)	2.19 (0.96 – 4.97)
Model 4	1.58 (.98 – 2.57)	6.13 (2.69 – 13.9)	1.24 (0.48 – 3.17)	2.66 (1.49 – 4.72)	1.34 (0.37 – 4.91)	2.03 (0.91 – 4.56)
Model 5	1.08 (0.66 – 1.75)	3.96 (1.58 – 9.93)	0.99 (0.39 – 2.51)	2.33 (1.27 – 4.25)	0.88 (0.25 – 3.05)	2.05 (0.89 – 4.70)
Model 6	0.92 (0.52 – 1.61)	3.72 (1.61 – 8.57)	0.90 (.37 – 2.19)	2.31 (1.26 – 4.23)	0.87 (0.26 – 2.89)	2.03 (0.85 – 4.86)

Model 1: crude

Model 2 (SES): adjusted for age at interview, gender, participant's marital status, participant's level of education, participant's income level

Model 3: same as model 2 + **the other forms of abuse apart from the main exposure**. For example, when the main exposure is physical abuse, the model also adjusts for sexual abuse and neglect. Similarly, when the main exposure is sexual abuse, the model adjusts for physical abuse and neglect.

Model 4: same as model 3 + **chronic illness**.

Model 5: same as model 4 + **lifetime anxiety** for the model with any depressive disorders as an outcome. **Lifetime depressive disorders** with the model with any anxiety disorders as an outcome.

Model 6: same as model 5 + **family characteristics (household/parental religiosity, and parental maladjustment)**

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