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Does Having a Guardian with Cancer Contribute to Heightened Anxiety in Adolescents?

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Abstract: When a guardian is diagnosed with cancer, the emotional and psychological toll they endure can have a profound impact on their children's mental health. Understanding the factors that contribute to heightened anxiety in these children is crucial for identifying mental health disorders early. This cross-sectional study explored the relationship between having a guardian with cancer and elevated anxiety levels in adolescents, accounting for confounding variables such as sex, age, and socioeconomic status. Data were obtained from the 2022 National Health Interview Survey (NHIS) using the Sample Adult Interview (27,651 participants) and Sample Child Interview (7464 participants) datasets. The independent variable (guardian's cancer diagnosis) was derived from the Sample Adult Interview, while the dependent variable (childhood anxiety) and confounders were derived from the Sample Child Interview. Using Stata 16.0, the datasets were merged based on household index variables, yielding a final sample of 4563 participants. Logistic regression analyses assessed the correlation between a guardian's cancer diagnosis and anxiety levels in children. The results show that children with a guardian battling cancer are significantly more likely to develop anxiety (through the use of odds ratio), with the effect size varying based on factors such as sex, income, and environment. Girls, children from lower-income families, and those with a guardian experiencing depression were at particularly high risk. These findings highlight the strong link between familial health challenges and adolescent anxiety, emphasizing the need for early intervention and mental health support in families affected by cancer.

Keywords: anxiety; adolescence; mental health; guardian cancer; depression; health

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1. Introduction

This study aims to investigate the relationship between a guardian's cancer diagnosis and heightened anxiety in adolescents in the United States. While prior research has explored the emotional and psychological responses in children facing parental cancer, a gap remains in understanding the extent to which various factors can exacerbate anxiety in adolescents. It is well-documented that children's anxiety can manifest in emotions such as anger, irritability, and withdrawal, particularly in response to major life stressors like a parent's illness [1]. Misunderstandings about the severity of the disease, disruptions in family communication, and altered social dynamics further contribute to these emotional responses [2–4].

In the United States, nearly 3 million children and adolescents have experienced a guardian's cancer diagnosis [5]. Of adults recently diagnosed with cancer, approximately one in five have children under the age of 18 [5]. These statistics signify the growing prevalence of parental cancer and the pressing need to examine its psychological toll on younger family members. Research from the Centers for Disease Control and Prevention (CDC) shows that one in five children in the U.S. suffers from a mental health disorder, with anxiety and depression being the most common [1].

This research builds on this foundation by not only examining the direct link between a guardian's cancer diagnosis and adolescent anxiety but also exploring how additional factors—such as socioeconomic status, sex, and the guardian's mental health—intensify this relationship. By utilizing the most up-to-date datasets from the 2022 National Health Interview Survey (NHIS), this methodology merges the Sample Adult Interview and Sample Child Interview datasets based on household index variables, enabling a comprehensive analysis that incorporates confounding variables. This approach ensures that the findings are grounded in the most current data available and provide a robust understanding of the interaction between these variables.

The implications of this study extend far beyond the individual family unit. The results should serve as a clarion call to policy leaders, emphasizing the urgent need for transformative changes. These include the equitable distribution of mental health resources among communities, the recognition and dismantling of stigmas surrounding mental illness, and the removal of barriers that hinder effective mental health assessments. Additionally, addressing neighborhood-driven disparities and bridging gaps in healthcare coverage and food assistance programs are essential steps in improving children's anxiety outcomes and fostering a more equitable and supportive environment for all.

By shedding light on the interplay between familial health challenges and broader socioeconomic factors, this research not only deepens our understanding of adolescent mental health but also advocates for systemic policy changes. Ultimately, this study aims to contribute both clinical and public health strategies that can mitigate long-term psychological consequences and promote mental well-being in families impacted by cancer.

2. Literature Review

The significance of a child's mental health challenges becomes particularly pronounced when a guardian is confronted with cancer. This literature review explores the relationship between a guardian's cancer diagnosis and the increased prevalence of anxiety in adolescents. By analyzing recent findings, it aims to identify the key factors contributing to heightened anxiety and provide a foundation for interventions in child psychology.

2.1. Impact of Guardian's Health-Related Quality of Life (HRQOL) on Adolescent Anxiety

In the research conducted by Walczak et al. [6], it highlights that a guardian's cancer diagnosis significantly affects children's psychological well-being. This research identifies depression and anxiety as predominant challenges, particularly in adolescents. Additional studies, such as Hauken et al. [7], emphasize the robust correlation between a low HRQOL index and increased anxiety levels in adolescents, introducing factors like socioeconomic stressors, psychological history, and social interactions, which amplify the link between HRQOL and anxiety.

2.2. Socioeconomic Status and Anxiety in Adolescents

Morris et al. [8] report that adolescents from lower socioeconomic backgrounds face heightened stress when their guardian has cancer, stemming from limited access to healthcare and mental health resources. This socioeconomic strain compounds the emotional burden on these adolescents, increasing their anxiety levels and highlighting the need for targeted interventions to alleviate financial and psychological stress.

2.3. Sex Differences in Adolescent Responses to Guardian's Cancer

Recent research, including Huizinga et al. [9], demonstrates that daughters are more likely to experience heightened anxiety compared to sons when a guardian is diagnosed with cancer. This difference may be linked to the activation of stress response systems, which vary in intensity between the sexes, with daughters showing greater physiological and emotional responses.

2.4. Role of Communication Between Guardian and Child

Effective communication is crucial in mitigating anxiety in adolescents. Hailey et al. [10] emphasizes the importance of transparent, age-appropriate conversations about a guardian's illness. Clear communication fosters better understanding and reduces psychological distress. Failure to adequately address a child's inquiries about their guardian's condition can lead to confusion and increased anxiety.

2.5. Conclusion of Literature Review

The relationship between a guardian's cancer diagnosis and adolescent anxiety is multifaceted, influenced by factors such as HRQOL, socioeconomic status, sex differences, and communication. Future research should focus on developing tailored interventions for families facing cancer, with an emphasis on addressing the unique psychological needs of adolescents. Healthcare professionals must prioritize clear communication and provide resources to support children during these challenging times.

3. Theoretical Framework

When a guardian is diagnosed with cancer, adolescents often experience heightened anxiety due to various psychological, emotional, social, and economic factors. This research focuses on the correlation between a guardian's cancer diagnosis (independent variable) and the resulting anxiety in adolescents (dependent variable). Additionally, the study investigates the mediator variable of deprivation of necessities (e.g., food, shelter, education), examining how it links both the independent and dependent variables.

Figure 1 outlines three different pathways explored in this research. Path A outlines the direct relationship between the guardian's cancer diagnosis and heightened adolescent anxiety. Path B explores how cancer amplifies the deprivation of necessities which, in turn, impacts the adolescent's mental health (Path C).

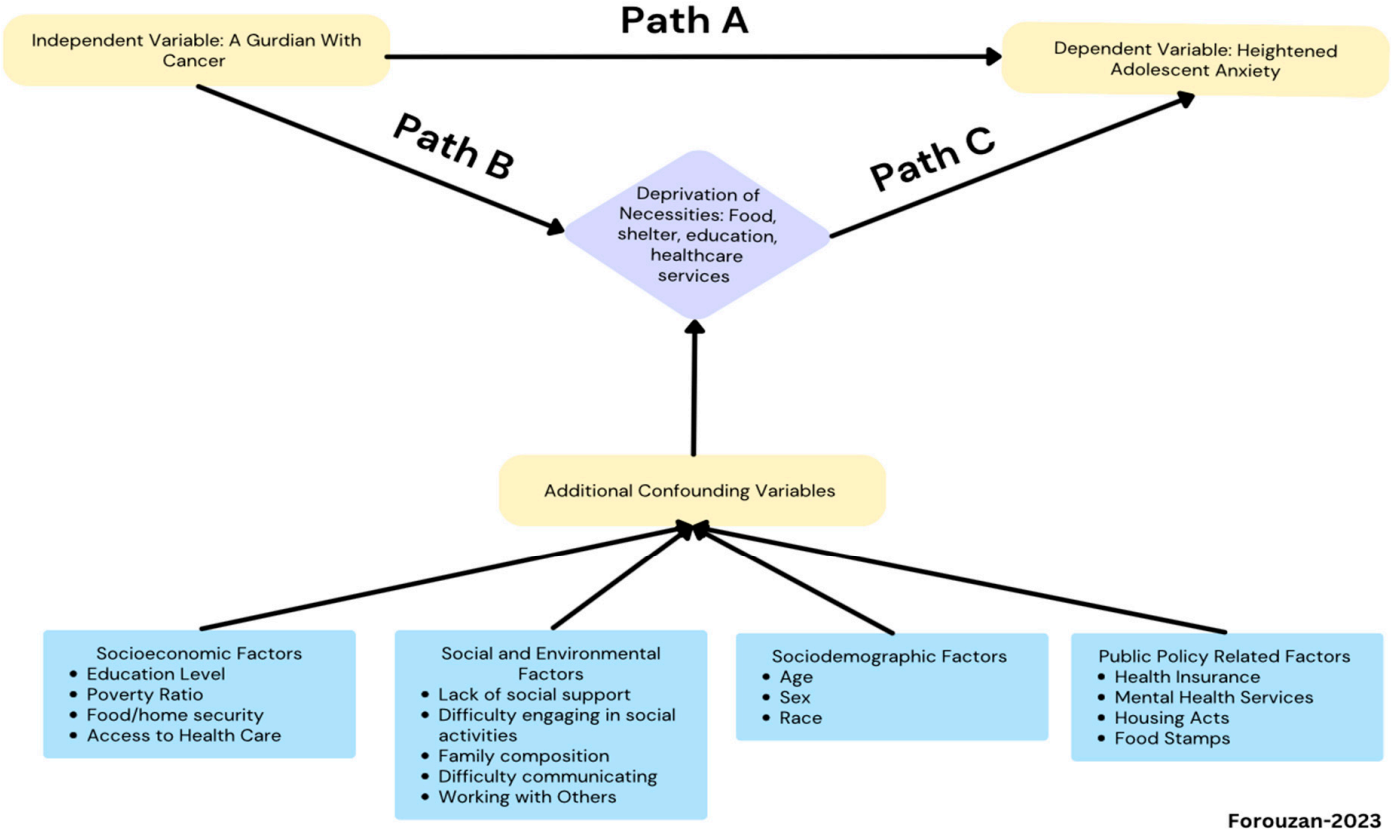

Figure 1. Theoretical framework discussing the correlation of the independent, dependent, control, and confounding variables in relation to the research topic.

3.1. Confounding Factors of This Pathway

The relationship between a guardian's cancer diagnosis and adolescent anxiety is influenced by several confounding variables, including socioeconomic status, social and environmental factors, sociodemographic characteristics, and public policy-related factors. Each of these elements can either exacerbate or mitigate the psychological burden on adolescents, complicating the direct impact of the illness.

First, socioeconomic status (SES) plays a critical role. Adolescents from lower SES backgrounds, characterized by poverty, home insecurity, and limited access to education and healthcare, face amplified stress when their guardian is diagnosed with cancer [11]. The strain of financial instability and inadequate resources adds to the emotional and psychological burden, increasing their vulnerability to anxiety.

Second, social and environmental factors such as lack of social support, disruptions in peer relationships, and disturbances in family dynamics further intensify adolescent anxiety [12]. When family structures are strained by illness, the adolescent's sense of stability and normalcy is often disrupted, which can lead to increased emotional distress and difficulty coping.

Third, sociodemographic factors—including age, sex, and race—also influence how adolescents process and respond to stress. Younger adolescents may struggle more with understanding and processing their guardian's illness, while cultural norms around gender and race may shape how individuals express and manage anxiety.

Finally, public policy-related factors—such as government provisions for healthcare access, mental health services, and food assistance programs—play a vital role in either alleviating or worsening the adolescent's experience [13]. Access to comprehensive healthcare and social services can mitigate the psychological toll by providing much-needed support, while inadequate policies can leave adolescents and their families more vulnerable to the detrimental effects of the illness.

3.2. Theoretical Integration

Several psychological and sociological theories help contextualize how a guardian's cancer diagnosis contributes to adolescent anxiety.

3.3. Socialization Theory and Bronfenbrenner's Ecological Model

This theory emphasizes the role of family dynamics in shaping a child's mental health. Within the context of a guardian's cancer diagnosis, disruptions in communication, emotional availability, and family cohesion significantly impact the child's well-being [14]. This theory aligns with Bronfenbrenner's Ecological Model, which signifies that a child's development is shaped by interactions across various societal levels: microsystem (family, peer group), mesosystem (interaction between family and school), ecosystem (external environments influencing the child indirectly), and macrosystem (broader cultural values and societal norms) [15].

3.4. Stress-Vulnerability Model

Additionally, the stress-vulnerability model highlights how trauma, such as witnessing a parent's cancer treatment, triggers anxiety in adolescents predisposed to psychological stress. The combination of environmental stressors and reduced parental emotional availability may push adolescents toward maladaptive coping mechanisms, leading to heightening anxiety [14].

3.5. Bowen Family Systems Theory

Bowen's theory of family dynamics explores how family interactions such as conflict, inconsistent parenting, and emotional withdrawal can heighten adolescent anxiety in the context of a guardian's illness [16]. For instance, family stressors can magnify internalizing behaviors, leading to increased anxiety, depression, and emotional distress in adolescents.

3.6. Attachment Theory

Attachment theory, particularly the work of Bowlby and Ainsworth, suggests that children develop anxiety when the emotional bond with their caregiver is disrupted [17]. In the context of a guardian's illness, this bond may weaken, leading to heightened insecurity and anxiety. Disrupted or insecure attachment patterns are common when a child's primary caregiver becomes ill, causing adolescents to become more vulnerable to mental health challenges [17].

3.7. Social Learning Theory

Albert Bandura's social learning theory demonstrates that behaviors are learned through observations. In the context of a guardian's illness, adolescents may model the anxiety or distress they observe in their caregiver, reinforcing their own anxious behaviors [18]. Moreover, the absence of positive reinforcement or emotional support from the parent due to illness exacerbates anxiety in the adolescent [18].

3.8. Polyvagal Theory

Polyvagal theory explains how social and physiological factors interplay to influence anxiety. It suggests that reduced parental socialization due to illness disrupts a child's ability to regulate their physiological and emotional responses, leading to maladaptive stress responses [19]. Studies show that parents with cancer often exhibit lower levels of social engagement, contributing to emotional isolation and heightened anxiety in their children [19].

3.9. Cultural and Societal Norms

The cultural perceptions of illness, particularly cancer, profoundly shape how adolescents cope with their guardian's condition. Societal stigma, fear, and culturally ingrained coping mechanisms influence a child's emotional response [20]. For example, societies that stigmatize illness or view cancer as a terminal condition may heighten a child's sense of fear and anxiety regarding their guardian's health. Tailored interventions that address these cultural and societal differences are essential in reducing anxiety in adolescents from diverse backgrounds [21].

3.10. Conclusion of Theoretical Framework

In summary, this theoretical framework synthesizes various factors contributing to adolescent anxiety in the context of a guardian's cancer diagnosis. Theories of socialization, family systems, attachment, and social learning, in conjunction with broader societal and cultural influences, offer a comprehensive understanding of how and why adolescents experience heightened anxiety. Further research will explore these mechanisms, focusing on mitigating the adverse psychological effects through targeted interventions.

4. Data and Methods

4.1. Research Question

This study aimed to investigate the association between a guardian's cancer diagnosis and adolescent anxiety levels. Specifically, the research sought to answer the question: Are adolescents whose guardians have been diagnosed with cancer more likely to exhibit anxiety compared to those whose guardians do not have cancer? Additionally, this study examined how demographic and socioeconomic factors influence anxiety levels in these adolescents.

4.2. Study Design and Data

This study employs a cross-sectional design to investigate the relationship between a guardian's cancer diagnosis and adolescent anxiety levels, using secondary data from the 2022 National Health Interview Survey (NHIS), conducted by the Centers for Disease Control and Prevention (CDC). The central hypothesis is that adolescents whose guardians

have been diagnosed with cancer will exhibit heightened anxiety levels compared to those whose guardians do not have cancer. In addition, this research explores how various demographic and socioeconomic factors might contribute to the observed anxiety levels in these children.

The NHIS, which provides nationally representative data through in-person household interviews, was chosen for its comprehensive health-related content and capacity to assess health outcomes across the U.S. population [22]. The 2022 NHIS includes two key datasets utilized in this study: the Sample Adult Interview and the Sample Child Interview. The Sample Adult Interview provided information on the independent variable, specifically whether a guardian had been diagnosed with cancer. In contrast, the Sample Child Interview offered data on the dependent variable—children's anxiety levels—as well as several confounding variables, such as age, sex, and socioeconomic status, that were included to control for additional factors influencing anxiety.

4.3. Data Sample

Participants were drawn from both the adult and child datasets. The Sample Adult Interview surveyed 27,651 adults, while the Sample Child Interview included responses for 7464 children aged 5 to 17. Each child participant's responses were linked to their corresponding guardian's data using household identifiers. Cases with incomplete linkage or missing data were excluded, resulting in a final analytical sample of 4563 participants.

The sample was geographically and demographically diverse, representing all United States regions and varying levels of urbanization. For the families selected in this study, 30.23% were from large central metro areas, 26.15% from large fringe metro areas, 30.13% from medium and small metro areas, and 13.49% from nonmetropolitan areas [22]. Regional representation included 15.06% from the northeast, 20.44% from the Midwest, 37.29% from the south, and 27.31% from the west [22].

4.4. Variables

- Independent Variable
  - *Adult Cancer Diagnosis:* The NHIS Adult Interview Survey measured cancer diagnosis by asking adults, "Have you ever been told by a doctor or other health professional that you had cancer or malignancy of any kind?" [22]. The possible responses were: 1 = Yes, 2 = No, 7 = Refused, 8 = Not ascertained, and 9 = Don't know. For this study, responses were recoded as follows: 1 = Yes (indicating a history of cancer) and 0 = No (indicating no history of cancer). Refused, Not ascertained, and Don't know responses were excluded from the analysis as they do not contribute meaningfully to testing the hypothesis.
- Dependent Variable
  - *Child Anxiety Status:* Anxiety, as defined by the Mayo Clinic, refers to recurring, severe, and persistent worries or fears about daily situations, potentially disrupting daily life [23]. For children, the NHIS 2022 Child Interview Survey assessed anxiety based on the guardian's report of how frequently the child appeared anxious, nervous, or worried. The survey responses were recorded as 1 = Daily, 2 = Weekly, 3 = Monthly, 4 = A few times a year, 5 = Never, 7 = Refused, 8 = Not ascertained, and 9 = Don't know [22].
    In this study, responses were recoded in Stata 16 to classify the presence or absence of anxiety in a binary format: responses 1 through 4 were recoded as 1 (indicating the presence of anxiety), while response 5 was recoded as 0 (indicating no anxiety). This recoding was performed to streamline the data into meaningful categories that would facilitate analysis, with responses 1–4 collectively representing any observable anxiety. Codes 7, 8, and 9 were excluded from the analysis due to their ambiguous nature and lack of relevance to the study's hypothesis.

By consolidating responses in these two categories, we aimed to generalize anxiety presence and absence effectively, ensuring that any level of reported anxiety, from daily to a few times a year, was captured as a potential area of concern for children.

- Control Variable
  - *Poverty Ratio*: The family poverty ratio, as assessed by the NHIS Child Interview Survey, represents the ratio of family income to the poverty threshold, ranging from 0.00 to 11.00+. Ratios below 11.00 indicate poverty. For analysis, the ratio was categorized as 0 (0.00–10.99) or 1 (11.00 or higher). Ratios above 11.00 reflect greater financial security, and dichotomizing these values allowed for meaningful differentiation in economic status.
- Explanatory Variables
  - *Sex of the Child:* The child's sex was recorded in the NHIS Child Interview Survey based on parental response: 1 = Male, 2 = Female, 7 = Refused, 8 = Not ascertained, and 9 = Don't know [22]. For the analysis, we coded the responses as 0 = Male and 1 = Female. The effect of biological sex on mental health was explored, as sex is a known factor in psychological development.
  - *Race of the Child:* Race was measured in the NHIS Child Interview Survey with the question, "What race does your child identify with?" For Hispanic individuals who did not select a race, their responses were coded as "Not ascertained". The available responses were: 1 = White only, 2 = Black/African American only, 3 = Asian Only, 5 = Asian and other groups, 6 = multiple races, 7 = Refused, 8 = Not ascertained, and 9 = Don't know [22]. For analysis, we used the following categories: 1 = White, 2 = Black/African American, 3 = Asian, 5 = Asian and other groups, and 6 = multiple races. Codes 7, 8, and 9 were excluded from the dataset as they did not provide relevant or eligible information for the hypothesis. It is important to note that Hispanic ethnicity was handled separately from the race variable, and the exclusion of unascertained responses presents a limitation in fully capturing the experiences of all ethnic groups.
  - *Child's General Health Status:* Guardians were asked to rate their child's general health on the following scale: 1 = Excellent, 2 = Very Good, 3 = Good, 4 = Fair, 5 = Poor, 7 = Refused, 8 = Not ascertained, and 9 = Don't know [22]. For analysis, the reponses were recoded as 1 (indicating good health), and response 5 was recoded as 0 (indicating poor health). Responses coded as 7 (Refused), 8 (Not ascertained), and 9 (Don't know) were excluded from the analysis due to their lack of interpretability and relevance to the study's objectives.
    This recoding approach allowed for a simplified binary representation of health status, facilitating a clearer distinction between good and poor health for the purposes of statistical analysis.
  - *Child Depression Status:* Depression, as defined by the Mayo Clinic, is a mood disorder characterized by persistent sadness and a loss of interest in activities [24]. According to the CDC, symptoms of childhood depression include a child feeling sad, disinterested in activities they once enjoyed, or experiencing feelings of helplessness and hopelessness [25]. When these feelings persist, the child may be diagnosed with depression.

In the 2022 NHIS Child Interview Survey, depression was assessed by asking children or their guardians how frequently the child appeared sad or depressed. A follow-up question further inquired about the frequency of these depressive feelings, with response options coded as follows: 1 = Daily, 2 = Weekly, 3 = Monthly, 4 = A few times a year, 5 = Never, 7 = Refused, 8 = Not ascertained, and 9 = Don't know [22]. For this study, responses 1 through 4 were recoded as 1, indicating the child experienced depression. Response 5 was re-coded as 0, indicating no significant depression. Refused, Not ascertained, and Don't know were excluded.

- *Guardian Depression Status:* The survey asked guardians how frequently they felt "really sad or depressed", with follow-up questions regarding the frequency of these feelings. The response options were coded as follows: 1 = Daily, 2 = Weekly, 3 = Monthly, 4 = A few times a year, 5 = Never, 7 = Refused, 8 = Not ascertained, and 9 = Don't know. For the purpose of analysis, responses 1 through 4 were re-coded as 1, indicating the presence of depression. Response 5 was coded as 0, indicating no significant depression. Refused, Not ascertained, and Don't know were excluded.
- *Guardian Anxiety Status:* In the 2022 NHIS Adult Interview Survey, guardians (including those with cancer) were asked how often they felt anxious, nervous, or worried. The survey further probed the frequency of these symptoms, with response options coded as follows: 1 = Daily, 2 = Weekly, 3 = Monthly, 4 = A few times a year, 5 = Never, 7 = Refused, 8 = Not ascertained, and 9 = Don't know. For this analysis, responses 1 through 4 were grouped and re-coded as 1, indicating the presence of anxiety. Response 5 was re-coded as 0, indicating no significant anxiety. Refused, Not ascertained, and Don't know were excluded.
- *Child Behavior Aggression:* In the 2022 National Health Interview Child Survey, data on child aggression were gathered by asking guardians, "Compared with children of the same age, how much does (child name) kick, bite, or hit other children or adults? Would you say: not at all, same or less, more, or a lot more?" Responses were coded as follows: 1 = Not at all, 2 = Same or less, 3 = More, 4 = A lot more, 7 = Refused, 8 = Not ascertained, and 9 = Don't know. For the purpose of this study, response 1 was re-coded as 0, indicating no aggressive behavior. Responses 2 through 4 were grouped and re-coded as 1, indicating the presence of aggressive behavior in the child. Refused, Not ascertained, and Don't know were excluded.
- *Guardian's Social Functioning:* In the 2022 National Health Interview Adult Survey, adult (parent) social functioning was assessed through the question, "Because of a physical, mental, or emotional condition, do you have difficulty participating in social activities such as visiting friends, attending clubs and meetings, or going to parties?" This question aimed to capture the extent to which adults faced difficulties engaging in social activities. Additionally, this variable was analyzed in the context of how a guardian's social functioning, particularly those with cancer, influenced their child's anxiety levels. Response options were coded as follows: 1 = No difficulty, 2 = Some difficulty, 3 = A lot of difficulty, 4 = Cannot do at all, 7 = Refused, 8 = Not ascertained, and 9 = Don't know. For this study, responses were re-coded to simplify the analysis: responses of 1 (no difficulty) were coded as 0, while responses 2, 3, and 4 (any level of difficulty) were grouped together and coded as 1, indicating the presence of some difficulty in social functioning. Refused, Not ascertained, and Don't know were excluded.
- *Urban–Rural Classification Scheme for Participants:* In the 2022 National Health Interview Adult and Child Survey, the data collected provided insights into the urban–rural classification scheme for each family. Urbanization levels were evaluated across four distinct categories: 1 = large central metro, 2 = large fringe metro, 3 = medium and small metro, and 4 = nonmetropolitan areas. This classification allowed for a detailed analysis of the surveyed families' living environments, ranging from densely populated urban centers to nonmetropolitan regions. For the purpose of our hypothesis, the numeric responses remained the same as the original coding provided in the survey. This ensured consistency in interpreting urbanization levels across the categories.
- *Region:* In the 2022 National Health Interview Adult and Child Survey, the data collected provided living regions for each family. Regions were evaluated across four distinct categories: 1 = northwest, 2 = southwest, 3 = northeast, and 4 = southeast. This classification allowed for a detailed analysis of the surveyed families' living environments, ranging from different regions in the United States. For the purpose of our hypothesis, the responses were coded the same.

4.5. Data Analysis

To conduct the analysis, the datasets from the Sample Adult and Sample Child Interviews were merged using household index variables to establish connections between adult and child participants from the same household. Cases without corresponding household identifiers were excluded to ensure data accuracy and reliability. The final dataset used for analysis included 4563 participants, and data analysis was performed using Stata 16.0.

Descriptive statistics were calculated to outline the distribution of key variables, such as demographic characteristics, presence of a guardian's cancer diagnosis, and reported anxiety levels in children. A series of regression analyses were conducted to address the research question: Does having a guardian with cancer contribute to heightened anxiety in adolescents?

Specifically, linear regression models were used to assess the relationship between a guardian's cancer diagnosis and the severity of anxiety symptoms reported in children. Multivariate regression models were employed to account for potential confounding variables, including socioeconomic status, child age, gender, and household structure. By controlling for these factors, the analysis aimed to isolate the impact of a guardian's cancer diagnosis on children's anxiety levels.

This regression approach allowed for a detailed examination of the primary research question while ensuring the findings were robust and reflective of the underlying relationships within the data.

4.6. Ethical Considerations

Ethical considerations were carefully addressed in this research. Since the study relied on publicly available secondary data from the NHIS, which had already been de-identified, no further ethical approval was required. The analysis adhered to the guidelines of the NHIS regarding privacy and protection of human subjects.

5. Results

Descriptive statistics for all variables are reported in Table 1. To address clarity, dichotomized variables (e.g., child anxiety, guardian with cancer) now present the number and percentage of participants responding "yes" or "no" instead of mean and standard deviation, to simplify interpretation.

Table 1. Descriptive statistics of all variables.

Variable	N	Yes (n, %)	No (n, %)
Child Anxiety	4561	1368 (30%)	3193 (70%)
Child Depression	4563	1850 (40.5%)	2713 (59.5%)
Guardian with Cancer	6260	251 (4%)	6009 (96%)
Poverty Status	6247	812 (13%)	5435 (87%)
Guardian Social Functioning	6258	500 (8%)	5758 (92%)
Guardian Depression	6252	502 (8%)	5750 (92%)
Guardian Anxiety	6252	125 (2%)	6123 (98%)
Urban Area	6261	Data in categories (not dichotomized)	
Region	6258	Data in categories (not dichotomized)	
Child Sex	5769	Female: 4095 (71%), Male: 1674 (29%)	
General Health Status of Child	6261	6198 (99%)	63 (1%)
Child Aggressive Behavior	6261	548 (9%)	5713 (91%)

Approximately 30% (1368/4561) of children frequently experienced anxiety, while 4% (251/6260) had a guardian diagnosed with cancer. Among the families surveyed, 13% (812/6247) were living below the poverty line. In terms of social functioning, 8% (500/6258) of guardians were significantly affected, and 2% (125/6248) experienced anxiety.

The sample consisted of 71% female (4095/5769) and 29% male (1674/5769) respondents. Nearly all children (99%, 6198/6261) were reported to be in good health. Additional descriptive data for key variables are detailed in Table 1.

The analysis examined the relationship between a guardian's cancer diagnosis and childhood anxiety, incorporating sociodemographic and psychological factors through three hierarchical regression models. **Model 1** demonstrated that a guardian's cancer diagnosis was significantly associated with increased childhood anxiety ($\beta = 1.479$, SE = 0.214, $p < 0.01$). This model explained 12% of the variance in childhood anxiety, indicating a substantial effect of the guardian's health status on the child's mental health.

In **Model 2**, the inclusion of poverty as a covariate slightly reduced the impact of a guardian's cancer diagnosis ($\beta = 1.434$, SE = 0.209, $p < 0.05$), although the relationship remained significant. Poverty emerged as a significant predictor ($\beta = 1.059$, SE = 0.011, $p < 0.001$), signifying its critical role in influencing childhood anxiety. The addition of this variable improved the model's explanatory power, with the adjusted R^2 increasing to 18%.

Model 3, the fully adjusted model, revealed that the effect of a guardian's cancer diagnosis persisted as a significant factor ($\beta = 1.179$, SE = 0.169, $p < 0.05$), though it was further attenuated when additional predictors were considered. Key predictors that significantly contributed to child anxiety included child depression ($\beta = 2.872$, SE = 0.124, $p < 0.001$), guardian social functioning ($\beta = 0.691$, SE = 0.056, $p < 0.001$), child sex—female ($\beta = 1.454$, SE = 0.101, $p < 0.001$), and living in an urban area ($\beta = 1.109$, SE = 0.039, $p < 0.001$). This model explained 29% of the variance in childhood anxiety, reflecting a comprehensive understanding of the contributing factors.

These findings signify the multifaceted nature of childhood anxiety in the context of a guardian's cancer diagnosis. While the diagnosis itself plays a direct role, the effect diminishes when broader sociodemographic and psychological factors are accounted for. Significant predictors such as child depression, guardian social functioning, and poverty highlight the necessity of addressing family-wide mental health challenges and socioeconomic disparities.

The Figure 2 presents the relationship between a guardian's cancer status and the presence of anxiety in children. The *x*-axis categorizes guardian cancer status (0 = no cancer, 1 = cancer), while the *y*-axis indicates the percentage of children who reported experiencing anxiety.

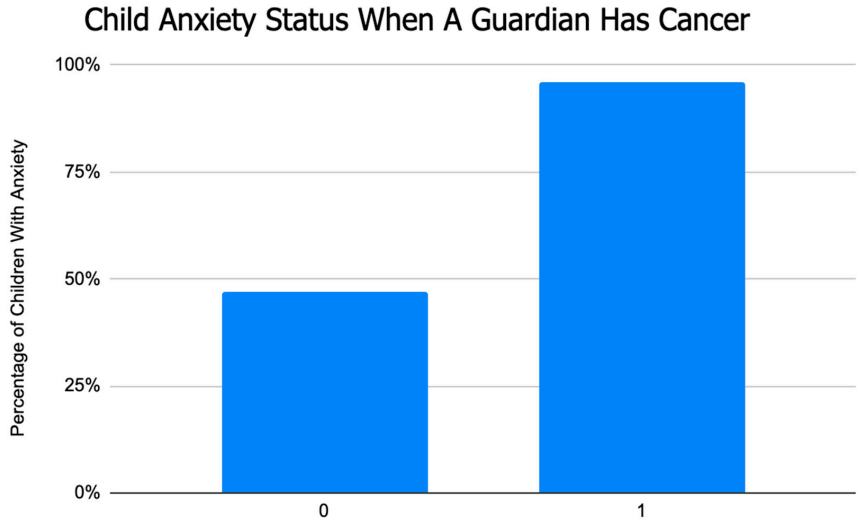

Figure 2. Bar graph: correlation between having a guardian with cancer and a child's anxiety status.

The graph reveals approximately double the prevalence of anxiety among children with a guardian diagnosed with cancer compared to those without such a diagnosis. This distinction signifies the significant emotional burden associated with having a guardian undergoing cancer treatment. Statistical analysis further supports this finding, indicating that the observed difference is both substantial and relevant to the research topic. These results align with the hypothesis that a guardian's cancer diagnosis is a significant contributing factor to heightening anxiety levels in adolescents, reinforcing the need for targeted interventions in this vulnerable population.

The regression analysis examines the association between having a guardian with cancer and childhood depression across three models while controlling for additional variables. In **Model 1**, having a guardian with cancer was significantly associated with increased childhood depression ($\beta = 1.479$, SE = 0.175, $p < 0.01$). This relationship persisted in **Model 2** ($\beta = 1.479$, SE = 0.175, $p < 0.01$), which incorporated poverty as an additional control variable, indicating that socioeconomic status did not attenuate this effect. However, in **Model 3**, after accounting for childhood anxiety, general child health, and guardian mental health factors, the association between a guardian with cancer and child depression become non-significant ($\beta = 0.101$, SE = 0.222).

Key variables introduced in **Model 3** further clarified contributors to childhood depression. Childhood anxiety exhibited a strong positive relationship with childhood depression ($\beta = 2.872$, SE = 0.124, $p < 0.001$), as did guardian depression ($\beta = 1.176$, SE = 0.031, $p < 0.001$). Other significant predictors included general child health ($\beta = 1.505$, SE = 0.636, $p < 0.05$), child sex ($\beta = 1.440$, SE = 0.104, $p < 0.001$), child race ($\beta = 1.116$, SE = 0.230, $p < 0.05$), and child aggressive behavior ($\beta = 1.11$, SE = 0.251, $p < 0.05$). A correlation table displaying the relationships among all variables is provided in Appendix A, offering a comprehensive overview of their interconnections.

Compared to the analysis of child anxiety in Table 2, the findings suggest that while having a guardian with cancer is a significant predictor of childhood depression in simpler models, this relationship diminishes when other psychological and health factors are considered. In contrast, the association between a guardian with cancer and childhood anxiety may remain significant in comparable models, indicating differential pathways by which parental health impacts child mental health outcomes.

The adjusted R^2 values across the three models ranged from 0.29 to 0.34, suggesting a moderate explanatory power of the predictors for childhood depression. The F-statistics, which were significant across all models (**Model 1:** 15.32; **Model 2:** 14.89; **Model 3:** 12.45), support the overall robustness of the regression analyses. These results highlight the complex interplay of guardian health, child health, and psychological factors in shaping childhood depression outcomes.

The regression analysis investigates the relationship between having a guardian with cancer and general child health (GCH) across three models, controlling for key variables, and compares these findings to childhood anxiety and depression regressions.

In **Model 1**, having a guardian with cancer was positively but marginally significant associated with poorer GCH ($\beta = 1.028$, SE = 0.228, $p = 0.05$). This association remained stable in **Model 2** ($\beta = 1.03$, SE = 0.103, $p = 0.05$), even after controlling for poverty, which was itself significantly associated with poorer GCH ($\beta = 0.527$, SE = 0.169, $p < 0.01$). However, in **Model 3**, the inclusion of psychological and behavioral variables reduced the significance of the association between a guardian with cancer and GCH ($\beta = 1.07$, SE = 0.402, $p = 0.10$), suggesting that much of the initial effect is mediated by other factors.

Among these additional variables, childhood anxiety and childhood depression were both significant predictors of poorer GCH in **Model 3**. Childhood anxiety exhibited a positive but non-significant relationship, while childhood depression showed a significant positive association. Guardian-related factors, including social functioning, anxiety, and depression, did not significantly predict GCH in the final model. A correlation table displaying the relationships among all variables is provided in Appendix B, offering a comprehensive overview of their interconnections.

Table 2. Regression statistics of a child's anxiety status when their guardian has cancer.

Variable	Model 1 (Child Anxiety)	Model 2 (Child Anxiety)	Model 3 (Child Anxiety)
Guardian With Cancer	1.479 ** (0.214, $p < 0.01$)	1.434 * (0.209, $p < 0.05$)	1.179 * (0.169, $p < 0.05$)
Poverty		1.059 *** (0.011, $p < 0.001$)	1.080 *** (0.013, $p < 0.001$)
General Child Health			0.262 (0.054, $p = 0.06$)
Guardian Social Functioning			0.691 *** (0.056, $p < 0.001$)
Guardian Anxiety			1.088 ** (0.040, $p < 0.01$)
Guardian Depression			0.872 * (0.032, $p < 0.05$)
Urban Area			1.109 *** (0.039, $p < 0.001$)
Region			0.452 (0.004, $p = 0.92$)
Child Sex			1.454 *** (0.101, $p < 0.001$)
Child Race			0.890 *** (0.025, $p < 0.001$)
Child Depression			2.872 *** (0.124, $p < 0.001$)
Child Aggressive Behavior			1.063 * (0.060, $p < 0.05$)
Constant	1.825 *** (0.044)	1.830 *** (0.071)	3.296 (0.861)
Adjusted R^2	0.12	0.18	0.29
F-Statistic	32.15	42.67	72.38
Observations	4555	4542	4165

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. Standard errors are in parentheses.

Additionally, when comparing this analysis to previous regressions on child anxiety (Table 1) and child depression (Table 3), distinct patterns emerge. For child anxiety, the presence of a guardian with cancer remained a significant predictor across all models, indicating a direct and robust relationship. In contrast, for child depression, the significance of having a guardian with cancer diminished after accounting for child anxiety and other psychosocial factors, suggesting that the effect may be indirect and mediated by overlapping variables such as anxiety or general health.

For GCH, the results bridge these patterns. The effect of having a guardian with cancer is more modest and sensitive to the inclusion of additional controls, particularly behavioral and psychological variables. This indicates that while a guardian's cancer status is associated with poorer GCH initially, much of this relationship is likely explained by child-level psychological factors, such as depression.

Table 3. Regression statistics of a child's depression status when their guardian has cancer.

Variable	Model 1 (Child Depression)	Model 2 (Child Depression)	Model 3 (Child Depression)
Guardian With Cancer	1.479 ** (0.175, $p < 0.01$)	1.479 * (0.175, $p < 0.01$)	0.101 (0.222, $p = 0.52$)
Poverty		0.001 (0.014, $p = 0.28$)	0.026 (0.018, $p = 0.36$)
General Child Health			1.505 * (0.636, $p < 0.05$)
Guardian Social Functioning			1.283 ** (0.107, $p < 0.01$)
Guardian Anxiety			0.107 (0.022, $p = 0.82$)
Guardian Depression			1.176 *** (0.031, $p < 0.001$)
Urban Area			0.005 (0.052, $p = 0.72$)
Region			0.023 (0.051, $p = 0.68$)
Child Sex			1.440 *** (0.104, $p < 0.001$)
Child Race			1.116 * (0.23, $p < 0.05$)
Child Anxiety			2.872 *** (0.124, $p < 0.001$)
Child Aggressive Behavior			1.11 * (0.251, $p < 0.05$)
Constant	1.825 *** (0.044)	1.830 *** (0.071)	0.296 (0.861)
Adjusted R^2	0.32	0.34	0.29
F-Statistic	15.32	14.89	12.45
Observations	4555	4542	4165

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. Standard errors are in parentheses.

Across all models in Table 4, the adjusted R^2 values ranged from 0.29 to 0.34 with F-statistics indicating strong model significance (**Model 1**: F = 16.78; **Model 2**: F = 15.45; **Model 3**: F = 13.89). A correlation table displaying the relationships among all variables is provided in Appendix C, offering a comprehensive overview of their interconnections. These findings suggest that the predictors included in the models account for a moderate proportion of the variance in general child health. These results signify the complexity of how a guardian's cancer diagnosis impacts child outcomes, with the mediating effects of psychological and behavioral factors playing a significant role.

Table 4. Regression statistics of a child's general health (GCH) when their guardian has cancer.

Variable	Model 1 (GCH)	Model 2 (GCH)	Model 3 (GCH)
Guardian With Cancer	1.028 (0.228, $p = 0.05$)	1.028 (0.228, $p = 0.05$)	1.07 (0.402, $p = 0.10$)
Poverty		0.527 ** (0.169, $p < 0.01$)	0.647 ** (0.211, $p < 0.01$)
Child Anxiety			0.341 (0.177, $p = 0.05$)
Child Depression			0.369 * (0.161, $p < 0.05$)
Guardian Social Functioning			0.593 (0.635, $p = 0.20$)
Guardian Anxiety			0.154 (0.166, $p = 0.30$)
Guardian Depression			0.005 (0.052, $p = 0.72$)
Urban Area			0.171 (0.153, $p = 0.25$)
Region			0.391 (0.255, $p = 0.12$)
Child Sex			0.028 (0.531, $p = 0.80$)
Child Race			0.104 (0.239, $p = 0.60$)
Child Aggressive Behavior			0.162 * (0.045, $p < 0.05$)
Constant	5.753 *** (0.230)	4.440 *** (0.368)	3.687 (3.344)
Adjusted R^2	0.31	0.34	0.29
F-Statistic	16.78	15.45	13.89
Observations	6260	6246	4165

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. Standard errors are in parentheses.

6. Discussion

This study provides significant insights into how a guardian's cancer diagnosis impacts adolescent anxiety, particularly within the context of socioeconomic challenges and other intersecting stressors. The primary hypothesis—that adolescents with a guardian diagnosed with cancer would experience heightened anxiety, with factors such as poverty exacerbating this effect—was supported. The data show that socioeconomic status played a pivotal role in amplifying anxiety levels, even when additional variables such as guardian social functioning, guardian depression, child aggressive behavior, and urbanization were accounted for. This reinforces the idea that poverty is the most influential factor in determining adolescent anxiety in these cases.

6.1. Hypotheses and Results

The findings corroborate the hypothesis that adolescents with a guardian diagnosed with cancer exhibit higher anxiety levels, particularly in financially disadvantaged families. As indicated by the statistical models (Table 2), poverty emerged as the dominant factor in explaining anxiety. While other variables—such as poor social functioning and urbanization—were significant, poverty remained the most critical determinant. These results align

with the socioeconomic stress mode, which highlights that financial hardship increases chronic stressors, particularly when compounded by the medical costs and emotional strain associated with a guardian's cancer diagnosis [26]. This model explains how adolescents in low-income families face heightened levels of anxiety due to a lack of resources and support.

6.2. Comparison with Previous Research

Several prior studies have explored the relationship between a guardian's illness and adolescent anxiety, particularly under socioeconomic stress. Reife et al. [27] identified that children with ill guardians experience elevated anxiety, especially when coupled with limited social support and poverty. This study extends those findings by highlighting the interaction between additional factors like social functioning, urbanization, and child behavior, confirming the role that socioeconomic and familial dynamics play in mental health outcomes [28].

For example, Erikson's Psychosocial Development Theory emphasizes the disruption caused by poverty in a child's developmental environment, which is consistent with the study's findings. Adolescents in financially unstable households face unmet basic needs and reduced opportunities for education and social interaction, which are critical for healthy psychological development [29]. These disruptions lead to increased emotional challenges, including anxiety, as demonstrated in the current study.

6.3. Theoretical Implications

The findings support several theoretical frameworks that help explain the mechanisms underlying adolescent anxiety in families where a guardian has cancer. Social Support Theory is especially relevant, as it illustrates how the lack of robust social networks intensifies anxiety. Families in lower-income brackets often face isolation, with fewer resources available to help them cope with the stress of cancer, which increases the psychological burden on adolescents [27]. This demonstrates the need for community mental health initiatives that specifically target children in these situations, offering both emotional and practical support.

Furthermore, Social Learning Theory explains how their guardians' experiences influence children's behavior. Adolescents often mimic the emotional responses of their caregivers, and when guardians are emotionally unavailable due to their illness, children may exhibit heightened anxiety and stress [28]. This study's findings support this theory, as poor social functioning in guardians was correlated with higher levels of anxiety in their children.

6.4. Guardian Mental Health and Family Systems Theory

The mental health of the guardian was another significant predictor of adolescent anxiety, consistent with the Parental Stress and Coping Model, which suggests that parents under extreme stress may be less capable of attending to their children's emotional needs [30]. When guardians are overwhelmed by their illness, their limited emotional availability exacerbates the child's anxiety, as predicted by the Family Systems Theory. This theory signifies that the mental health of any family member, especially a primary caregiver, affects the overall family dynamic [31]. In this context, interventions targeting both the patient and the family are crucial for alleviating the child's mental health burden.

6.5. Comorbidity, Cognitive Vulnerability, and Attachment Theories

The comorbidity of anxiety and depression in adolescents observed in this study highlights the relevance of the Comorbidity Theory [32]. Adolescents with depression, likely exacerbated by their guardian's illness, displayed heightened anxiety, underscoring the intersection of these mental health challenges. Cognitive Vulnerability Theory adds another layer of understanding by suggesting that adolescents exposed to stressors like a guardian's illness develop maladaptive cognitive patterns that make them more susceptible to both anxiety and depression [33].

Additionally, Attachment Theory provides insight into the relationship between a child and their ill guardian. Disruptions in the secure attachment between parent and child, caused by the guardian's illness and emotional unavailability, contribute to increased anxiety [34]. This is supported by the study's findings, which highlight the importance of emotional consistency in reducing adolescent anxiety, further emphasizing the need for family-centered mental health interventions.

6.6. Limitations of the Study

Several limitations of this study should be acknowledged. First, the cross-sectional design limits the ability to infer causality, as the relationships between variables represent only a glimpse in time, rather than a progression of experiences or outcomes. Future longitudinal studies are needed to establish better causal links between a guardian's cancer diagnosis and adolescent anxiety.

The sample size, though adequate for the analysis, may not fully capture the socio-economic and cultural diversity of broader populations, which limits the generalizability of the findings. Moreover, selection bias could be present, as families experiencing extreme financial hardship or severe emotional distress may have been less likely to participate, potentially skewing the results.

Another limitation lies in the racial diversity and categorization within the sample. The National Health Interview Survey (NHIS) used two separate questions to assess race and ethnicity. The question, "What race would you identify as" placed Hispanic participants under the "Other Races" category, without a specific Hispanic section. While a follow-up question asked about Hispanic origin, the results of this question asked about Hispanic origin, the results of this question were not incorporated into the primary race categorization, limiting the accuracy of racial and ethnic distinctions in the analysis.

Additionally, the reliance on self-reported measures may have introduced response bias, as participants might have underreported or overreported their symptoms due to social desirability or recall challenges. Future studies should aim to include more objective measures of psychological well-being and use larger, more diverse samples to improve the robustness and generalizability of the findings. Employing longitudinal methods could also provide deeper insights into the long-term impacts of a guardian's illness on adolescent mental health.

6.7. Future Research Direction

This study opens several avenues for future research. One important direction is a deeper exploration of the role of urbanization in adolescent anxiety. According to Social Disorganization Theory, urban environments may weaken social bonds, increasing stress and anxiety [35]. Future studies could investigate how specific environmental factors within urban areas—such as crime rates, pollution, or access to green spaces—impact adolescent mental health.

In addition, further research is needed to explore the intersection of race, gender, and socioeconomic status in these outcomes. While this study found higher anxiety levels in females, it also pointed to discrepancies in racial anxiety patterns that warrant further investigation. Future research should explore how these demographic variables intersect with guardian illness to shape adolescent mental health, using larger and more representative samples.

This study provides critical evidence that a guardian's cancer diagnosis significantly impacts adolescent anxiety, with poverty, social functioning, and comorbid mental health issues serving as key contributors. Through the application of severe psychological and sociological theories, this research enhances our understanding of the complex interplay between environmental and familial factors in adolescent mental health. These findings signify the urgent need for mental health interventions that target both the child and the family system, particularly for those in economically disadvantaged households. Future research should continue to explore these dynamics, incorporating more diverse samples

and longitudinal designs to fully understand the long-term impacts of a guardian's cancer diagnosis on adolescent well-being.

7. Conclusions

This study provides valuable insights into the heightened anxiety experienced by adolescents when their guardians are diagnosed with cancer, emphasizing the need for targeted interventions to support mental well-being. The findings highlight the importance of addressing structural inequalities that exacerbate the stress experienced by these families. Specifically, policy improvements in health insurance coverage and the Supplemental Nutrition Assistance Program (SNAP) for families in economic limbo—those too financially strained to afford necessities but ineligible for assistance—are crucial. Ensuring access to affordable healthcare and essential resources like food may mitigate some of the psychological and emotional challenges faced by children in these families.

Moreover, this study emphasizes the significance of addressing neighborhood-driven health disparities by investigating local infrastructure and resources that promote healthier living environments. Achieving gender pay equity and implementing policies such as increasing the minimum wage, expanding job opportunities, and improving access to affordable childcare and housing are also essential to reducing financial stress on families. Such measures could allow caregivers to devote more time and attention to their children, improving overall family dynamics and emotional well-being.

However, this study has limitations that should be acknowledged. Its cross-sectional design does not allow for casual inferences, limiting the ability to fully explore how a guardian's cancer diagnosis directly affects adolescent anxiety over time. Additionally, the reliance on parental reports of mental health diagnoses introduces potential bias, as parents may underreport or misinterpret symptoms due to stigma or cultural beliefs. Future research would benefit from more direct assessments of child mental health, perhaps through clinician-administered interviews or standardized diagnostic tools. Lastly, the study's reliance on secondary data restricted the depth of exploration, pointing to the need for comprehensive, longitudinal studies that can provide a clearer picture of the long-term effects of a guardian's cancer diagnosis on adolescent mental health.

In summary, while this study sheds light on an important issue, addressing these limitations in future research is essential to developing more effective interventions and policy changes aimed at protecting the mental well-being of adolescents with guardians facing serious health challenges.

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Data Availability Statement: This open access public data set on survey results by National Health Interview Survey (CDC) can be found on https://www.cdc.gov/nchs/nhis/about_nhis.htm (accessed date: 22 September 2023).

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Appendix A. Correlation Matrix of Guardian's Cancer Diagnosis and Adolescent Anxiety Across Various Explanatory Variables

	CA	GC	PS	GSF	CD	GA	UA	SC	RC	GHS
Child Anxiety (CA)	1									
Guardian with Cancer (GC)	0.03	1								
Poverty Status (PS)	0.07	0.04	1							
Guardian Social Functioning (GSF)	−0.09	−0.07	0.13	1						
Child Depression (CD)	0.05	0	−0.14	−0.08	1					
Guardian Anxiety (GA)	−0.18	−0.03	−0.08	0.09	−0.09	1				
Urban Area (UA)	0.04	0.04	−0.19	−0.06	0.01	0.01	1			
Sex of Child (SC)	0.08	0	0	−0.02	0.02	0.02	0	1		
Race of Child (RC)	−0.08	−0.02	−0.01	−0.03	−0.04	0.05	−0.12	0.07	1	
General Health Status of Child (GHS)	−0.06	−0.01	0.05	0	−0.03	0	0.01	−0.01	0.08	1

The correlation graph reveals a 3% correlation between a guardian having cancer and childhood anxiety. When the additional variable of poverty is introduced to child anxiety and guardian cancer, the correlation increases to 9%. Additionally, the relationship between poverty and guardianship with cancer shows a 4% correlation.

The variables of child behavior (aggression), guardian depression, and region are not depicted in this correlation graph.

Appendix B. Correlation Matrix of Guardian's Cancer Diagnosis and Adolescent Depression Across Various Explanatory Variables

	CD	GC	PS	GSF	CA	GA	UA	SC	RC	GHS
Child Depression (CD)	1									
Guardian with Cancer (GC)	0.0280	1								
Poverty Status (PS)	−0.0039	0.0453	1							
Guardian Social Functioning (GSF)	−0.1174	−0.0078	0.1266	1						
Child Anxiety (CA)	0.4733	−0.0311	−0.0760	0.0905	1					
Guardian Anxiety (GA)	−0.1098	0.0445	0.0744	−0.0084	−0.1960	1				
Urban Area (UA)	0.2660	0.0299	−0.1873	−0.0619	0.0001	0.0371	1			
Sex of Child (SC)	0.0913	0.0345	−0.0197	0.0149	0.0122	0.0135	−0.0807	1		
Race of Child (RC)	−0.0211	0.058	−0.0098	0.0334	0.0539	0.0280	0.0038	0.0038	1	
General Health Status of Child (GSH)	−0.0782	−0.005	0.0486	0.0042	−0.0027	0.037	−0.0553	−0.0553	0.071	1

The variables of child behavior (aggression), guardian depression, and region are not depicted in this correlation graph.

Appendix C. Correlation Matrix of Guardian's Cancer Diagnosis and Adolescent General Health Across Various Explanatory Variables

	GHS	GC	PS	GSF	CA	GA	UA	SC	RC	CD
General Health Status of Child (GHS)	1									
Guardian with Cancer (GC)	−0.0050	1								
Poverty Status (PS)	0.0486	0.0453	1							
Guardian Social Functioning (GSF)	−0.0042	−0.0728	0.1260	1						
Child Anxiety (CA)	−0.0027	0.0311	−0.0761	0.0905	1					
Guardian Anxiety (GA)	−0.012	0.053	−0.0299	0.0844	0.1960	1				
Urban Area (UA)	0.1140	−0.0445	0.1873	0.0699	0.149	−0.0807	1			
Sex of Child (SC)	−0.00065	−0.00051	−0.0239	0.0149	−0.0002	−0.0007	0.024	1		
Race of Child (RC)	0.0071	−0.0239	−0.0098	−0.0332	0.22	0.12	0.0727	0.0124	1	
Child Depression (CD)	−0.028	0.0039	0.1174	0.1098	−0.0539	0.0266	0.0096	0.0913	0.0211	1

The variables of child behavior (aggression), guardian depression, and region are not depicted in this correlation graph.

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