Anxiety disorder agreement among children with chronic physical illness and their parents

by

Reese Parks

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Author's Declaration

This thesis consists of material all of which I authored or co-authored: see Statement of Contributions included in the thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Statement of Contributions

This thesis was conducted by Reese Parks in collaboration with her supervisor, Dr. Mark Ferro, and with guidance from advisory committee members, Dr. Chris Perlman and Dr. Hao Luo.

Abstract

Background: Assessment of child psychopathology using multiple informants provides a more comprehensive and accurate evaluation of child mental health; however, parent-child agreement is low-to-moderate in child psychiatry and tends to be lower for internalizing disorders. Children with chronic physical illness (CPI) are at an elevated risk of developing anxiety disorders, making accurate assessment especially important in this population. Despite this, longitudinal patterns and determinants of parent-child agreement in children with CPI remain underexplored.

Objectives: The objectives of this thesis were to: (1) Estimate the magnitude of informant agreement for anxiety disorders on the Mini-International Neuropsychiatric Interview for Children and Adolescents (MINI-KID) between parents and children with CPI at baseline, 6, 12, 24, and 48 months, (2) Explore whether child sex moderates parent-child agreement, and (3) Identify sociodemographic and health factors associated with parent-child disagreement for anxiety disorders on the MINI-KID over time.

Methods: Data for 119 dyads came from the Multimorbidity in Youth Across the Life-course (MY LIFE) study, a longitudinal study of children aged 2 to 16 years who had been diagnosed with a CPI and their primary caregiver. The prevalence-adjusted bias-adjusted kappa (PABAK) estimated the magnitude of agreement between parents and children with CPI at baseline, 6, 12, 24, and 48 months. Sex-stratified agreement analyses were conducted using the PABAK to investigate whether parent-child agreement was moderated by child sex. The method of variance estimates recovery (MOVER) was used to construct a confidence interval for the difference in κ estimates between male and female children at each timepoint. A generalized estimating equations model examined factors associated with parent-child disagreement over time.

Results: Agreement ranged from fair to substantial over time (κ = 0.40-0.65). For male children, agreement was moderate to almost perfect (κ = 0.47-0.82), whereas for female children, fair to moderate agreement was observed (κ = 0.32-0.51). Moderation by child sex was only found at 6 and 48 months. Compared to baseline, time at 6 months (OR = 0.46, 95% CI = 0.23-0.91, p = 0.026) and 12 months (OR = 0.55, 95% CI = 0.31-0.97, p = 0.040) were associated with lower odds of disagreement. Female children were found to have significantly higher odds of disagreement compared to male children (OR = 2.04, 95% CI = 1.20-3.46, p = 0.008). Parents who were not partnered had lower odds of disagreement relative to partnered parents (OR = 0.27, 95% CI = 0.10-0.71, p = 0.008). Higher levels of parent psychopathology were also associated with increased odds of disagreement (OR = 1.15, 95% CI = 1.01-1.31, p = 0.032).

Conclusion: Parent-child agreement ranged from low-to-substantial and varied over time. Moderation by child sex was only evident at 6 and 48 months. Predictors of parent-child disagreement may help identify dyads who may be at greater risk for informant discrepancies. Future research should examine the underlying mechanisms driving parent-child disagreement to inform targeted interventions that help strengthen agreement among parents and children with CPI.

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Table 1: Baseline demographic characteristics of the MY LIFE sample

Characteristic	**Mean (SD)**
Child age, years	13.4 (2.2)
Parent age, years	44.3 (5.8)
Years since child diagnosis	6.0 (5.0)
Characteristic	**N (%)**
Female child	59 (49.6)
Female parent	107 (89.9)
Immigrant child	13 (10.9)
Immigrant parent	21 (17.7)
Caucasian child	103 (86.6)
Caucasian parent	104 (87.4)
Biological parent	116 (97.5)
Married/common-law parent	103 (86.6)
Postsecondary graduate	85 (71.4)
Household income ≥$90,000	67 (56.3)
Child diagnosis	
Rheumatological	37 (31.1)
Respiratory	17 (14.3)
Neurological	7 (5.9)
Hematological	16 (13.5)
Gastroenterological	16 (13.5)
Endocrine	20 (16.8)
Dermatological	6 (5.0)

Table 2: Dyad responses on the MINI-KID

Timepoint	Agreement Count (%)		Disagreement Count (%)		Missing (n [%])
	Parent: Yes Child: Yes	**Parent: No Child: No**	**Parent: No Child: Yes**	**Parent: Yes Child: No**	
Baseline	10 (8.62)	71 (61.21)	11 (9.48)	24 (20.69)	3 (2.52)
6 months	15 (13.63)	76 (69.10)	7 (6.36)	12 (10.91)	9 (7.56)
12 months	12 (10.91)	77 (70.0)	7 (6.36)	14 (12.73)	9 (7.56)
24 months	11 (10.58)	68 (65.38)	17 (16.35)	8 (7.69)	15 (12.61)
48 months	15 (16.85)	57 (64.04)	12 (13.48)	5 (5.62)	30 (25.21)

Table 3: Parent-child MINI-KID agreement across timepoints

Timepoint	**κ**	**95% CI**
Baseline	0.40	0.23, 0.56
6 months	0.65	0.51, 0.80
12 months	0.62	0.47, 0.77
24 months	0.52	0.36, 0.68
48 months	0.62	0.45, 0.78

Table 4: Dyad responses on the MINI-KID by child sex

Timepoint	Agreement Count (%)		Disagreement Count (%)		Missing (n [%])
	Parent: Yes Child: Yes	Parent: No Child: No	Parent: No Child: Yes	Parent: Yes Child: No	
Males					
Baseline	6 (10.0)	38 (63.33)	3 (5.0)	13 (21.67)	0 (0)
6 months	6 (10.71)	45 (80.36)	1 (1.79)	4 (7.14)	4 (6.67)
12 months	3 (5.26)	46 (80.70)	1 (1.75)	7 (12.28)	3 (5.0)
24 months	2 (3.77)	39 (73.58)	6 (11.32)	6 (11.32)	7 (11.67)
48 months	4 (9.09)	36 (81.82)	4 (9.09)	0 (0.0)	16 (26.67)
Females					
Baseline	4 (7.14)	33 (58.93)	8 (14.29)	11 (19.64)	3 (5.08)
6 months	9 (16.67)	31 (57.41)	6 (11.11)	8 (14.81)	5 (8.47)
12 months	9 (16.98)	31 (58.49)	6 (11.32)	7 (13.21)	6 (10.17)
24 months	8 (15.69)	30 (58.82)	10 (19.61)	3 (5.88)	8 (13.56)
48 months	11 (24.44)	21 (46.67)	8 (17.78)	5 (11.11)	14 (23.73)

Table 5: Parent-child MINI-KID agreement by child sex and MOVER moderation analysis across timepoints

	Males		Females		Δκ	95% CI
Timepoint	**κ**	**95% CI**	**κ**	**95% CI**		
Baseline	0.47	0.24, 0.69	0.32	0.07, 0.57	-0.15	-0.48, 0.19
6 months	0.82	0.67, 0.97	0.48	0.25, 0.72	-0.34	-0.62, -0.06
12 months	0.72	0.54, 0.90	0.51	0.28, 0.74	-0.21	-0.50, 0.08
24 months	0.55	0.32, 0.77	0.49	0.25, 0.73	-0.06	-0.39, 0.62
48 months	0.82	0.65, 0.99	0.42	0.16, 0.69	-0.40	-0.71, -0.09

Table 6: Generalized estimating equations model of parent-child disagreement

Characteristic	OR (95% CI)	*p*-value
Time [a]		
6 months	0.46 (0.23, 0.91)	0.026
12 months	0.55 (0.31, 0.97)	0.040
24 months	0.68 (0.35, 1.32)	0.259
48 months	0.45 (0.20, 1.03)	0.060
Child		
Age, years	1.03 (0.91, 1.17)	0.658
Female child	2.04 (1.20, 3.46)	0.008
Illness duration	1.02 (0.97, 1.08)	0.401
Disability, WHODAS 2.0	1.07 (0.92, 1.24)	0.377
Parent		
Immigrant	1.61 (0.85, 3.06)	0.145
Not partnered	0.27 (0.10, 0.71)	0.008
Not postsecondary graduate	1.61 (0.90, 2.89)	0.109
Household income < $90,000	0.53 (0.28, 1.03)	0.063
Parenting stress, PSS	1.12 (0.99, 1.28)	0.075
Psychopathology, CES-D and GAD-7	1.15 (1.01, 1.31)	0.032

[a] Baseline was the reference category for time

List of Abbreviations

CES-D	Center for Epidemiologic Studies Depression Scale
CI	Confidence Interval
CPI	Chronic Physical Illness
GAD-7	Generalized Anxiety Disorder – 7 items
MINI-KID	Mini International Neuropsychiatric Interview for Children and Adolescents
MOVER	Method of variance estimates recovery
MY LIFE	Multimorbidity in Children and Youth Across the Life-course
PABAK	Prevalence-adjusted bias-adjusted kappa
PSS	Parental Stress Scale
WHODAS	World Health Organization Disability Assessment Schedule

Background

1.1 Introduction

The use of multiple informants in assessments of child psychopathology help provide a more comprehensive, well-rounded, and accurate assessment of child mental health.[1] Despite the advantages of using multiple informants, discrepancies between informants are common, and several studies suggest that parent-child agreement is low-to-moderate in child psychiatry, with agreement findings ranging from $\kappa = 0.2\text{-}0.35$.[2-15] Due to externalizing disorders having more observable symptoms, parent-child agreement tends to be stronger compared to internalizing disorders;[16-18] however, findings have been mixed. [2,19,20] Higher levels of parent psychopathology have been found to be associated with greater parent-child disagreement,[2,6,21-23] although this may be disorder-dependent.[2,24,25] Other factors, including sex, age, symptom severity, socioeconomic status, and parental engagement and communication, have been shown to influence parent-child agreement,[2,26-28] but findings are not definitive.[2,13,24,25]

1.2 Chronic Physical Illness in Children

The importance of multiple informants is further emphasized in populations facing unique challenges, such as children with chronic physical illness (CPI). Children with CPI, such as asthma, epilepsy, or diabetes, frequently experience psychosocial and emotional burdens due to their health challenges and often have reduced quality of life and poorer social, educational, and employment outcomes compared to youth without CPI.[29,30] Experiencing a CPI in childhood increases the risk of poor mental health, suicide attempts, substance misuse, and multimorbidity (co-occurring chronic physical and mental health conditions).[31,32] Notably, children with CPI face a significantly elevated risk of developing anxiety disorders, which are among the most prevalent psychiatric conditions experienced by this population.[33-37] This heightened

vulnerability is often attributed to the cumulative stress associated with managing a CPI, including frequent medical appointments, physical limitations, disruptions to daily functioning, and uncertainty about disease progression.[34,38,39] These factors can compound over time, contributing to heightened psychological distress, altered coping mechanisms, and increased internalizing symptoms, all of which can increase the risk and severity of anxiety disorders in children with CPI.

1.3 Multiple Informant Agreement

Given the complex interactions between physical and mental health, understanding the level of agreement between parent and child reports in this population is essential for accurate diagnosis and treatment. However, the dynamics of parent-child agreement in psychiatric evaluations of children with CPI remain underexplored, particularly over time. Ennett et al.[40] found modest correlations between mothers and children with juvenile rheumatoid arthritis. In a study of children newly diagnosed with cancer, authors used parent and teacher ratings from the Child Behavior Checklist (CBCL) and the Teacher Report Form (TRF),[41,42] finding low to moderate correlations ($r = 0.10–0.50$) for depression, anxiety, behavioural conduct, and social acceptance.[43] Similarly, as part of a larger study on children aged 7–12 with sickle cell disease, authors compared maternal and child assessments of adjustment (categorized as good or bad) and found agreement of 34%.[44] To achieve optimal outcomes for children with CPI, it is necessary to explore the significance of and the factors influencing agreement and disagreement.

1.4 The Mini International Neuropsychiatric Interview for Children and Adolescents

The Mini International Neuropsychiatric Interview for Children and Adolescents (MINI-KID) is a brief, standardized diagnostic interview used to assess and identify mental health disorders in children.[45] It offers both parent and child versions and has a short administration

time, making it an attractive tool for healthcare providers and researchers.[27,46] Prior research on the MINI-KID has yielded varying results regarding parent-child agreement. A study by Sheehan et al.[45] reported strong concordance between parent and child assessments (κ=0.46–0.94), whereas other studies by Butler et al.[47] and Duncan et al.[27] found much lower levels of agreement (κ=0.15–0.20). In a clinical sample of children with a mental disorder, low to moderate agreement was observed, with household income, parent psychosocial distress, and receiving inpatient services associated with stronger agreement for certain disorders.[48]

1.5 Knowledge Gaps and Study Rationale

While previous studies have examined parent-child agreement on the MINI-KID,[27,45,47,48] several knowledge gaps remain. First, to my knowledge, no existing studies on this topic have focused on a clinical sample of children with CPI, a group that experiences unique stressors influencing psychiatric symptoms and perceptions. Second, the majority of existing research is cross-sectional, limiting our understanding of how parent-child agreement changes over time. Although Butler et al.[47] employed a longitudinal design, the study was a small-scale pilot with a limited follow-up period of 6 months, restricting its generalizability and potential to capture longer-term patterns of informant agreement. Third, although prior studies have investigated factors that influence overall agreement, few have examined moderators of parent-child agreement—particularly child sex. Findings on sex differences in informant agreement have been mixed. Some studies have reported higher agreement for females with social phobia,[13] while others have found greater agreement for males with social phobia or separation anxiety disorder.[7] Other studies have found no difference.[49] Given these inconsistent findings, further investigation into child sex as a moderator of parent-child agreement is essential for clarifying its role in symptom reporting and for guiding the development of more tailored assessment

approaches that account for potential sex-based differences in how symptoms are expressed among children with CPI. Finally, both physical and mental health are inherently dynamic and subject to change due to illness progression, symptom exacerbations, changes in medications, and access to health services. Consequently, there is a critical need to investigate how both fixed characteristics (e.g., sex) and modifiable factors (e.g., level of disability, parental psychopathology) influence patterns of agreement over time. Taken together, addressing these gaps are essential to inform dyadic profiles that identify patterns of low agreement and highlight opportunities to support the development of more accurate, equitable, and developmentally sensitive approaches to mental health assessment and care for children with CPI.

Research Objectives

This study investigated parent-child agreement for anxiety disorders on the MINI-KID over time among children diagnosed with a CPI recruited from outpatient clinics at a pediatric hospital in Ontario, Canada. The specific research objectives are to:

1. Estimate the magnitude of informant agreement for anxiety disorders on the MINI-KID between parents and children with CPI at baseline, 6, 12, 24, and 48 months.

It was hypothesized that parent-child agreement will be low to moderate and become stronger over time.

2. Explore whether child sex moderates parent-child agreement.

It was hypothesized that child sex will moderate parent-child agreement for anxiety disorders on the MINI-KID, such that agreement will be stronger among female compared to male children.

3. Identify sociodemographic and health factors associated with parent-child disagreement for anxiety disorders on the MINI-KID over time.

It was hypothesized that disagreement will be negatively associated with household income ≥$90,000, children of older ages, children with more severe disability/impairment from their CPI, parental education (postsecondary graduate), and female children, but positively associated with parental psychopathology.

Methods

3.1 Participants and Recruitment

Participants are from the Multimorbidity in Children and Youth Across the Life-course (MY LIFE) study, an ongoing longitudinal study of children and youth with CPI and their primary caregiver.[50,51] Families were recruited from outpatient clinics at a pediatric hospital in Canada from August 2017 to November 2019.[51] Youth were eligible to participate if they were aged 2 to 16 years, diagnosed by a health professional with a CPI, and had a caregiver who could communicate in English.[51] Of 508 eligible families, 294 consented to participate, and 263 were enrolled into the MY LIFE study. Participants were followed for a total of 48 months, with assessments at baseline, 6, 12, 24, and 48 months. For the purpose of this study, children under the age of 10 years at baseline will be excluded from the analysis as they were not age-eligible to self-report on the MINI-KID (must be 10 years old). This resulted in a total of 119 families included in this study.

3.2 Procedure

Data were collected using structured interviews and self-reported questionnaires on laptops or paper for mail packages. To sustain the MY LIFE cohort during the COVID-19 pandemic, data collection was transitioned to mail surveys and telephone interviews in March 2020. Parent reports were collected for all children and adolescents, and self-reports were collected from adolescents aged ≥10 years. Informed written consent was obtained from all parents and children aged 16 years, while informed written assent was obtained from children 7 to 15 years of age.[51] MY LIFE received approval from the University of Waterloo Human Research Ethics Board and Hamilton Integrated Research Ethics Board.

3.3 Measures

3.3.1 Child Anxiety

The MINI-KID was completed by both parents and children. The MINI-KID is a structured, diagnostic interview to assess Diagnostic and Statistical Manual of Mental Disorders, 5th edition and International Statistical Classification of Diseases and Related Health Problems, 10th revision psychiatric disorders in children and adolescents.[45] MINI-KID responses are binary (yes/no), and response algorithms are used to determine the presence or absence of a disorder. It has previously shown to be reliable and valid in clinical and general population samples.[27,45,52] Anxiety disorders measured by the MINI-KID include generalized anxiety disorder, separation anxiety disorder, specific phobia, and social phobia, which were combined into a single composite anxiety disorder category for analysis.

3.3.2 Child Disability/Impairment

The World Health Organization Disability Assessment Schedule (WHODAS) 2.0 is a 12-item self-report tool that evaluates disability or impairment over a 30-day period.[53] It assesses functioning in areas of cognition, mobility, self-care, getting along, life activities, and participation. Each item is rated by the child and their parent on a five-point scale from '1' (none) to '5' (extreme/cannot do), with higher scores reflecting greater functional impairment. In child and adolescent populations, the WHODAS 2.0 has demonstrated strong psychometric properties, such as a confirmed factor structure, measurement invariance, high test-retest reliability (ICC=0.93-0.96), and internal consistency (α=0.91-0.94).[53-55] The WHODAS 2.0 has also shown to be reliable in adolescent populations with or without the presence of a chronic illness.[54-59]

3.3.3 Parent Psychopathology

The Center for Epidemiological Studies Depression Scale (CES-D) and Generalized Anxiety Disorder 7 (GAD-7) were used to assess parent psychopathology. The CES-D is a 20-item self-report survey that measures the severity of depression.[60] Respondents report how often they have experienced depression symptoms in the past week using a 4-point Likert scale from '0' (rarely) to '3' (most of the time).[60] Scores range from 0 to 60, with higher scores indicating more severe depressive symptoms.[60] The GAD7 is a 7-item self-report questionnaire used to assess the severity of generalized anxiety disorder.[61] Individuals rate the severity of their symptoms over the past two weeks, with response options including "not at all", "several days", "more than half the days", and "nearly every day".[61] Both scales have demonstrated high reliability, validity, and test-retest reliability in general and clinical populations.[60-62] Because the CES-D and GAD-7 were highly correlated ($r = 0.80$), the measures were summed to create a composite measure of parent psychopathology.[36]

3.3.4 Family Environment

The Parental Stress Scale (PSS) was used to examine parent stress. The PSS is a self-report questionnaire consisting of 18 items.[63] It measures parent perceived stress related to four domains of parenting: rewards, stressors, loss of control, and satisfaction.[63] Lower scores indicate low levels of stress, whereas higher scores indicate high levels of stress.[63] It has demonstrated reliability and validity in parents of children with a CPI.[64]

3.3.5 Sociodemographic Factors

Sociodemographic factors collected include child and parent age, sex, ethnicity, and country of birth, the CPI of the child, child illness duration, parental education, marital status,

and household income as <$90,000 or ≥$90,000, reflecting the gross median income for households with more than one person.[65]

3.4 Statistical Analysis

3.4.1 Objective 1

For Objective 1, Cohen's kappa (κ) was used to estimate the magnitude of agreement between parents and children with CPI at baseline, 6, 12, 24, and 48 months. At each timepoint, a binary variable (0=No, 1=Yes) was generated for each informant indicating the presence or absence of an anxiety disorder based on the MINI-KID. Agreement patterns were first summarized descriptively using a cross tabulation table that classified dyads into four categories: (1) agreement on presence (parent: yes, child: yes), (2) agreement on absence (parent: no, child: no), (3) parent-negative/child-positive disagreement (parent: no, child: yes), and (4) parent-positive/child-negative disagreement (parent: yes, child: no).

κ was then estimated using the PROC FREQ procedure in SAS 9.4 software. The TABLES statement was used to specify the two variables to be compared (parent and child reports), along with the AGREE(PABAK) option to obtain the prevalence-adjusted bias-adjusted kappa (PABAK) estimates with corresponding standard errors and CIs. The PABAK method was used to prevent against the κ paradox, in which κ yields a deceptively low value of agreement despite a high proportion of concordant ratings.[66] This occurs when one category (e.g., no anxiety) is highly prevalent, inflating expected chance agreement and deflating κ despite substantial concordance.[66] To account for this, the PABAK modifies κ by fixing the expected agreement at a constant value, thereby removing the influence of imbalanced outcome prevalence and marginal rater bias on the agreement estimate.[67] Interpretation of κ values was

such that $\kappa \leq 0$ (poor), $\kappa = 0.01\text{-}0.20$ (slight), $\kappa = 0.21\text{-}0.40$ (fair), $\kappa = 0.41\text{-}0.60$ (moderate), $\kappa = 0.61\text{-}0.80$ (substantial), and $\kappa = \geq 0.81$ (almost perfect).[68]

3.4.2 Objective 2

To investigate whether parent-child agreement for anxiety disorders on the MINI-KID was moderated by child sex, sex-stratified agreement analyses were conducted. Agreement was assessed separately for male and female children at each timepoint (baseline, 6, 12, 24, and 48 months) using the PABAK method. For each sex-stratified group, a binary variable (0=No, 1=Yes) was generated for each informant indicating the presence or absence of an anxiety disorder based on the MINI-KID. Agreement outcomes were summarized using cross tabulation tables, and κ values were calculated and interpreted using the same benchmarks described in Objective 1. To formally test for sex differences in agreement, the method of variance estimates recovery (MOVER) was used to construct a CI for the difference in κ estimates between male and female children at each timepoint (see Appendix A for the MOVER calculation method).[69,70] A statistically significant sex difference in agreement was evident if the MOVER CI did not include 0.

3.4.3 Objective 3

To examine factors associated with parent-child disagreement over time, a longitudinal model was conducted using generalized estimating equations (GEE). A binary outcome variable indicating agreement status (0=agreement, 1=disagreement) was used and measured at five timepoints: baseline, 6, 12, 24, and 48 months. Predictor variables included both time-invariant (child age, child sex, child illness duration, parental education, parental marital status, parental immigrant status, and household income) and time-varying characteristics (time, child disability/impairment (parent-reported WHODAS 2.0), parent psychopathology (composite score

of the CES-D and GAD-7), and parental stress (PSS)). Continuous variables (child age, child illness duration, child disability/impairment (WHODAS 2.0), parent psychopathology (composite score of the CES-D and GAD-7), and parental stress (PSS)) were grand-mean centered to reduce potential multicollinearity.[71] Measures of child disability/impairment, parent psychopathology, and parent stress were rescaled to improve clinical interpretability, such that unit increases correspond to a half standard deviation, indicative of a minimum clinically important difference.[72] The analysis was conducted using the PROC GENMOD procedure in SAS 9.4 software, with an unstructured working correlation structure to account for within-dyad correlation over time. Odds ratios and 95% CIs were estimated to quantify the association between each predictor and the odds of disagreement.

3.4.4 Missing Data

Data from the MY LIFE study were available as raw and imputed data. The imputed dataset was used for all analyses in this study. Differences in baseline characteristics between children and parents who did not vs. did have missing outcome data were examined using two-sample t-tests for continuous variables and χ^2 or Fisher's exact tests for categorical variables. Any significant differences identified between groups were discussed in the results. For the WHODAS 2.0, if one item was missing, mean imputation was used by averaging the available items.[56] For the CES-D and GAD-7, mean imputation was used by averaging the available items when up to four items were missing.[60,73] For the PSS, when up to three items were missing, mean imputation was used by averaging the available items.

Results

4.1 Sample Characteristics

Baseline demographic characteristics of the sample are presented in Table 1. Children had a mean age of 13.4 years (SD = 2.2), and 49.6% were female. The most common CPI diagnoses were rheumatological (31.1%), endocrine (16.8%), and respiratory (14.3%). The mean age of parents was 44.3 years (SD = 5.8), and 89.9% were female. Most were the biological parent (97.5%), in partnered relationships (86.6%) (married or common-law), and most had a postsecondary education (71.4%). Further, 56.3% reported annual household incomes of ≥$90,000. Dyads with missing outcome data were more likely to have parents who were not a postsecondary graduate. There were no other significant differences between dyads with and without missing outcome data.

4.2 Objective 1

4.2.1 Dyad Response Table

Table 2 presents dyad responses on the MINI-KID for anxiety disorders at each timepoint. Dyads were excluded from agreement analyses if one or both respondents had missing MINI-KID data. This resulted in three dyads excluded at baseline, nine at 6 and 12 months, fifteen at 24 months, and thirty at 48 months. From baseline to 12 months, when disagreement occurred, parents were more likely than children to endorse the presence of an anxiety disorder. However, this pattern reversed at 24 and 48 months, with children more likely to report the presence of an anxiety disorder than their parents. Across all timepoints, agreement was most common when both parent and child agreed on the absence of an anxiety disorder.

4.2.2 Parent-child Agreement

Table 3 shows the estimates of parent-child agreement on the MINI-KID at each timepoint. Agreement was fair at baseline [κ = 0.40 (0.23, 0.56)], then increased to substantial at 6 months [κ = 0.65 (0.51, 0.80)], and remained substantial until 12 months [κ = 0.62 (0.47, 0.77]. At 24 months, agreement decreased to moderate [κ = 0.52 (0.36, 0.68)], but increased back to substantial at 48 months [κ = 0.62 (0.45, 0.78)].

4.3 Objective 2

4.3.1 Sex-stratified Dyad Response Tables

Dyad response tables for male and female children on the MINI-KID are presented in Table 4. There were 59 female and 60 male child dyads. Dyads were excluded from agreement analyses if one or both respondents had missing MINI-KID data. For male children, this resulted in four dyads excluded at 6 months, three at 12 months, seven at 24 months, and sixteen at 48 months. For female children, three dyads were excluded at baseline, five at 6 months, six at 12 months, eight at 24 months, and fourteen at 48 months. From baseline to 12 months, for male and female children, when disagreement occurred, parents were more likely than children to endorse the presence of an anxiety disorder. However, at 48 months, for both sexes, children were more likely to report the presence of an anxiety disorder than their parents. Across all timepoints, agreement was most common when the parent and child agreed on the absence of an anxiety disorder.

4.3.2 Sex-stratified Parent-child Agreement

The estimates of agreement for male and female children on the MINI-KID at each timepoint are shown in Table 5. For male children, agreement was moderate at baseline [κ = 0.47 (0.24, 0.69)], then increased to almost perfect at 6 months [κ = 0.82 (0.67, 0.97)]. At 12 months,

agreement decreased to substantial [κ = 0.72 (0.54, 0.90)], and further decreased at 24 months to moderate [κ = 0.55 (0.32, 0.77)], increasing back up to almost perfect at 48 months [κ = 0.82 (0.65, 0.99)]. For female children, agreement was fair at baseline [κ = 0.32 (0.07, 0.57)], increasing to moderate at 6 months [κ = 0.48 (0.25, 0.72)], and remaining stable at moderate until 48 months.

4.3.3 Moderation Analysis

Findings from the moderation analysis using the MOVER can be found in Table 5. As shown in the table, only the 6- and 48-month MOVER CIs were significant as they did not contain zero [6 months = (-0.62, -0.06), 48 months = (-0.71, -0.09)]. Moderation by child sex was not found at baseline, 12, and 24 months [baseline = (-0.48, 0.19), 12 months = (-0.50, 0.08), 24 months = (-0.39, 0.27)].

4.4 Objective 3

Given that moderation by child sex was found at 6- and 48-months, an unadjusted and adjusted GEE model with a time*child sex interaction for each timepoint were initially run. No significant findings were observed (refer to Appendix B and Appendix C), and therefore, the GEE model was not stratified by child sex, and child sex was included as a covariate in the GEE model instead. Table 6 shows the results from the GEE model of parent-child disagreement. Five dyads were excluded from the analysis due to having only baseline outcome and covariate data, and therefore could not contribute to the estimation of within-dyad correlation or longitudinal associations over time. Compared to baseline, the odds of parent-child disagreement were significantly lower at 6 months (OR = 0.46, 95% CI = 0.23-0.91, $p = 0.026$) and 12 months (OR = 0.55, 95% CI = 0.31-0.97, $p = 0.040$). Female children were found to have significantly higher odds of parent-child disagreement compared to male children (OR = 2.04, 95% CI = 1.20-3.46, p

= 0.008). Parent marital status was also significantly associated with disagreement, with parents who were not partnered having lower odds of disagreement relative to partnered parents (OR = 0.27, 95% CI = 0.10-0.71, p = 0.008). Further, higher levels of parent psychopathology were also associated with increased odds of disagreement (OR = 1.15, 95% CI = 1.01-1.31, p = 0.032). No other variables were significant in the model.

Discussion

Findings from this study indicate that parent-child agreement on anxiety disorders among children with CPI was fair to substantial and fluctuated over time. Across all timepoints, agreement was most common when informants reported the absence of an anxiety disorder, while patterns of disagreement shifted over time, with parents more likely to report anxiety at earlier timepoints and children more likely to do so at later timepoints. Sex-stratified agreement analyses revealed higher agreement among male compared to female children, although moderation by child sex was only observed at 6 and 48 months and was not found to be significant in the GEE model with time*child sex interaction terms. Results from the GEE analysis further demonstrated that the odds of disagreement were significantly lower at 6 and 12 months relative to baseline. Additionally, female children and higher levels of parent psychopathology were associated with increased odds of disagreement, whereas parents who were not in partnered relationships had significantly lower odds of disagreement. Overall, these findings underscore that parent-child agreement is not uniform across time or dyads but varies according to both temporal factors and characteristics of the child and parent.

5.1 Objective 1

The initial pattern of higher parental endorsement of anxiety disorders is consistent with existing literature indicating that parents tend to report higher levels of psychopathology than their children, particularly in clinical populations.[17,74,75] This overreporting may reflect parents' heightened awareness of behavioural, functional, or illness-related indicators of distress, as the ongoing medical uncertainty associated with managing a CPI can intensify parental concern and increase sensitivity to the mental health of their children.[76] In addition, this pattern may result from the developmental stage of children during the first year of the study. At younger ages,

children often have limited emotional vocabulary and reduced awareness of symptoms that may indicate emerging mental health problems.[13,77-79] Consequently, this may lead to under recognition and subsequent underreporting of anxiety symptoms in children, contributing to lower self-reported rates compared to their parents at earlier timepoints.

The shift toward higher child endorsement of anxiety disorders from 24 to 48 months may reflect distinct developmental changes as children transition from childhood to adolescence or adolescence to young adulthood. These developmental periods are marked by profound cognitive, emotional, and social changes which often coincide with an elevated risk for the onset or exacerbation of mental health disorders.[80] This, along with the fact that as children age, they gain greater emotional intelligence and cognitive maturity, may enhance their ability to identify and label anxiety symptoms that were previously unnoticed or difficult to articulate.[13,77-79] Conversely, parent-reported declines are consistent with recent literature from MY LIFE showing decreases in parent-reported symptoms of child psychopathology over 24 months.[81,82] Such declines may reflect parents' adaptation to the demands of managing a CPI, during which initial hypervigilance gradually diminishes and behaviours that once appeared concerning become normalized. Increasing child autonomy and independence may also reduce parental visibility into internal experiences, making it more difficult for parents to detect persistent or emerging anxiety symptoms, potentially contributing to lower parental reports of child anxiety over time.

Across all timepoints, agreement was most common when both informants reported the absence of an anxiety disorder. This finding was also observed for separation anxiety disorder in previous research examining parent-child agreement using the Anxiety Disorders Interview Schedule for DSM-IV, Child/Parent version.[3] In the context of our sample, greater agreement on

absence likely reflects the small percentage of children who met diagnostic criteria for an anxiety disorder, increasing the proportion of dyads accurately reporting no anxiety. On the other hand, the absence of clinically significant symptoms may be easier for both informants to identify, whereas the presence of symptoms, particularly those that are internal or fluctuate over time, may be more subject to differences in reporting.[83] Additionally, it is possible that in the context of CPI, both parents and children may be less likely to endorse the presence of an anxiety disorder due to concerns about additional labelling or burden, with parents potentially reluctant to attribute further challenges to their child and children potentially minimizing symptoms to avoid placing further emotional strain on their parent(s).

Contrary to what was hypothesized, parent-child agreement was low-to-substantial, not low-to-moderate. This aligns with findings from Sheehan et al.[45] but is stronger than what several studies have found using the MINI-KID and other measures of child psychopathology in population and clinical samples.[13,15,27,47,48,81,84] In this context, substantial agreement may result from the high level of healthcare engagement inherent in managing a CPI,[31,47] where frequent medical appointments, ongoing monitoring, and regular discussions about symptoms may promote shared awareness of emotional changes in children, contributing to stronger agreement between informants. Regular contact with healthcare providers may also align interpretations of symptoms, as clinicians can help distinguish emotional distress from illness-related behaviours, reducing ambiguity about whether behaviours reflect anxiety or physical symptoms and promoting greater consistency in parent-child reports. While Brown-Jacobsen et al.[78] attribute their findings of high parent-child agreement to the use of a continuous measure (Spence Children's Anxiety Scale), this explanation does not apply here, as agreement in the present study was measured using the MINI-KID, which is a dichotomous, structured interview.[45]

Therefore, these findings suggest that meaningful agreement can be observed when using reliable and valid dichotomous measures of anxiety disorders, and that factors unique to children with CPI may be primarily driving the substantial agreement rather than the diagnostic measure used.

Consistent with the hypothesis, parent-child agreement became stronger over time, increasing from fair at baseline to substantial at 48 months. Research examining changes in parent-child agreement over time is scarce; however, this finding is consistent with recent evidence from MY LIFE showing that parent-child agreement on reports of child psychopathology improved over 24 months.[81] Similarly, previous research evaluating health-related quality of life in children with CPI found that parent-child agreement improved over time, with the largest improvements observed in the domain of psychological well-being.[85] While the factors that contribute to increased agreement over time are not yet well understood, agreement in this context may strengthen as developmental and contextual factors gradually align parent and child perspectives. As youth mature, they develop a greater capacity to communicate their internal states, making their reports more consistent with what parents can externally observe. At the same time, parents often change their interpretations of child psychopathology over time,[86] reducing early over- or underestimation of anxiety symptoms. These changes in how symptoms are reported may reflect a response shift, defined as a change in the interpretation of a construct over time due to changing circumstances, often driven by recalibration of internal standards, reprioritization of values, or reconceptualization of the construct.[87] Such shifts may, in turn, contribute to a natural convergence of informant reports as time progressed.

Nevertheless, agreement decreased from substantial to moderate at 24 months, perhaps reflecting the impacts of the COVID-19 pandemic, which disproportionately affected children with CPI and their parents.[88] During the pandemic, children with CPI reported elevated anxiety symptoms related to heightened fears of infection, reduced access to healthcare services, and disruptions to daily routines.[89-92] In turn, parents may have interpreted these symptoms as situational responses to pandemic-related stressors rather than indicators of an emerging anxiety disorder, or vice versa, resulting in lower overall parent-child agreement at this timepoint. Concurrently, parents of children with CPI reported increased feelings of stress, anxiety, and exhaustion during the pandemic, as well as disintegrated support networks, increased role overload, and caregiver burnout.[93-95] This increased parental stress may have limited parents' capacity to be aware of emotional changes in their child, resulting in greater discrepancies between parent and child reports.

5.2 Objective 2

For the sex-stratified agreement analyses, similar agreement patterns were observed in the dyad response tables for both sexes. Despite similar dyad response patterns, this did not result in similar κ estimates between male and female children, reflecting the influence of differing marginal distributions of parent and child reports between sexes. Given that the dyad response tables for both sexes followed the same pattern as the non-sex-stratified dyad response table, the same interpretations discussed in Objective 1 apply here.

For male children, agreement fluctuated over time, ranging from moderate at baseline, almost perfect at 6 months, substantial at 12 months, moderate at 24 months, and back up to almost perfect at 48 months, suggesting periods of divergence and alignment in informant perspectives. These shifts in agreement may reflect sex-specific patterns in emotional expression,

where males are often less likely to disclose internal distress due to stigma or social norms that dismiss male mental health concerns and discourage help-seeking behaviours.[96] In fact, evidence suggests that young males typically have a low awareness of anxiety disorders and do not believe that seeking help or treatment would change their experiences.[97,98] Moreover, anxiety tends to present differently in young males compared to females, with males reporting more externalized physical or psychosomatic symptoms over internalized symptoms of sadness or fear.[99,100] Taken together, these factors may contribute to periods of both higher and lower agreement over time, such that higher agreement may reflect informants agreeing on the absence of a disorder despite underlying distress that remains undisclosed by male children, and lower agreement when anxiety manifests through externalizing symptoms that may be mistaken for behavioural or attentional disorders rather than anxiety. However, male children generally have lower levels of anxiety compared to females,[101-103] and therefore, the high levels of agreement observed likely reflect true concordance on the absence of an anxiety disorder.

For female children, agreement remained fairly stable, ranging from fair to moderate over time. Despite this relative stability, agreement among female child-parent dyads did not reach substantially high levels, perhaps reflecting heightened mother-daughter conflict during adolescence.[104] Several studies have found that mother-child conflict and mother-child closeness increase and decrease, respectively, when children are in early to late adolescence,[104-106] and that compared to mothers with children under the age of 5 years, mothers of children aged 13-17 years are more likely to report that they feel unhappy and stressed when interacting with their children.[107,108] Prior research on agreement between adolescents and parents on the Strengths and Difficulties Questionnaire found that older females (15-17 years) were more likely to disagree with their parents about emotional problems compared to males of the same age.[109] As well,

Ohannessian and De Los Reyes[110] found that adolescent females who reported less positive adolescent-mother communication and less family satisfaction, as measured by the Parent-Adolescent Communication Scale and the Family Satisfaction Scale, reported increased anxiety symptoms 1 year later, with adolescent males' perceptions not predicting later anxiety symptoms. Therefore, given that parents in our sample were predominantly biological mothers (n=104), and that anxiety disorders are more prevalent among female children,[101-103] the low-to-moderate agreement observed may likely be a function of mother-daughter relational strain during adolescence, where increasing child autonomy and emotional distance reduces symptom disclosure and parental awareness of anxiety symptoms, resulting in greater misalignment in informant reporting.

Contrary to what was hypothesized, child sex only moderated parent-child agreement at 6 and 48 months, not across all timepoints, indicating that moderation by child sex was time-specific rather than consistent. This finding contrasts previous literature examining moderators of parent-child agreement in pediatric obsessive-compulsive disorder,[49] and adds to the literature on this topic. This pattern appears to be driven by the almost perfect agreement observed for male children at 6 and 48 months, but only moderate agreement for female children, thereby producing a larger between-sex difference and a significant moderation effect at these timepoints. However, the absence of sex differences in agreement at baseline, 12, and 24 months suggests that parents and children of either sex may interpret anxiety symptoms similarly within the context of CPI. Although higher levels of anxiety among female children are well documented in both chronic illness and general populations,[101-103] the present findings suggest that elevated anxiety does not translate into stronger agreement between female children and their parents, as hypothesized. Instead, the lack of consistent moderation by child sex suggests

that shared factors associated with managing or living with a CPI, such as illness-related stressors, disruptions to daily life, or family communication dynamics, may contribute to similar reporting patterns between male and female children and their parents over time.

5.3 Objective 3

Time at 6 and 12 months was significantly associated with lower odds of parent-child disagreement. As discussed previously, research investigating longitudinal changes in parent-child agreement in child mental health is limited; however, these findings are consistent with previous literature demonstrating improvements in agreement for child psychopathology and health-related quality of life over time.[81,85] In this context, agreement may have improved as initial differences in how parents and children perceive and interpret anxiety symptoms became more aligned with repeated assessments and shared experience over time. It should be noted, however, that these improvements likely would have extended to later timepoints if it were not due to the impacts of the COVID-19 pandemic,[88-95] as discussed previously. Further investigation is needed to better understand the mechanisms underlying improvements in agreement over time.

Contrary to the hypothesis, female children were positively associated with disagreement, having just over twice the odds of disagreement compared to male children. This finding aligns with previous research demonstrating greater agreement for male children with social phobia or separation anxiety disorder using the Anxiety Disorders Interview Schedule, Child and Parent versions (ADIS-C/P),[7] and other studies finding that female children are more discrepant from their parents than male children.[78,111,112] Rapee et al.[113] also found stronger agreement between male children and their parents for overanxious disorder, specific phobia, and a general diagnosis of an anxiety disorder, but marginally greater agreement between female children and their

parents for social phobia. The finding of greater agreement for social phobia between female children and their parents is consistent with findings from Choudhury et al.,[13] suggesting that child sex may be a significant factor influencing parent-child agreement for this disorder. However, no such effect could be found in our study due to the use of a composite anxiety disorder measure, which did not allow for the examination of agreement patterns by child sex for each individual disorder. As discussed previously, the lower agreement observed in female compared to male children is likely a function of increased mother-daughter conflict during adolescence,[104] where decreases in communication and closeness contribute to inconsistent informant reporting. However, further research is needed to better understand the factors contributing to discrepancies in female child-parent reports of anxiety disorders.

An unexpected finding was that parents who were not in a partnered relationship had significantly lower odds of disagreement compared to parents in a partnered relationship. One possible explanation for this finding is that, in single-parent households, there may be fewer opportunities for shared interpretation of child experiences, allowing for more direct observation of emotional challenges and fostering closer relationships that encourage frequent, open communication about mental health issues that cannot be deferred to another parent. In fact, research suggests that children from single-parent families develop stronger bonds with, and have a greater appreciation for, their parent compared to children and parents from nuclear families.[114] These children are more aware of caregiver challenges, mature earlier, and show stronger emotional regulation and problem-solving abilities,[115] all of which may contribute to greater parent-child agreement. In the context of children with CPI, daily routines often involve complex treatment regimens and ongoing healthcare management.[31,47] A single parent who is solely responsible for illness management may develop detailed, first-hand knowledge of

fluctuations in both the physical and mental health of the child, reducing reliance on second-hand observations and limiting opportunities for misinterpretation of symptoms.

Finally, as hypothesized, parent psychopathology was found to be positively associated with disagreement, such that parents with higher levels of psychopathology had increased odds of parent-child disagreement. Previous research supports the idea that higher parental psychopathology is associated with greater disagreement on anxiety symptoms among children with anxiety disorders,[21,116,117,] and that anxious or depressed parents tend to report more clinical symptoms in their children compared to parents without elevated psychopathology.[22,118-121] In children with diabetes, Hood.[122] found that parents with symptoms of depression are more likely to disagree with, and overestimate symptoms of, depression in their child. One explanation is that cognitive biases, which suggest that parents with psychopathology tend to overreport psychopathology in their children,[123] may contribute to these discrepancies by shaping how child behaviours are perceived and interpreted, such that behaviours are viewed as more problematic than they actually are.[124] Alternatively, parents experiencing depression or anxiety may have greater insight into mental health problems, making them more sensitive to difficulties experienced by their child, and therefore more accurate reporters of child psychopathology.[74,81,125,126] This heightened awareness may contribute to discordance if parents recognize symptoms indicative of clinically meaningful anxiety that the child does not perceive as problematic, or conversely, interpret situational worry as normative while the child experiences it as concerning.

Strengths and Limitations

This study had several strengths. First, to our knowledge, this was the first study to examine anxiety disorder agreement on the MINI-KID among a clinical sample of children with CPI, addressing a notable gap in research on diagnostic agreement in pediatric chronic illness populations. Additionally, the longitudinal nature of the study allowed for the examination of parent-child agreement over time, offering a more comprehensive understanding of changes and fluctuations in agreement than would be possible with single timepoint assessments.

However, there are notable limitations to this study. First, recruitment of participants from a single pediatric hospital in Ontario with adequate English language skills may reduce the generalizability of the findings to the broader population of children with CPI, which include those from diverse linguistic, cultural, and healthcare settings. However, while this limitation may constrain the generalizability of the findings, the results still offer critical insights into the nuances of parent-child agreement for anxiety disorders on the MINI-KID in a clinical pediatric context. Second, children under the age of 10 years at baseline were excluded from the analysis. Although this restriction may limit the generalizability of the findings to children with CPI under the age of 10 years, whose diagnostic trajectories and patterns of parent-child agreement may differ from those of older children, it is necessary to maintain consistency in informant reporting over time. Because children in MY LIFE were eligible to self-report on the MINI-KID once they are 10 years old, including all children who transition from parent-only reporting to self-reporting over the course of the study could introduce substantial measurement heterogeneity and potentially confound the estimation of parent-child agreement. Therefore, the findings of this study were interpreted in the context of children with CPI aged 10 years and older. Finally, anxiety disorders were assessed using the MINI-KID, which yields binary diagnostic outcomes

and does not capture variability in symptom severity or frequency. Consequently, the assessment of subclinical anxiety symptoms and subtle changes in symptom burden over time may have been limited relative to the use of a dimensional measure of anxiety.

Implications and Future Directions

Overall, this study has the potential to impact clinical practice and child mental health research by deepening the understanding of parent-child agreement for anxiety disorders on the MINI-KID for children with CPI. Clinically, the finding of low-substantial agreement underscores the necessity of routine multi-informant assessments when evaluating anxiety disorders in children with CPI. Reliance on a single informant risks both under- and over-reporting of anxiety, potentially delaying appropriate intervention or contributing to unnecessary clinical concern. Importantly, when discrepancies arise, clinicians should treat such differences as opportunities for open dialogue between informants, adopting family-centred care models that consider both informant perspectives as central to identifying mental health concerns.[127,128] Adopting family-centred care models is not only appropriate but essential for delivering care that is attuned to the needs, strengths, and challenges of the entire family unit, especially in the context of CPI, where families are deeply involved in navigating both the physical and mental health of the child.[127,128]

Along with family-centred care models, the findings of this study emphasize the importance of longitudinal, multi-informant assessments of child anxiety. Although symptoms of psychopathology in children with CPI are expected to change as children age and in response to fluctuations in their physical health,[36,78] some observed changes may reflect informant discrepancies in reporting rather than true changes in psychopathology. Failure to account for these discrepancies may result in missed opportunities to address communication or relational problems between informants or refer children to appropriate mental health services when needed. By conceptualizing agreement as a dynamic, rather than static, phenomenon, clinicians can be better positioned to identify when, why, and for whom discrepancies emerge—insight that

is unlikely to be captured through single-time-point assessments—and act accordingly to guide timely intervention.

Furthermore, clinicians should remain attentive to the increased odds of parent-child disagreement when assessing anxiety in female children with CPI. In instances where discrepancies occur, clinicians should facilitate open discussion and dialogue to clarify differences in symptom reporting and ensure that both parent and child perspectives are heard and understood. When disagreement appears to reflect broader mother-daughter relational challenges, referral to family-based supports or therapy may help families develop more effective communication strategies, learn to engage in active listening, and build stronger bonds and greater trust that help align informant perspectives.[129] Future research should investigate factors that may contribute to child sex differences in anxiety disorder agreement, such as child emotional expression or regulation, parent-child communication, or illness-specific factors that may intersect with sex and anxiety. Qualitative or mixed-methods studies may be particularly valuable in uncovering how male and female children with CPI experience and interpret anxiety symptoms within family contexts.

The lower odds of disagreement observed among parents who were not partnered compared to parents who were partnered underscore the importance of considering family structure when assessing anxiety in children with CPI. In pediatric settings, clinicians should routinely document parental arrangements and identify the primary caregiver when collecting parent-reported information on child mental health. When discrepancies arise in families with partnered parents, clinicians may consider including both parents in the assessment process, as differences in parental perspectives and caregiving responsibilities may influence how symptoms are recognized and communicated within the family.[130] Creating opportunities for open

discussion and adopting family-centred models of care may help promote shared understanding of symptoms and support greater alignment between parent and child reports of anxiety.

The association between parental psychopathology and increased odds of disagreement highlights the need for parent mental health screening in pediatric settings. Research shows that when parents receive appropriate care for their own mental health, it provides benefits to the functioning and mental health of their children.[131-133] Given that parents of children with CPI are already at greater risk for mental health problems,[134,135] identifying elevated parental psychopathology will not only benefit the parent and child directly, but can also help align informant reports, as parental psychopathology may influence how child anxiety symptoms are perceived.[22,118-124] Because parents of children with CPI often have regular contact with pediatric healthcare settings, these environments provide a practical avenue to incorporate parent mental health screening into routine care. For example, brief, validated tools, including the CES-D or GAD-7,[60-62] could be administered periodically to identify elevated parent psychopathology. Importantly, screening should be paired with accessible support pathways, including on-site or integrated services where parents can receive care within the pediatric setting, delivered by providers trained in adult mental health or through family-centred approaches.[136] As elevated parental psychopathology is linked to higher rates of child anxiety,[137] worse treatment outcomes,[138] and greater disagreement,[21,116,117] addressing parent mental health is essential for supporting both family well-being and ensuring the accurate identification and interpretation of child anxiety in multi-informant assessments.

Finally, these findings may serve as a foundation for future research to investigate informant agreement in larger, more diverse samples of children with CPI with various mental health conditions, helping validate and expand upon the conclusions of this study and ensuring

their applicability across broader clinical and demographic contexts. Beyond extending current findings, future work should seek to examine the underlying mechanisms through which the specific risk factors observed contribute to parent-child disagreement. Understanding how these variables influence perceptions of child mental health may offer deeper insight into the informant-specific processes that drive discrepant reporting. Uncovering these pathways could inform the development of targeted interventions aimed not only at improving agreement, but at addressing the root causes of misalignment, ultimately enhancing the accuracy of diagnosis, the effectiveness of treatment planning, and the quality of family-centred mental healthcare in pediatric chronic illness contexts.

Conclusion

The findings from this study demonstrate that parent-child agreement on anxiety disorders among children with CPI is low-to-substantial and fluctuates over time. Notably, time at 6 and 12 months was associated with lower odds of disagreement, suggesting early improvements in agreement during the first year of the study; however, this effect was not sustained over time. Although differences in agreement between male and female children were observed, child sex only moderated parent-child agreement at 6 and 48 months, with no evidence of moderation at baseline, 12, or 24 months. Female children were found to have increased odds of disagreement compared to male children, indicating potential variation in the way anxiety disorders are recognized or reported across child sex. Higher levels of parent psychopathology were also associated with increased odds of disagreement, whereas parents who were not in partnered relationships had lower odds of disagreement, suggesting that parental mental health and family structure play an important role in shaping anxiety symptom perception and interpretation. Together, these findings help identify dyads who may be at greater risk for informant discrepancies and emphasize the importance of longitudinal, multi-informant mental health assessments in pediatric chronic illness settings. Future research should examine the underlying mechanisms driving parent-child disagreement to inform targeted, family-centred interventions that help strengthen anxiety disorder agreement among parents and children with CPI.

References

1. De Los Reyes A, Epkins CC, Asmundson GJG, Augenstein TM, Becker KD, Becker SP, et al. Editorial statement about JCCAP's 2023 special issue on informant discrepancies in youth mental health assessments. J Clin Child Adolesc Psychol. 2023;52(1):147–58. https://doi.org/10.1080/15374416.2022.2158842
2. Becker EM, Jensen-Doss A, Kendall PC, Birmaher B, Ginsburg GS. All anxiety is not created equal: Correlates of parent/youth agreement vary across subtypes of anxiety. J Psychopathol Behav Assess. 2016;38(4):528–37. https://doi.org/10.1007/s10862-016-9544-z
3. Hamblin RJ, Salloum A, Andel R, Nadeau JM, McBride NM, Lewin AB, et al. Predictors of parent-child agreement on child anxiety diagnoses on the ADIS-IV-C/P. Psychiatry Res. 2016;245:303–10. https://doi.org/10.1016/j.psychres.2016.07.041
4. Achenbach TM, McConaughy SH, Howell CT. Child/adolescent behavioral and emotional problems: implications of cross-informant correlations for situational specificity. Psychol Bull. 1987;101(2):213–32. Available from: https://pubmed.ncbi.nlm.nih.gov/3562706/
5. Foley D, Rutter M, Pickles A, Angold A, Maes H, Silberg J, et al. Informant disagreement for separation anxiety disorder. J Am Acad Child Adolesc Psychiatry. 2004;43(4):452–60. https://doi.org/10.1097/00004583-200404000-00011
6. Foley DL, Rutter M, Angold A, Pickles A, Maes HM, Silberg JL, et al. Making sense of informant disagreement for overanxious disorder. J Anxiety Disord. 2005;19(2):193–210. https://doi.org/10.1016/j.janxdis.2004.01.006

7. Grills AE, Ollendick TH. Multiple informant agreement and the anxiety disorders interview schedule for parents and children. J Am Acad Child Adolesc Psychiatry. 2003;42(1):30–40. https://doi.org/10.1097/00004583-200301000-00008
8. Jensen PS, Rubio-Stipec M, Canino G, Bird HR, Dulcan MK, Schwab-Stone ME, et al. Parent and child contributions to diagnosis of mental disorder: are both informants always necessary? J Am Acad Child Adolesc Psychiatry. 1999;38(12):1569–77. https://doi.org/10.1097/00004583-199912000-00019
9. Kraemer HC, Measelle JR, Ablow JC, Essex MJ, Boyce WT, Kupfer DJ. A new approach to integrating data from multiple informants in psychiatric assessment and research: mixing and matching contexts and perspectives. Am J Psychiatry. 2003;160(9):1566–76. https://doi.org/10.1176/appi.ajp.160.9.1566
10. Lewin AB, Mink JW, Bitsko RH, Holbrook JR, Parker-Athill EC, Hanks C, et al. Utility of the diagnostic interview schedule for children for assessing Tourette syndrome in children. J Child Adolesc Psychopharmacol. 2014;24(5):275–84. https://doi.org/10.1089/cap.2013.0128
11. Roberts RE, Alegria M, Roberts CR, Chen IG. Concordance of reports of mental health functioning by adolescents and their caregivers: a comparison of European, African and Latino Americans. J Nerv Ment Dis. 2005;193(8):528–34. https://doi.org/10.1097/01.nmd.0000172597.15314.cb
12. Safford SM, Kendall PC, Flannery-Schroeder E, Webb A, Sommer H. A longitudinal look at parent-child diagnostic agreement in youth treated for anxiety disorders. J Clin Child Adolesc Psychol. 2005;34(4):747–57. https://doi.org/10.1207/s15374424jccp3404_16

13. Choudhury MS, Pimentel SS, Kendall PC. Childhood anxiety disorders: parent-child (dis)agreement using a structured interview for the DSM-IV. J Am Acad Child Adolesc Psychiatry. 2003;42(8):957–64. https://doi.org/10.1097/01.CHI.0000046898.27264.A2
14. Comer JS, Kendall PC. A symptom-level examination of parent-child agreement in the diagnosis of anxious youths. J Am Acad Child Adolesc Psychiatry. 2004;43(7):878–86. https://doi.org/10.1097/01.chi.0000125092.35109.c5
15. van der Meer M, Dixon A, Rose D. Parent and child agreement on reports of problem behaviour obtained from a screening questionnaire, the SDQ. Eur Child Adolesc Psychiatry. 2008;17(8):491–7. https://doi.org/10.1007/s00787-008-0691-y
16. Hawley KM, Weisz JR. Child, parent, and therapist (dis)agreement on target problems in outpatient therapy: the therapist's dilemma and its implications. J Consult Clin Psychol. 2003;71(1):62–70. https://doi.org/10.1037//0022-006x.71.1.62
17. Martin JL, Ford CB, Dyer-Friedman J, Tang J, Huffman LC. Patterns of agreement between parent and child ratings of emotional and behavioral problems in an outpatient clinical setting: when children endorse more problems. J Dev Behav Pediatr. 2004;25(3):150–5. https://doi.org/10.1097/00004703-200406000-00002
18. Salbach-Andrae H, Klinkowski N, Lenz K, Lehmkuhl U. Agreement between youth-reported and parent-reported psychopathology in a referred sample. Eur Child Adolesc Psychiatry. 2009;18(3):136–43. https://doi.org/10.1007/s00787-008-0710-z
19. Chen YY, Ho SY, Lee PC, Wu CK, Gau SS. Parent-child discrepancies in the report of adolescent emotional and behavioral problems in Taiwan. PLoS One. 2017;12(6):e0178863. https://doi.org/10.1371/journal.pone.0178863

20. Ender S, Stachow R, Petermann F, Tiedjen U. Behavioral problems of somatic chronically ill adolescents: parent-child-agreement and differences. Klin Padiatr. 2011;223(4):231–5. https://doi.org/10.1055/s-0030-1269863

21. Berg-Nielsen TS, Vika A, Dahl AA. When adolescents disagree with their mothers: CBCL-YSR discrepancies related to maternal depression and adolescent self-esteem. Child Care Health Dev. 2003;29(3):207–13. https://doi.org/10.1046/j.1365-2214.2003.00332.x

22. Briggs-Gowan MJ, Carter AS, Schwab-Stone M. Discrepancies among mother, child, and teacher reports: examining the contributions of maternal depression and anxiety. J Abnorm Child Psychol. 1996;24(6):749–65. https://doi.org/10.1007/BF01664738

23. Hughes EK, Gullone E. Discrepancies between adolescent, mother, and father reports of adolescent internalizing symptom levels and their association with parent symptoms. J Clin Psychol. 2010;66(9):978–95. https://doi.org/10.1002/jclp.20695

24. Affrunti NW, Woodruff-Borden J. The effect of maternal psychopathology on parent-child agreement of child anxiety symptoms: A hierarchical linear modeling approach. J Anxiety Disord. 2015;32:56–65. https://doi.org/10.1016/j.janxdis.2015.03.010

25. Popp L, Neuschwander M, Mannstadt S, In-Albon T, Schneider S. Parent-child diagnostic agreement on anxiety symptoms with a structured diagnostic interview for mental disorders in children. Front Psychol. 2017;8:404. https://doi.org/10.3389/fpsyg.2017.00404

26. Becker-Haimes EM, Jensen-Doss A, Birmaher B, Kendall PC, Ginsburg GS. Parent-youth informant disagreement: Implications for youth anxiety treatment. Clin Child Psychol Psychiatry. 2018;23(1):42–56. https://doi.org/10.1177/1359104516689586

27. Duncan L, Georgiades K, Wang L, Van Lieshout RJ, MacMillan HL, Ferro MA, et al. Psychometric evaluation of the Mini International Neuropsychiatric Interview for Children and Adolescents (MINI-KID). Psychol Assess. 2018;30(7):916–28. https://doi.org/10.1037/pas0000541

28. Van Roy B, Groholt B, Heyerdahl S, Clench-Aas J. Understanding discrepancies in parent-child reporting of emotional and behavioural problems: effects of relational and socio-demographic factors. BMC Psychiatry. 2010;10:56. https://doi.org/10.1186/1471-244X-10-56

29. Ferro MA, Toulany A. Longitudinal association between youth multimorbidity and psychological distress: Impact of the COVID-19 pandemic. Child Psychiatry Hum Dev. 2023. https://doi.org/10.1007/s10578-023-01564-3

30. Ferro MA, Qureshi S, Van Lieshout RJ, Lipman EL, Georgiades K, Gorter JW, et al. Prevalence and correlates of physical-mental multimorbidity in outpatient children from a pediatric hospital in Canada. Can J Psychiatry. 2022;67(8):626–37. https://doi.org/10.1177/07067437221074430

31. Reaume SV, Luther AWM, Ferro MA. Physical morbidity and mental health care among young people. J Adolesc Health. 2021;68(3):540–7. https://doi.org/10.1016/j.jadohealth.2020.06.040

32. Thomsen EL, Boisen KA, Andersen A, Jørgensen SE, Teilmann G, Michelsen SI. Low level of well-being in young people with physical-mental multimorbidity: a population-based study. J Adolesc Health. 2023;73(4):707–14. https://doi.org/10.1016/j.jadohealth.2023.05.014

33. Barker MM, Beresford B, Fraser LK. Incidence of anxiety and depression in children and young people with life-limiting conditions. Pediatr Res. 2023;93(7):2081–90. https://doi.org/10.1038/s41390-022-02370-8

34. Boris P, Kovács KE, Nagy BE. The comparative study of chronically ill and healthy children and adolescents in the light of their general mental health. Sci Rep. 2024;14(1):6754. https://doi.org/10.1038/s41598-024-57442-y

35. Cobham VE, Hickling A, Kimball H, Thomas HJ, Scott JG, Middeldorp CM. Systematic review: Anxiety in children and adolescents with chronic medical conditions. J Am Acad Child Adolesc Psychiatry. 2020;59(5):595–618. https://doi.org/10.1016/j.jaac.2019.10.010

36. Ferro MA, Chan CKY, Lipman EL, Van Lieshout RJ, Shanahan L, Gorter JW. Continuity of mental disorders in children with chronic physical illness. Eur Child Adolesc Psychiatry. 2024;33(10):3593–602. https://doi.org/10.1007/s00787-024-02420-y

37. Shakeshaft A, Mundy J, Dennison C, Bragantini D, Hannigan L, Andreassen O, et al. Investigating causal links between chronic physical illness and major depressive and anxiety disorders in youth. Eur Neuropsychopharmacol. 2023;75(1):13. https://doi.org/10.1016/j.euroneuro.2023.08.032

38. Pao M, Bosk A. Anxiety in medically ill children/adolescents. Depress Anxiety. 2011;28(1):40–9. https://doi.org/10.1002/da.20727

39. Tarbell SE. Editorial: Anxiety in pediatric chronic illness: the elephant in the exam room. J Am Acad Child Adolesc Psychiatry. 2020;59(5):586–7. https://doi.org/10.1016/j.jaac.2020.01.007

40. Ennett ST, DeVellis BM, Earp JA, Kredich D, Warren RW, Wilhelm CL. Disease experience and psychosocial adjustment in children with juvenile rheumatoid arthritis: children's versus mothers' reports. J Pediatr Psychol. 1991;16(5):557–68. https://doi.org/10.1093/jpepsy/16.5.557
41. Achenbach TM. Manual for the Child Behavior Checklist/4-18 and 1991 profile. Burlington (VT): Univ of Vermont Department of Psychiatry; 1991.
42. Achenbach TM. Manual for the Teacher Report Form and 1991 profile. Burlington (VT): Univ of Vermont Department of Psychiatry; 1991.
43. Varni JW, Katz ER, Colegrove R, Dolgin MJ. Adjustment of children with newly diagnosed cancer: cross-informant variance. J Psychosoc Oncol. 1995;13(4):23–38. https://doi.org/10.1300/J077V13N04_02
44. Thompson RJ Jr, Gil KM, Burbach DJ, Keith BR, Kinney TR. Role of child and maternal processes in the psychological adjustment of children with sickle cell disease. J Consult Clin Psychol. 1993;61(3):468–74. https://doi.org/10.1037//0022-006x.61.3.468
45. Sheehan DV, Sheehan KH, Shytle RD, Janavs J, Bannon Y, Rogers JE, et al. Reliability and validity of the Mini International Neuropsychiatric Interview for Children and Adolescents (MINI-KID). J Clin Psychiatry. 2010;71(3):313–26. https://doi.org/10.4088/JCP.09m05305whi
46. Leffler JM, Riebel J, Hughes HM. A review of child and adolescent diagnostic interviews for clinical practitioners. Assessment. 2015;22(6):690–703. https://doi.org/10.1177/1073191114561253

47. Butler A, Van Lieshout RJ, Lipman EL, MacMillan HL, Gonzalez A, Gorter JW, et al. Mental disorder in children with physical conditions: a pilot study. BMJ Open. 2018;8(1):e019011. https://doi.org/10.1136/bmjopen-2017-019011

48. McDonald E, Whitney S, Horricks L, Lipman EL, Ferro MA. Parent-child agreement on the Mini International Neuropsychiatric Interview for Children and Adolescents (MINI-KID). J Can Acad Child Adolesc Psychiatry. 2021;30(4):264–72. https://pmc.ncbi.nlm.nih.gov/articles/PMC8561856/

49. Storch EA, Rudy BM, Wu MS, Lewin AB, Murphy TK. Moderators of impairment agreement among parent-child dyads in pediatric obsessive-compulsive disorder. J Psychopathol Behav Assess. 2015;37(2):318–28. https://doi.org/10.1007/s10862-014-9456-8

50. Ferro MA, Lipman EL, Van Lieshout RJ, Gorter JW, Shanahan L, Boyle M, et al. Multimorbidity in Children and Youth Across the Life-course (MY LIFE): protocol of a Canadian prospective study. BMJ Open. 2019;9(11):e034544. https://doi.org/10.1136/bmjopen-2019-034544

51. Ferro MA, Lipman EL, Van Lieshout RJ, Timmons B, Shanahan L, Gorter JW, et al. Cohort Profile: Multimorbidity in Children and Youth Across the Life-course (MY LIFE) Study. J Can Acad Child Adolesc Psychiatry. 2021;30(2):104–15.

52. Boyle MH, Duncan L, Georgiades K, Bennett K, Gonzalez A, Van Lieshout RJ, et al. Classifying child and adolescent psychiatric disorder by problem checklists and standardized interviews. Int J Methods Psychiatr Res. 2017;26(4):e1544. https://doi.org/10.1002/mpr.1544

53. Üstün TB, Kostanjsek N, Chatterji S, Rehm J. Measuring health and disability: Manual for WHO disability assessment schedule WHODAS 20. World Health Organization; 2010. https://iris.who.int/bitstream/handle/10665/43974/9789241547598_eng.pdf

54. Kimber M, Rehm J, Ferro MA. Measurement invariance of the WHODAS 2.0 in a population-based sample of youth. PLoS One. 2015;10(11):e0142385. https://doi.org/10.1371/journal.pone.0142385

55. Tompke BK, Tang J, Oltean II, Buchan MC, Reaume SV, Ferro MA. Measurement invariance of the WHODAS 2.0 across youth with and without physical or mental conditions. Assessment. 2020;27(7):1490–501. https://doi.org/10.1177/1073191118816435

56. Federici S, Bracalenti M, Meloni F, Luciano JV. World Health Organization Disability Assessment Schedule 2.0: An international systematic review. Disabil Rehabil. 2017;39(23):2347–80. https://doi.org/10.1080/09638288.2016.1223177

57. Ferro MA, Basque D, Elgie M, Dol M. Agreement of the 12-item WHODAS 2.0 in parents and youth with physical illness living in Canada. Disabil Rehabil. 2023;45(19):3125–34. https://doi.org/10.1080/09638288.2022.2120095

58. Ferro MA, Dol M, Basque D, Elgie M. Validating the 12-item proxy-administered WHODAS 2.0 in young children with chronic physical illness in Canada. Disabil Rehabil. 2023;45(19):3135–42. https://doi.org/10.1080/09638288.2022.2118868

59. Ferro MA, Elgie M, Dol M, Basque D. Measurement invariance of the 12-item self-administered WHODAS 2.0 across early and late adolescents in Canada. Disabil Rehabil. 2023;45(19):3118–24. https://doi.org/10.1080/09638288.2022.2118867

60. Radloff LS. The CES-D scale: A self-report depression scale for research in the general population. Appl Psychol Meas. 1977;1(3):385–401. https://doi.org/10.1177/014662167700100306

61. Spitzer RL, Kroenke K, Williams JB, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. Arch Intern Med. 2006;166(10):1092–7. https://doi.org/10.1001/archinte.166.10.1092

62. Jordan P, Shedden-Mora MC, Löwe B. Psychometric analysis of the Generalized Anxiety Disorder scale (GAD-7) in primary care using modern item response theory. PLoS One. 2017;12(8):e0182162. https://doi.org/10.1371/journal.pone.0182162

63. Berry JO, Jones WH. The Parental Stress Scale: Initial Psychometric Evidence. J Soc Pers Relatsh. 1995;12(3):463–72. https://doi.org/10.1177/0265407595123009

64. Zelman J, Ferro MA. The Parental Stress Scale: Psychometric properties in families of children with chronic health conditions. Fam Relat. 2018;67(2):240–52. https://doi.org/10.1111/fare.12306

65. Statistics Canada. Census of Population. 2016. Available from: https://www12.statcan.gc.ca/census-recensement/index-eng.cfm

66. Derksen BM, Bruinsma W, Goslings JC, Schep NWL. The Kappa Paradox Explained. J Hand Surg Am. 2024;49(5):482–485. https://doi.org/10.1016/j.jhsa.2024.01.006

67. SAS Institute Inc. SAS/STAT® User's Guide The FREQ Procedure. Cary, NC: SAS Institute Inc; Dec 2025. Available from: https://documentation.sas.com/api/docsets/statug/v_039/content/freq.pdf?locale=en#nameddest=statug_freq_details78

68. Landis JR, Koch GG. The measurement of observer agreement for categorical data. Biometrics. 1977;33(1):159–74. https://pubmed.ncbi.nlm.nih.gov/843571/

69. Donner A, Zou G. Interval estimation for a difference between intraclass kappa statistics. Biometrics. 2002;58(1):209–215. https://doi.org/10.1111/j.0006-341x.2002.00209.x

70. Sodanin K, Niwitpong SA, Niwitpong S. Estimating Simultaneous Confidence Intervals for Multiple Contrasts of Means of Normal Distribution with Known Coefficients of Variation. Emerging Science Journal. 2022;6(4):705–716. https://doi.org/10.28991/ESJ-2022-06-04-04

71. Iacobucci D, Schneider MJ, Popovich DL, Bakamitsos GA.Mean centering helps alleviate "micro" but not "macro" multicollinearity. Behav Res Methods. 2016;48(4):1308–1317. https://doi.org/10.3758/s13428-015-0624-x

72. Norman GR, Sloan JA, Wyrwich KW. Interpretation of changes in health-related quality of life: the remarkable universality of half a standard deviation. Med Care. 2003;41(5):582–592. https://doi.org/10.1097/01.MLR.0000062554.74615.4C

73. Bono C, Ried LD, Kimberlin C, Vogel B. Missing data on the Center for Epidemiologic Studies Depression Scale: a comparison of 4 imputation techniques. Res Soc Adm Pharm. 2007;3(1):1–27. https://doi.org/10.1016/j.sapharm.2006.04.001

74. Grills AE, Ollendick TH. Issues in parent-child agreement: the case of structured diagnostic interviews. Clin Child Fam Psychol Rev. 2002;5(1):57–83. https://doi.org/10.1023/a:1014573708569

75. Smith SR. Making sense of multiple informants in child and adolescent psychopathology: A guide for clinicians. J Psychoeduc Assess. 2007;25(2):139–149. https://doi.org/10.1177/0734282906296233

76. Kobayashi M, Hayakawa M, Ishii-Takahashi A, Tanaka K. Exploring mental health experiences of parents of children with chronic illnesses: Trauma-related symptoms and isolation. Pediatr Int. 2025;67(1):e70218. https://doi.org/10.1111/ped.70218

77. Adelman CB, Lebowitz ER. Poor insight in pediatric obsessive compulsive disorder: Developmental considerations, treatment implications, and potential strategies for improving insight. J Obsessive Compuls Relat Disord. 2012;1(2):119–124. https://doi.org/10.1016/j.jocrd.2012.02.003

78. Brown-Jacobsen AM, Wallace DP, Whiteside SP. Multimethod, multi-informant agreement, and positive predictive value in the identification of child anxiety disorders using the SCAS and ADIS-C. Assessment. 2011;18(3): 382–392. https://doi.org/10.1177/1073191110375792

79. Canavera KE, Wilkins KC, Pincus DB, Ehrenreich-May JT. Parent-child agreement in the assessment of obsessive-compulsive disorder. J Clini Child and Adolesc Psychol. 2009;38(6): 909–915. https://doi.org/10.1080/15374410903258975

80. Scheiner C, Grashoff J, Kleindienst N, Buerger A. Mental disorders at the beginning of adolescence: prevalence estimates in a sample aged 11–14 years. Public Health Pract (Oxf). 2022;4:100348. https://doi.org/10.1016/j.puhip.2022.100348

81. Parks R, Ferro MA. Informant reports of psychopathology in children with chronic physical illness over time: role of parent psychological distress. J Pediatr Psychol. 2025;jsaf097. https://doi.org/10.1093/jpepsy/jsaf097

82. Dol M, Browne D, Perlman CM, Ferro MA. (2025). Trajectories of Psychopathology Among Youth with Physical Illness. Child Psychiatry Hum Dev. 2025. https://doi.org/10.1007/s10578-025-01835-1

83. Reardon T, Harvey K, Young B, O'Brien D, Creswell C. Barriers and facilitators to parents seeking and accessing professional support for anxiety disorders in children: qualitative interview study. Eur Child Adolesc Psychiatry. 2018;27(8):1023–1031. https://doi.org/10.1007/s00787-018-1107-2

84. De Los Reyes A, Augenstein TM, Wang M, Thomas SA, Drabick DAG, Burgers DE, et al. The validity of the multi-informant approach to assessing child and adolescent mental health. Psychol Bull. 2015;141(4):858–900. https://doi.org/10.1037/a0038498

85. Qadeer RA, Ferro MA. Child–parent agreement on health-related quality of life in children with newly diagnosed chronic health conditions: A longitudinal study. Int J of Adolesc Youth. 2018;23(1):99–108. https://doi.org/10.1080/02673843.2017.1297242

86. Sajobi TT, Ayilara OF, Dhuga GK, Ferro MA. Response shift in parent-reported psychopathology in children with chronic physical illness. Qual Life Res. 2023;32(11):3099–3108. https://doi.org/10.1007/s11136-023-03458-2

87. Vanier A, Oort FJ, McClimans L, Ow N, Gulek BG, Böhnke JR, et al. Response shift in patient-reported outcomes: definition, theory, and a revised model. Qual Life Research. 2021;30(12):3309–3322. https://doi.org/10.1007/s11136-021-02846-w

88. Ferro MA, Meyer SB, Yessis J, Reaume SV, Lipman E, Gorter JW. COVID-19-Related Psychological and Psychosocial Distress Among Parents and Youth With Physical Illness: A Longitudinal Study. Front Psychiatry, 2021;12:761968. https://doi.org/10.3389/fpsyt.2021.761968

89. Darlington AE, Morgan JE, Wagland R, Sodergren SC, Culliford D, Gamble A, et al. COVID-19 and children with cancer: Parents' experiences, anxieties and support needs. Pediatr Blood Cancer. 2021;68(2):e28790. https://doi.org/10.1002/pbc.28790

90. Durcan G, Barut K, Haslak F, Doktur H, Yildiz M, Adrovic A, et al. Psychosocial and clinical effects of the COVID-19 pandemic in patients with childhood rheumatic diseases and their parents. Rheumatol Int. 2021;41(3):575–583. https://doi.org/10.1007/s00296-021-04790-x

91. Pınar Senkalfa B, Sismanlar Eyuboglu T, Aslan AT, Ramaslı Gursoy T, Soysal AS, Yapar D, et al. Effect of the COVID-19 pandemic on anxiety among children with cystic fibrosis and their mothers. Pediatr Pulmonol. 2020;55(8):2128–2134. https://doi.org/10.1002/ppul.24900

92. Hawke LD, Monga S, Korczak D, Hayes E, Relihan J, Darnay K, et al. Impacts of the COVID-19 pandemic on youth mental health among youth with physical health challenges. Early Interv Psychiatry. 2021;15(5):1146–1153. https://doi.org/10.1111/eip.13052

93. Asbury K, Fox L, Deniz E, Code A, Toseeb U. How is COVID-19 Affecting the Mental Health of Children with Special Educational Needs and Disabilities and Their Families?. J Autism Dev Disord. 2021;51(5):1772–1780. https://doi.org/10.1007/s10803-020-04577-2

94. Cacioppo M, Bouvier S, Bailly R, Houx L, Lempereur M, Mensah-Gourmel J, et al. Emerging health challenges for children with physical disabilities and their parents during the COVID-19 pandemic: The ECHO French survey. Ann Phys Rehabil Med. 2021;64(3)101429. https://doi.org/10.1016/j.rehab.2020.08.001

95. A L van Tilburg M, Edlynn E, Maddaloni M, van Kempen K, Díaz-González de Ferris M, Thomas J. High Levels of Stress Due to the SARS-CoV-2 Pandemic among Parents of Children with and without Chronic Conditions across the USA. Children (Basel). 2020;7(10):193. https://doi.org/10.3390/children7100193

96. Fisher K, Seidler ZE, King K, Oliffe JL, Rice SM. Men's anxiety: A systematic review. J Affective Disord. 2021;295:688–702. https://doi.org/10.1016/j.jad.2021.08.136

97. Clark LH, Hudson JL, Haider T. Anxiety specific mental health stigma and help-seeking in adolescent males. J Child Fam Stud. 2020;29(7):1970–1981. https://doi.org/10.1007/s10826-019-01686-0

98. Cotton SM, Wright A, Harris MG, Jorm AF, McGorry PD. Influence of gender on mental health literacy in young Australians. Aust N Z J Psychiatry. 2006;40(9):790–796. https://doi.org/10.1080/j.1440-1614.2006.01885.x

99. Auerbach RP, Richardt S, Kertz S, Eberhart NK. Cognitive vulnerability, stress generation, and anxiety: Symptom clusters and gender differences. Int J Cogn Behav Ther. 2021;5(1):50–66. https://doi.org/10.1521/ijct.2012.5.1.50

100. de Anda D, Bradley M, Collada C, Dunn L, Kubota J, Hollister V, et al. A Study of Stress, Stressors, and Coping Strategies among Middle School Adolescents, Social Work in Education. 1997;19(2):87–98. https://doi.org/10.1093/cs/19.2.87

101. Alanen A, Kallio M, Culnane E, Koivisto M, Pasanen M, Salanterä S, et al. Anxiety and care experiences in adolescents with chronic health conditions: an international, longitudinal study across the transfer of care. BMJ Paediatr Open. 2024;8(1):e002836. https://doi.org/10.1136/bmjpo-2024-002836

102. Farhane-Medina NZ, Luque B, Tabernero C, Castillo-Mayén R. Factors associated with gender and sex differences in anxiety prevalence and comorbidity: A systematic review. Sci Prog. 2022;105(4):368504221135469. https://doi.org/10.1177/00368504221135469

103. Yeretzian ST, Sahakyan Y, Kozloff N, Abrahamyan L. Sex differences in the prevalence and factors associated with anxiety disorders in Canada: A population-based study. J Psychiatr Res. 2023;164:125–132. https://doi.org/10.1016/j.jpsychires.2023.06.018

104. Nomaguchi K, Allen A. Mother-Child Relationship Quality from Preschool to Adolescence: Variation by Maternal Education. Pers Relatsh. 2023;30(2):399–418. https://doi.org/10.1111/pere.12475

105. Nomaguchi KM. Parenthood and psychological well-being: Clarifying the role of child age and parent-child relationship quality. Soc Sci Res. 2021;41(2):489–498. https://doi.org/10.1016/j.ssresearch.2011.08.001

106. Luthar SS, Ciciolla L.What it feels like to be a mother: Variations by children's developmental stages. Dev Psychol. 2016;52(1):143–154. https://doi.org/10.1037/dev0000062

107. Meier A, Musick K, Fischer J, Flood S. Mothers' and Fathers' Well-Being in Parenting Across the Arch of Child Development. J Marriage Fam. 2018;80(4):992–1004. https://doi.org/10.1111/jomf.12491

108. Roeters A, Gracia P. Child Care Time, Parents' Well-Being, and Gender: Evidence from the American Time Use Survey. J Child Fam Stud. 2016;25:2469–2479. https://doi.org/10.1007/s10826-016-0416-7

109. Gray EJ, Scott JG, Lawrence DM, Thomas HJ. Concordance between adolescents and parents on the Strengths and Difficulties Questionnaire: Analysis of an Australian nationally representative sample. Aust N Z J Psychiatry, 2021;55(11):1058–1070. https://doi.org/10.1177/00048674211009610

110. Ohannessian CM, De Los Reyes A. Discrepancies in Adolescents' and their Mothers' Perceptions of the Family and Adolescent Anxiety Symptomatology. Parent Sci Pract. 2014:14(1):1–18. https://doi.org/10.1080/15295192.2014.870009

111. Angold A, Weissman MM, John K, Merikangas KR, Prusoff BA, Wickramaratne P, et al. Parent and child reports of depressive symptoms in children at low and high risk of depression. J Child Psychol Psychiatry. 1987;28(6):901–915. https://doi.org/10.1111/j.1469-7610.1987.tb00678.x

112. Verhulst FC, van der Ende J. (1992). Agreement between parents' reports and adolescents' self-reports of problem behavior. J Child Psychol Psychiatry. 1992;33(6):1011–1023. https://doi.org/10.1111/j.1469-7610.1992.tb00922.x

113. Rapee RM, Barrett PM, Dadds MR, Evans L. Reliability of the DSM-III-R childhood anxiety disorders using structured interview: interrater and parent-child agreement. J Am Acad Child Adolesc Psychiatry. 1994;33(7):984–992. https://doi.org/10.1097/00004583-199409000-00008

114. Chavda K, Nisarga V. Single parenting: Impact on child's development. J Indian Assoc Child Adolesc Ment Health. 2023;19(1):14–20. https://doi.org/10.1177/09731342231179017

115. Sangeet O, Singh S. Experiences of single-parent children in the current Indian context. J Family Med Prim Care. 2022;11(7):3790–3794. https://doi.org/10.4103/jfmpc.jfmpc_2455_21

116. De Los Reyes A. Introduction to the special section: More than measurement error: Discovering meaning behind informant discrepancies in clinical assessments of children and adolescents. J Clin Child Adolesc Psychology. 2011;40(1):1–9. https://doi.org/10.1080/15374416.2011.533405

117. Müller JM, Achtergarde S, Furniss, T. The influence of maternal psychopathology on ratings of child psychiatric symptoms: an SEM analysis on cross-informant agreement. Eur Child Adolesc Psychiatry. 2011;20(5):241–252. https://doi.org/10.1007/s00787-011-0168-2

118. Chi TC, Hinshaw SP. Mother-child relationships of children with ADHD: the role of maternal depressive symptoms and depression-related distortions. J Abnorm Child Psychol. 2002;30(4):387–400. https://doi.org/10.1023/a:1015770025043

119. Najman JM, Williams GM, Nikles J, Spence S, Bor W, O'Callaghan M, et al. Mothers' mental illness and child behavior problems: cause-effect association or observation bias?. J Am Acad Child Adolesc Psychiatry. 2000;39(5):592–602. https://doi.org/10.1097/00004583-200005000-00013

120. Rothen S, Vandeleur CL, Lustenberger Y, Jeanprêtre N, Ayer E, Gamma F, et al. Parent-child agreement and prevalence estimates of diagnoses in childhood: direct interview versus family history method. Int J Methods Psychiatr Research. 2009;18(2):96–109. https://doi.org/10.1002/mpr.281

121. Treutler CM, Epkins CC. Are discrepancies among child, mother, and father reports on children's behavior related to parents' psychological symptoms and aspects of parent-child relationships?. J Abnorm Child Psychol. 2003;31(1):13–27. https://doi.org/10.1023/a:1021765114434

122. Hood KK. The influence of caregiver depressive symptoms on proxy report of youth depressive symptoms: a test of the depression-distortion hypothesis in pediatric type 1 diabetes. J Pediatr Psychol. 2009;34(3):294–303. https://doi.org/10.1093/jpepsy/jsn090

123. Everaert J, Podina IR, Koster EHW. A comprehensive meta-analysis of interpretation biases in depression. Clin Psychol Rev. 2017;58:33–48. https://doi.org/10.1016/j.cpr.2017.09.005

124. Gartstein MA, Bridgett DJ, Dishion TJ, Kaufman NK. Depressed Mood and maternal report of child behavior problems: Another look at the Depression-Distortion hypothesis. J ApplDev Psychol. 2009;30(2):149–160. https://doi.org/10.1016/j.appdev.2008.12.001

125. Maoz H, Goldstein T, Goldstein BI, Axelson DA, Fan J, Hickey MB, et al. The effects of parental mood on reports of their children's psychopathology. J Ame Acad Child Adolesc Psychiatry. 2014;53(10):1111–22.e5. https://doi.org/10.1016/j.jaac.2014.07.005

126. Moore MT, Fresco DM. Depressive realism: a meta-analytic review. Clin Psychol Rev. 2021;32(6):496–509. https://doi.org/10.1016/j.cpr.2012.05.004

127. Kokorelias KM, Gignac MAM, Naglie G, Cameron JI. Towards a universal model of family centered care: a scoping review. BMC Health Serv Res. 2019;19(1):564. https://doi.org/10.1186/s12913-019-4394-5

128. McCarthy E, Guerin S. Family-centred care in early intervention: a systematic review of the processes and outcomes of family-centred care and impacting factors. Child Care Health Dev. 2022;48(1):1–32. https://doi.org/10.1111/cch.12901

129. Todd E, Pond R, Coomber K. Client Perspectives of Family Therapy: A Qualitative Systematic Review. J Marital Fam Ther. 2025;51(3):e70024. https://doi.org/10.1111/jmft.70024

130. Jansen M, Bodden DHM, Muris P, van Doorn M, Granic I. Measuring Anxiety in Children: The Importance of Separate Mother and Father Reports. Child Youth Care For. 2017;46(5):643–659. https://doi.org/10.1007/s10566-017-9402-5

131. Buka SL, Beers LS, Biel MG, Counts NZ, Hudziak J, Parade SH, et al. The Family is the Patient: Promoting Early Childhood Mental Health in Pediatric Care. Pediatrics. 2022;149(Suppl 5):e2021053509L. https://doi.org/10.1542/peds.2021-053509L

132. England M, Sim L, National Research Council. Associations Between Depression in Parents and Parenting, Child Health, and Child Psychological Functioning. In: Depression in Parents, Parenting, and Children: Opportunities to Improve Identification, Treatment, and Prevention. National Academies Press (US); 2009. Available from: https://www.ncbi.nlm.nih.gov/books/NBK215128/

133. Reedtz C, Lauritzen C, Stover YV, Freili JL, Rognmo K. Identification of Children of Parents With Mental Illness: A Necessity to Provide Relevant Support. Front Psychiatry. 2019;9:728. https://doi.org/10.3389/fpsyt.2018.00728

134. Cohn LN, Pechlivanoglou P, Lee Y, Mahant S, Orkin J, Marson A, et al. (2020). Health Outcomes of Parents of Children with Chronic Illness: A Systematic Review and Meta-Analysis. J Pediatr, 2020;218:166–177.e2. https://doi.org/10.1016/j.jpeds.2019.10.068

135. Thomas S, Ryan NP, Byrne LK, et al. Psychological Distress Among Parents of Children With Chronic Health Conditions and Its Association With Unmet Supportive Care Needs and Children's Quality of Life. J Pediatr Psychol 2024;49:45–55. https://doi.org/10.1093/jpepsy/jsad074

136. Salley CG, Axelrad M, Fischer E, Steuer KB. But parents need help! Pathways to caregiver mental health care in pediatric hospital settings. Palliat Support Care. 2023;21(2):347–53. https://doi.org/10.1017/S1478951522001353

137. Maliken A, Katz L. Exploring the impact of parental psychopathology and emotion regulation on evidence-based parenting interventions: a transdiagnostic approach to improving treatment effectiveness. Clinical Child & Family Psychology Review 2013; 16:173–186. https://doi.org/10.1007/s10567-013-0132-4

138. Sperling J, Boger K, Potter M. Associations between parental distress and pediatric anxiety and obsessive-compulsive disorder treatment outcomes. Clin Child Psychol Psychiatry 2021; 26:1102–1110. https://doi.org/10.1177/13591045211028159

Appendices

Appendix A. MOVER calculation method

For each group, the following values were obtained:

1. Kappa estimate (κ)
2. Lower confidence limit (*L)*
3. Upper confidence limit (*U)*

Let:
Group 1 = male children (κ_1, L_1, U_1)
Group 2 = female children (κ_2, L_2, U_2)

MOVER Formula
Difference = $\kappa_2 - \kappa_1$

Lower = $Difference - \sqrt{(\kappa_2 - L_2)^2 + (U_1 - \kappa_1)^2}$

Upper = $Difference + \sqrt{(U_2 - \kappa_2)^2 + (\kappa_1 - L_1)^2}$

To illustrate the calculation, the following example uses baseline κ estimates:

Male children: κ_1= 0.47, 95% CI = (0.24, 0.69)
Female children: κ_2= 0.32, 95% CI = (0.07, 0.57)

Step 1: Calculate the difference
Difference $= 0.32 - 0.47$
$= -0.15$

Step 2: Calculate the lower confidence limit
Lower $= -0.15 - \sqrt{(0.32 - 0.07)^2 + (0.69 - 0.47)^2}$
$= -0.48$

Step 3: Calculate the upper confidence limit
Upper $= -0.15 + \sqrt{(0.57 - 0.32)^2 + (0.47 - 0.24)^2}$
$= 0.19$

Final result:
Difference = -0.15 (-0.48, 0.19)

Appendix B. Unadjusted generalized estimating equations model with time*child sex interaction

Characteristic	OR (95% CI)	*p*-value
Time		
6 months	0.27 (0.10, 0.76)	0.013
12 months	0.44 (0.20, 0.95)	0.035
24 months	0.53 (0.23, 1.22)	0.135
48 months	0.23 (0.06, 0.88)	0.032
Child		
Female child	1.24 (0.56, 2.78)	0.595
6 months*sex	2.72 (0.73, 10.16)	0.137
12 months*sex	1.51 (0.52, 4.41)	0.449
24 months*sex	1.67 (0.53, 5.29)	0.386
48 months*sex	3.49 (0.68, 17.91)	0.134

[a] Baseline was the reference category for time

Appendix C. Adjusted generalized estimating equations model with time*child sex interaction

Characteristic	OR (95% CI)	*p*-value
Time		
6 months	0.25 (0.08, 0.75)	0.014
12 months	0.45 (0.20, 1.00)	0.050
24 months	0.58 (0.24, 1.41)	0.228
48 months	0.22 (0.05, 0.93)	0.039
Child		
Age, years	1.03 (0.91, 1.17)	0.651
Female child	1.21 (0.49, 2.99)	0.675
Illness duration	1.02 (0.97, 1.08)	0.400
Disability, WHODAS 2.0	1.07 (0.93, 1.24)	0.353
6 months*sex	2.94 (0.70, 12.31)	0.140
12 months*sex	1.49 (0.48, 4.63)	0.492
24 months*sex	1.39 (0.38, 5.06)	0.617
48 months*sex	3.37 (0.55, 20.71)	0.190
Parent		
Immigrant	1.63 (0.85, 3.14)	0.140
Not partnered	0.26 (0.10, 0.71)	0.009
Not postsecondary graduate	1.63 (0.90, 2.96)	0.106
Household income < $90,000	0.54 (0.28, 1.05)	0.070
Parenting stress, PSS	1.13 (0.99, 1.28)	0.062
Psychopathology, CES-D and GAD-7	1.15 (1.01, 1.31)	0.032

[a] Baseline was the reference category for time