

Perceived Differential Parenting and Childhood Physical-Mental Multimorbidity

by

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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 is the work of Christopher Barclay with the collaboration of his supervisor, Dr. Mark Ferro, and advisory committee members, Dr. Dillon Browne and Dr. Karen Patte.

ABSTRACT

Background: Physical-mental multimorbidity (herein multimorbidity), the co-occurrence of a chronic physical and mental illness, affects a substantial proportion of children, compromising their quality of life, causing hardship for families, and burdening the healthcare system. Research investigating the potential causal mechanisms of childhood multimorbidity is scarce. Child-perceived differences in parenting style within families (i.e., differential parenting) may be one of these mechanisms.

Objectives: 1— What is the direction and strength of the association between perceived differential parenting and psychopathology in children with chronic physical illnesses (i.e., multimorbidity)? 2— Do birth order and concordant/discordant child-sibling sex pairs moderate this association? 3— Does child self-concept mediate this association?

Methods: Data come from the Multimorbidity in Children and Youth across the Life-course (MY LIFE) study. Perceived differential parenting was assessed using the Sibling Inventory of Differential Experiences (SIDE), and child psychopathology was assessed using the Emotional Behavioural Scale (EBS). linear mixed models were used to determine the directionality and strength of the association between perceived differential parenting and multimorbidity. Stratified models were computed to determine the moderating effect of birth order and child-sibling sex pairs. The product of coefficients approach was used alongside generalized linear modelling to determine the mediating effect of child self-concept.

Implications: Health professionals can utilize findings to foster better communication within families and refer those at-risk to appropriate resources. Findings can also inform the integration of physical and mental health services to promote healthy child self-concept and nurturing family environments to reduce the incidence of childhood multimorbidity.

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LIST OF ABBREVIATIONS

Emotional Behavioural Scale (EBS)

Multimorbidity in Children and Youth across the Life-course (MY LIFE)

Self Perception Profile for Children (SPPC)

Sibling Inventory of Differential Experiences (SIDE)

1.0 BACKGROUND

1.1 Chronic Physical Illnesses in Children

Chronic physical illnesses, such as asthma, diabetes mellitus and epilepsy effect a substantial proportion of children and youth (herein children).¹⁻³ As the definitions of chronic physical illnesses vary throughout the literature, it is difficult to estimate their exact prevalence among children.^{1,3,4} However, research suggests that this prevalence ranges from 30% to over 50%.¹⁻⁴ Furthermore, findings suggest that this prevalence has been increasing over time.²

This situation has implications for pediatric health at both the individual and population level. From an individual patient perspective, research suggests that, when compared to their healthy counterparts, children living with chronic physical illnesses often have poorer health-related quality of life,⁵ poorer school experiences,⁶ and increased difficulty reaching psychosocial milestones.⁷ At the population level, data from the United States suggests that children affected by chronic physical illnesses can accrue medical expenditures of \$9,000 more per year than healthy children.^{8,9}

This is not a matter that affects children in isolation. Due to medical advancements, more children living with chronic physical illnesses are surviving to adulthood.¹⁰ As a result, the issues described above can impact the health of individuals and populations in all age groups. For example, chronic physical illnesses currently cost Ontario's healthcare system over \$10.5B annually.¹¹ However, that figure could rise as an increasing number of children affected by chronic physical illnesses reach adulthood.

1.2 Mental Illnesses in Children

Similar to chronic physical illnesses, mental illnesses affect a substantial proportion of children. It is estimated that at least 20% of children are affected by a mental illness,^{12,13} with major depressive episode, separation anxiety disorder, social anxiety disorder, specific phobia, attention deficit hyperactivity disorder, conduct disorder, oppositional defiant disorder and generalized anxiety disorder being the most common.^{13,14} Like chronic physical illnesses, the prevalence of mental illness among Canadian children is thought to be on the rise.¹² However, unlike childhood chronic physical illnesses, this expected increase is attributed to a lack of investment in child mental health services rather than improved treatments.¹²

As with childhood chronic physical illnesses, childhood mental illnesses do not affect children in isolation. Research indicates that diagnosis of mental illness in childhood increases the risk of persistent adulthood mental illness.¹² As a result, childhood mental illnesses have the potential to impact both individual and population level health across all age groups.

1.3 Physical-Mental Multimorbidity in Children

Physical-mental multimorbidity (herein multimorbidity) is the co-occurrence of a chronic physical and mental illness. Children affected by chronic physical illnesses are at an increased risk of developing a mental illness, with research suggesting they have a 50% higher risk of developing such disorders compared to children without a chronic

physical illness.¹⁵ As with childhood chronic physical illnesses, the prevalence of childhood multimorbidity varies widely throughout the literature. In population-based samples, up to 35% of children may be living with multimorbidity.^{1,16} However, clinical samples suggest that as many as 58% of children may be affected.^{17,18}

As with its component chronic physical and mental illnesses discussed above, multimorbidity takes a toll on child health at both the individual and population level. Children living with multimorbidity have poorer health-related quality of life,¹⁷ are more likely to use mental health services,^{18,19} and may be high-cost users within the Ontario healthcare system²⁰ when compared to their healthy counterparts. Furthermore, as the physical and mental illnesses that comprise childhood multimorbidity can often persist as children grow into adulthood, childhood multimorbidity has the potential to impact the health of individuals and populations at all stages of the life-course.

1.4 Perceived Differential Parenting

1.4.1 Perceived Differential Parenting in Children

When parents adapt their parenting to fit the respective personalities or needs of each of their children,²¹ children may perceive that parental behaviours are unequal between them and their siblings, equating to a perception of differential parenting.²²

Previous research has demonstrated that in western societies, several immutable characteristics are linked to differential parenting, including: family structure, family size, birth order, and gender.²³ Specifically, single parent and larger families demonstrated a higher degree of differential parenting compared to other families²⁴, which children may then detect. Additionally, siblings often perceive that parents favour the youngest child over their other children.²⁵ Finally, as mothers tend to view daughters as sources of emotional and instrumental support, mothers tend to favour daughters over sons; something that children can often perceive.²⁶

1.4.2 Perceived Differential Parenting and Child Mental Health

Research indicates that parenting practices can influence the psychosocial well-being of children.²⁷ Children may use perceived differential parenting as a way of inferring how their parents evaluate them, and might internalize these evaluations.²⁴ Children who perceive a greater degree of differential parenting may feel competition or injustice among their siblings, with both favoured and disfavoured children demonstrating poorer mental health outcomes.^{28,29} For example, unfavourable comparisons with siblings can lead to negative self-evaluations, which can in turn result in anxiety, depressive symptoms, and problem behaviours such as truancy or tobacco and alcohol use.^{28,30-32} In contrast, children who perceive that they are the favoured sibling often develop feelings of superiority.³³ This may lead them to carry out behaviours that cause their peers to reject them, which in turn can lead to reduced socialization and lowered social self esteem.³³ Children who intuit that they are the favoured sibling may also experience feelings of guilt, anxiety or insecurity stemming from their unearned favoured status.³⁴ Finally, adolescents who perceive differential parenting have demonstrated higher rates of suicidal ideation, regardless of whether they perceive themselves to be favoured or disfavoured.³⁵

1.4.3 Perceived Differential Parenting and Families of Children With Chronic Illnesses

As discussed previously, childrearing practices are an integral aspect of family functioning, and are characteristic of both individuals and their social environments.³⁶ In a reciprocal parent-child relationship, parental behaviors and practices affect the child, and the child's characteristics and behaviors affect the parents. The presence of a chronically ill or disabled child in the family can influence several aspects of the parent-child relationship, such as the amount of time parents spend with each child or the types and amount of discipline from parents.³⁷ Research conducted by Crain et al.³⁸ found that parenting practices differ between children with and without diabetes. In this study of school-age children with diabetes and their healthy siblings, it was found that a more dependent, closer relationship was present between the mother and the diabetic child than the mother and healthy sibling.³⁸ A study conducted by Markova et al.³⁹ examined the parents of 16 preschool and school-age children with hemophilia. They found that the fathers were significantly more involved in childrearing, and that both parents fostered more dependency in the child with hemophilia, than did a comparison group of parents.³⁹ In contrast to these studies, King's³⁶ study of 19 families, each with one healthy and one chronically ill child, did not find any significant differences in child-rearing patterns between the mothers and fathers on the childrearing dimensions of punishment, promotion of independence, levels of rules of behavior, and amount of spouse involvement. Despite this, King³⁶ reported that fathers saw the mothers as more involved in childrearing than they saw themselves.

Differential or inconsistent parenting has been shown to lead to negative sibling outcomes and impaired sibling relationships in families of children living with chronic physical illnesses.³⁷ While studies examining the specific impact of differential parenting on children living with chronic physical illnesses are scarce, researchers have explored the reverse association: mental health impacts of differential parenting among healthy siblings of children affected by chronic physical illnesses. A study conducted by Taylor⁴⁰ reported that, in families of children with chronic illnesses, the parent-child relationships of healthy siblings were negatively affected, owing to less parental time and attention and differing disciplinary practices. In a study by Kelada et al.,⁴¹ it was found that healthy siblings of children living with chronic physical illnesses who perceived that their parents provided them with less affection than their brother/sister reported worse psychosocial functioning than healthy children who did not perceive differential parental affection.

In summary, the presence of a child with a chronic physical illness can drastically alter parent-child relationships within a family, leading to differential or inconsistent parenting practices between siblings, as parents aim to meet the unique needs of each child. Research has shown that healthy siblings who perceive this unequal parental treatment (i.e., perceived differential parenting) are at a higher risk for negative mental health outcomes than healthy children who did not report a perception of differential parenting. Studies exploring the effects of perceived differential parenting on the siblings affected by chronic illnesses in such families are scarce.

1.5 Self-Concept

1.5.1 Self-Concept in Children and Youth

The psychological construct of self-concept is comprised of the self-perceived identity of an individual, as well as a self-evaluation of their personal characteristics relative to others; in reference to physical appearance, social acceptance, behavior, and athletic and academic capabilities.⁴² It is formed through interpersonal experiences in social contexts and affected by genetics, as well as the expectations and judgments of significant others, such as parents, siblings, and peers.⁴³

Studies have demonstrated that self-perceptions are flexible, and that ratings of self-concept change as individuals progress through the life-course.⁴⁴ Young children seem to have relatively high levels of self-concept.⁴⁵ Research suggests that this is due to their inability to form complex representations of themselves with regard to domain-specific self-concepts, resulting in excessively high perceptions of their capabilities.⁴⁵ As children reach later childhood and early adolescence, cognitive development leads children to a greater understanding of themselves.⁴⁶ Personal weaknesses are also revealed through social comparisons and external feedback as children mature.⁴⁶ This leads children to more accurate perceptions of their capabilities, tempering their previously unrealistic self-concept.⁴⁶ This decline in self-concept appears to continue as individuals progress through adolescence.⁴⁷ It is thought that this continued decline in self-concept is the result of changes during puberty, such as lowered self-image, developments in cognition that allow adolescents to think more abstractly about themselves, and the academic and social challenges associated with transitioning to secondary school.⁴⁷ Research suggests that these changes in self-concept are robust across population subgroups, such as different ethnicities.⁴⁴

Theoretically, positive self-concept is seen as an essential component of mental health⁴⁸, and empirical research suggests a link between self-concept and functioning across multiple psychological domains.⁴⁹ Although negative self-concept is not equivalent to a psychological disorder, among adolescents, it is strongly associated with a host of negative outcomes, including: increased risk for major depressive and anxiety disorders, aggression, substance abuse, increased criminal behavior, lower educational attainment, and lower quality of life.⁵⁰⁻⁵²

1.5.2 Self-Concept in Children and Youth With Chronic Illnesses

A substantial body of research suggests that children affected by chronic physical illnesses may be at an increased risk for greater declines in self-concept due to the additional health burdens they experience during this developmental period. Examples of this are: brain injuries that lead to cerebral palsy or epilepsy, as well as adverse effects of medications,⁵³ may compromise the learning ability of children, thereby reducing their scholastic competence;⁵⁴ children living with conditions such as cerebral palsy or asthma tend to rank themselves lower in regards to physical appearance and athletic competence, a trend that suggests compromised body image, and difficulties in participation in physical activities with peers, respectively;^{54,55} and the stigma that often accompanies certain conditions, such as neurological disorders, can adversely affect self-reported social acceptance among children living with chronic physical illnesses.⁵⁶

The compounding of these domain-specific effects may lead to overall declines in self-concept among children affected by chronic physical illnesses. For example, findings from a meta-analysis conducted by Ferro and Boyle⁵⁷ demonstrated that self-concept is modestly compromised in children living with chronic physical illnesses compared to their otherwise healthy counterparts. Despite the aforementioned findings, other studies have reported no significant difference in global self-concept between children with vs. without chronic physical illnesses.^{58,59} This may be due in part to heterogeneity in illness severity.⁶⁰ Self-protective mechanisms among those living with chronic physical illnesses may also play a role.⁶⁰ The self-protective hypothesis asserts that children living with chronic physical illnesses who feel threatened by a challenging task may hide their feelings of inadequacy by exaggerating reports of self-competence, thereby inflating self-concept.⁶¹ This hypothesized use of self-protective mechanisms, as well as the increased psychological vulnerability among this population, makes children living with chronic physical illnesses an important demographic for the study of self-concept.

2.0 STUDY RATIONALE AND RESEARCH OBJECTIVES

2.1 Study Rationale

Previous research examining multimorbidity in children has key limitations.⁶² Most studies, especially those that utilize clinical data, are often small and cross-sectional.⁶²⁻⁶⁵ This lack of prospective, longitudinal research limits the ability to understand the temporality of effects, document the natural course of multimorbidity over time and generalise findings to a wider population of children living with multimorbidity.⁶² Utilizing data from the MY LIFE study leverages a relatively large, longitudinal, clinical sample of children living with multimorbidity, who have been followed prospectively over multiple measurement occasions.⁶²

Next, when considering the influence of perceived differential parenting, both Social Comparison Theory⁶⁶ and Adler's Theory of Individual Psychology⁶⁷ imply that differential treatment will lead to changes in sibling outcomes.⁶⁸ Although causal hypotheses were not specifically tested, the majority of literature on this subject is framed in this manner.⁶⁸ Despite this, it should be acknowledged that differences between siblings in relationship quality and well-being can also lead to differential treatment.⁶⁸ Research examining child effects⁶⁹⁻⁷¹ demonstrates how the individual qualities and characteristics of children shape family dynamics such as parenting.⁶⁸ Furthermore, as briefly mentioned in section 1.4.3, the presence of a child with a chronic physical illness may exacerbate these child effects. As a result, while it is hypothesized that perceived differential parenting will lead to an increased risk of multimorbidity, the directionality as well as the strength of this association were examined.

Additionally, the current research examined the moderating effect of birth order on the relationship between perceived differential parenting and multimorbidity. To review, a moderating variable, such as birth order, influences the strength and/or direction of an association between an independent and dependent variable.⁷² A substantial body of evidence suggests that birth order affects the mental health of children and adolescents. Previous studies have noted that first-born children demonstrate higher levels of conduct problems compared to their later-born counterparts, possibly as a stress

response to changes in the home environment after younger siblings are born.^{73,74} In contrast, a considerable body of research has found that later-born children display higher rates of internalizing mental health problems compared to their earlier-born counterparts,⁷⁵⁻⁷⁸ possibly due to the lack of parental time and attention they receive.^{79,80} As such, the moderating effect of birth order was investigated in the current study.

The potential moderating effect of concordant and discordant sibling sex pairs was also investigated in the current study. While few studies on this topic could be found, a study conducted by Tamrouti-Makkink et al.⁸¹ noted that mixed versus same gender sibling pairs had a moderating effect on the association between perceived differential parenting and internalizing and externalizing behaviour problems among physically healthy adolescents. As a result, this research examined the potential moderating effect of concordant versus discordant sibling sex pairs.

Finally, this study investigated the mediating effect of child self-concept on the association between perceived differential parenting and multimorbidity. Social Comparison Theory provides a rationale as to why this potential mediation should be examined. Social Comparison Theory states that individuals often evaluate themselves via comparisons with others⁸². (i.e., when a person compares him or herself to a sibling in respect to parental treatment, as discussed in section 1.4.1). These comparisons are often associated with self-esteem, or self-concept.⁸³ Research suggests that a complicated relationship exists between perceived differential parenting and self-esteem.³³ A study of young adults by Zervas and Sherman found that participants who did not perceive any differential parenting had higher total self-esteem than those who perceived they were disfavoured.³³ These researchers also observed that participants who perceived no differential parenting, as well as those who perceived that they were favoured, had higher self-esteem with respect to home and parent relationships.³³ Finally, the results indicate that participants who perceived no differential parenting had higher social self-esteem than those who perceived they were favoured.³³

As previously discussed in section 1.5.1, positive self-concept is an essential component of mental health, and associated with psychological functioning in a variety of domains, while negative self-concept is associated with a host of poor psychological outcomes. As a result, a perception of differential parenting may lead to an increase in negative self-concept, which in turn results in poor mental health outcomes, thereby mediating the association between perceived differential parenting and multimorbidity.

2.2 Research Objectives and Hypotheses

The current study addresses the following questions: (O1) What is the direction and strength of the association between perceived differential parenting and psychopathology in children with chronic physical illnesses (i.e., multimorbidity)? (O2) Do birth order and concordant/discordant child-sibling sex pairs moderate the association between perceived differential parenting and childhood multimorbidity? (O3) Does child self-concept mediate the association between perceived differential parenting and childhood multimorbidity?

Informed by limited previous research, it is hypothesized that: (O1) Perceived differential parenting will lead to an increased risk of multimorbidity. (O2) Birth order and concordant/discordant child-sibling sex pairs will moderate the relationship between

perceived differential parenting and multimorbidity. (O3) Child self-concept will mediate the link between perceived differential parenting and multimorbidity.

3.0 METHODS

3.1 Study Design and Sample

Data for the current study come from the Multimorbidity in Children and Youth across the Life-course (MY LIFE) study, a prospective study of children with physician-diagnosed chronic physical illnesses and their primary caregiving parent.^{62,84} The inclusion criteria were: children were aged 2–16 years at the time of recruitment; had one physician-diagnosed chronic physical illness (operationally defined as expected to last for 12 months or longer and result in one or more of the following sequelae: (a) functional limitations, (b) dependencies to compensate for functional limitations, (c) need for additional health services); and, children and their parents had sufficient English language skills to complete the study interviews and questionnaires.^{62,84,85} Children were excluded if they had more than one physician-diagnosed CPI at the time of recruitment.^{62,84,85}

In total, 508 eligible children were identified, of which 294 consented to participate and 263 were enrolled.⁸⁵ The mean age of children at baseline was 9.2 years (SD=4.2 years), and 54% of children were male.⁸⁵ Of the children who were age-eligible to provide self reports (age ≥ 10 years) (n=117), 24.8% had screened positive for a mental illness at baseline.⁸⁵

In cases where participating children had a sibling within three years of their age, parents reported on the psychopathology and quality of life of siblings, and children reported on perceived differences between their relationship with their parents and the relationship of their sibling with their parents.^{62,84} The age-gap criterion of within + or - 3 years was chosen to ensure similarity of developmental periods between the two siblings.^{62,84,86} Overall, 65.9% of children had eligible siblings whose data were collected (n=78).⁸⁴ These 78 MY LIFE participants comprise the sample used for the current study.

3.2 Procedure

Ethics approval for the MY LIFE study was obtained from the University of Waterloo Human Research Ethics Board and the Hamilton Integrated Research Ethics Board.

Research assistants worked alongside health professionals within the hospital to identify eligible children and families.^{62,84} Families were recruited from the following outpatient clinics: dermatology, endocrinology, gastroenterology, haemophilia, immunology, neurology, respirology, and rheumatology.^{62,84} Once identified, clinic nurses informed these individuals about the study, and invited them to speak with research assistants about enrollment.^{62,84} Research assistants verified the eligibility of each family, described what participation in the study would entail, and obtained permission from interested families for the study manager to contact them and schedule baseline data collection.^{62,84} In total, 610 families were approached by clinic staff, 530 were approached by research assistants, and 508 were eligible to participate.⁸⁴

Interested families were contacted by a study coordinator to schedule in-person interviews at the hospital or at their homes.⁶² If these two options were not feasible for families, mailed packages were sent to their homes.⁶² Consent was obtained prior to the first study visit in the form of informed written consent for parents and children aged 16 years, informed written assent for children between the ages of 7 and 15 years, and oral assent for children under the age of 7 years.^{62,84}

Data collection took place in a private office within the hospital, and included structured interviews, self-reported questionnaires, and biological sample collection.^{62,84,85} Parent reports were collected for all children, and children aged ≥ 10 years also provided self-reports.⁸⁵ In March 2020, all data collection was switched to mail surveys and telephone interviews to minimize risk of COVID-19 exposure for participants and research staff.⁸⁴

The MY LIFE cohort was followed for 24 months, with data collection occurring at baseline, as well as at 6, 12, and 24 month follow-ups.⁸⁴ This follow-up schedule was based on the timing of typical clinical follow-ups for chronic physical illnesses among the participating children, and designed to allow for adequate time between assessments to identify detectable changes in mental health outcomes, as well as in biomarkers of inflammation and the stress response.⁸⁴

3.3 Measures

3.3.1 Sibling Inventory of Differential Experiences (SIDE)

Perceived differential parenting among the MY LIFE cohort was assessed using the Sibling Inventory of Differential Experiences (SIDE).^{62,84} This questionnaire measures how children perceive their familial experiences in comparison to their siblings.^{62,84,87} While the full questionnaire comprises four dimensions, only the “differential parental treatment” dimension was used for the MY LIFE study.^{62,87} This portion of the SIDE is an 18-item scale that assesses perceived differential treatment by the mother and father (9 items per parent) in relation to the closest-aged sibling, producing a continuous final score.^{62,84,87} For the MY LIFE study, participants with only one parent were asked to skip the section pertaining to the missing parent when responding to the questionnaire.⁸⁸ Participants with same-sex parents were asked to respond to the “MOTHER” section of the questionnaire for one parent, and respond to the “FATHER” section for their other parent.⁸⁸

Each item of the questionnaire is scored on a five-point Likert scale.⁸⁷ Higher scores indicate that participating children perceive their parents to provide them with more affection and control than what is provided to their sibling, and vice versa.⁸⁷ Scores in the middle of the scale (3/5) indicate no perceived difference in affection or control.⁸⁷ The SIDE has demonstrated strong concordance between siblings, as well as good test–retest reliability for differential parental affection ($r=0.70$ to 0.77) and differential parental control ($r=0.77$ to 0.80).⁸⁹ Internal consistency ratings (Cronbach’s α) for the SIDE among children in the current study sample were as follows: maternal affection, 0.59 to 0.69; maternal control, 0.58 to 0.80; paternal affection, 0.64 to 0.85; paternal control, 0.58 to 0.80. This measure was completed at baseline, as well as each follow-up visit by children age 10 or older in the MY LIFE cohort who had an eligible sibling.^{62,84}

3.3.2 Emotional Behavioural Scale (EBS)

The presence of child psychopathology among children age 10 or older in the MY LIFE cohort was assessed using the Emotional Behavioural Scale (EBS), a measure of symptoms of mental illness based on the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5).^{62,84,90} This 52-item tool assesses symptoms of four internalizing disorders [generalized anxiety disorder (GAD), separation anxiety disorder (SAD), major depressive disorder (MDD), social phobia (SP)], and three externalizing disorders [attention deficit hyperactivity disorder (ADHD), oppositional defiant disorder (ODD), conduct disorder (CD)].⁹⁰ Each item of the EBS is scored on a three-point Likert scale in regards to the presence of specific signs or symptoms of mental illness within the past 6 months: 0 = 'never or not true', 1 = 'sometimes or somewhat true' or 2 = 'often or very true'.^{90,91} Scores are calculated by summing all items corresponding to each mental illness to form sub-scale scores, which can then be combined to calculate an overall score. Higher scores are indicative of greater mental illness symptoms.⁹¹ In the current study, total scores for internalizing and externalizing symptoms will be used to assess the presence of child psychopathology.

The EBS has been shown to have robust psychometric properties in both clinical and population samples.^{90,91} Among children in the current study sample, the internal consistency (Cronbach's α) was 0.83 to 0.90 for externalizing symptom scores, and 0.91 to 0.95 for internalizing symptom scores. As with the SIDE, the EBS was administered at baseline, as well as each follow-up visit.^{62,84}

3.3.3 Self Perception Profile for Children (SPPC)

The Self Perception Profile for Children (SPPC) was used to measure self-concept among children age 10 or older in the MY LIFE cohort.^{62,84} The 36-item SPPC is a self-reported scale designed to assess children's perceptions of their competence, or self-concept, across six different domains: Scholastic Competence, Social competence, Athletic Competence, Physical Appearance, Behavioral Conduct, and Global Self-worth.⁹² Each questionnaire item contains one positive and one negative description of a specific skill.⁹³ Respondents are asked to choose which statement best describes them and then select whether the chosen statement was "Really true for me" or "Sort of true for me".⁹³ Scores for each domain are the mean of the item scores, with higher scores indicating more positive self-concept.⁹³ The SPPC is validated for children aged 8–15 years and its initial development demonstrated strong psychometric properties.⁹² Findings from research conducted by Ferro and Tang⁹³ have shown the psychometric properties of the SPPC to be a valid and reliable measure of self-concept in children newly-diagnosed with chronic illnesses. Internal consistency ratings (Cronbach's α) for the SPPC among children in the current sample were as follows: scholastic competence, 0.89 to 0.93; social competence, 0.88 to 0.93; athletic competence, 0.85 to 0.92; physical appearance, 0.88 to 0.91; behavioural conduct, 0.88 to 0.90; global self-worth, 0.78 to 0.91. As with the previous two questionnaires, the SPPC was administered at baseline, as well as each follow-up visit.^{62,84}

3.3.4 World Health Organization Disability Assessment Schedule 2.0

The level of disability among children in the MY LIFE cohort was assessed using the World Health Organization Disability Assessment Schedule (WHODAS) 2.0.^{62,84} This questionnaire assesses level of functioning in the past 30 days across 6 domains: cognition, getting along, life activities, mobility, participation, and self-care.⁹⁴ Each domain has two associated questions, for a total of 12 items overall.⁹⁴ The level of disability for each item is scored on a five-point Likert scale, with scores ranging from 1 (none) to 5 (extreme).⁹⁴ The scores for all items are then totaled, with higher overall scores denoting greater illness severity.^{62,84,94} The WHODAS 2.0 has demonstrated strong psychometric properties across different populations.⁹⁵⁻⁹⁷ Among children in the current study sample, the internal consistency rating (Cronbach's α) was 0.80. As with previous questionnaires, the WHODAS 2.0 was administered to children at baseline and each follow-up visit.^{62,84}

3.3.5 Center for Epidemiologic Studies Depression Scale

Depressive symptoms among participating parents in the MY LIFE sample were measured using the Center for Epidemiologic Studies Depression Scale (CES-D).^{62,84} This questionnaire measures self-reported depressed affect, positive affect, interpersonal relations, and somatic activity.⁹⁸ Each of the 20 items assesses the frequency of symptom occurrence within the past week on a 4-point Likert scale.⁹⁸ Item scores range from 0 (less than once a week) to 3 (five to seven days a week).⁹⁸ Total scores range from 0 to 60, with higher scores denoting more depressive symptoms.⁹⁸ The CES-D has demonstrated evidence of robust psychometric properties across populations.^{99,100} Among parents in the current study sample, the internal consistency rating (Cronbach's α) was 0.92. The CES-D was administered at baseline, as well as each follow-up visit.^{62,84}

3.3.6 Generalized Anxiety Disorder-7

Anxiety symptoms among participating parents in the MY LIFE sample were measured using the Generalized Anxiety Disorder-7 (GAD-7).^{62,84} This questionnaire assesses self-reported symptoms of anxiety experienced during the previous two weeks.¹⁰¹ Each of the seven items on the questionnaire are scored on a four-point Likert scale.¹⁰¹ Item scores range from 0 (not at all in the past two weeks) to 3 (nearly every day).¹⁰¹ Total scores range from 0 to 21, with higher scores indicating more anxiety symptoms.¹⁰¹ The GAD-7 has been shown to possess strong psychometric properties across populations.^{101,102} Among parents in the current study sample, the internal consistency rating (Cronbach's α) was 0.85. The GAD-7 was administered at baseline and each follow-up visit.^{62,84}

3.3.7 McMaster Family Assessment Device

Family functioning among the MY LIFE sample was assessed using the General Functioning sub-scale of the McMaster Family Assessment Device.^{62,84} This questionnaire assesses communication, effective involvement, effective responses, problem-solving, and roles.¹⁰³ The questionnaire consists of 12 items, each of which are

scored on a four-point Likert scale.¹⁰³ Item scores range from 0 (strongly agree) to 3 (strongly disagree).¹⁰³ Overall scores are calculated by reverse-coding six positive item scores, and summing the results.¹⁰³ Total scores range from 0 to 36, with higher scores indicating better family functioning.¹⁰³ Among Canadian populations, this sub-scale of the McMaster Family Assessment Device has demonstrated adequate psychometric properties.^{104,105} Among parents in the current study sample, the internal consistency rating (Cronbach's α) was 0.78. The questionnaire was administered to parents at baseline, as well as at each follow-up visit.^{62,84}

3.3.8 Sociodemographic Variables

Sociodemographic variables assessed for the MY LIFE cohort included the age, sex, ethnicity, and country of birth for parents, children and siblings.⁶² The age of onset of chronic physical illness for each child was also provided.⁶² Finally, marital status of parents, parental educational attainment, and yearly income before taxes were assessed.⁶²

3.4 Statistical Analysis

3.4.1 Objective 1

The current study utilized linear mixed models to determine the directionality and strength of the association between perceived differential parenting and multimorbidity among the MY LIFE participants, using the Statistical Package for the Social Sciences (SPSS).

Linear mixed models can be used for the regression analysis of correlated data.¹⁰⁶ This correlation occurs as study participants may contribute multiple responses to the dataset, such as in the MY LIFE study.^{62,106} The model assumes a continuous dependent variable, linearly related to a set of independent variables.¹⁰⁶ This expands on the traditional linear regression model by allowing the incorporation of a lack of independence between observations, and to model more than a single error term.¹⁰⁶

In the current study, two unadjusted models were run; one examining the outcome of internalizing symptoms, and the other examining the outcome of externalizing symptoms. Both models contained terms for all SIDE sub-scale scores as well as linear time. Quadratic time was also included, as a complex construct like mental health was not anticipated to change linearly. This was followed by two fully-adjusted models that contained specific covariates in addition to the aforementioned terms. All covariates included in the fully-adjusted model can be found in Table 1 in the appendix of this document.

3.4.2 Objective 2

To determine if birth order and concordant/discordant child-sibling sex pairs moderate the association between perceived differential parenting and the presence of multimorbidity, the first step was to conduct a stratified analysis, in which models were computed for each level of the potential moderator; children with older or younger siblings, and children with same or different sex siblings, for birth order and child-siblings ex pairs, respectively. In the second step, the main effect estimates between

these models were then compared using the method of variance estimates recovery (MOVER). Using the confidence intervals of parameter estimates from each model, this method constructs new confidence intervals around parameter differences between these two models.¹⁰⁷

3.4.3 Objective 3

To examine the mediating effect of child self-concept, the product of coefficients method was used alongside generalized linear modelling.

The product of coefficients method calculates the indirect effect by multiplying two regression coefficients.^{108,109} These two coefficients are obtained from two regression models.¹⁰⁹ Consider the case where X is the predictor variable, Y is the outcome variable, and M is the mediator. A product is formed by multiplying the partial regression effect for M predicting Y, B₂ by the simple coefficient for X predicting M.¹⁰⁹

This approach has several strengths compared to other methods of mediation analysis. First, unlike the popular four step method of mediation analysis proposed by Barron and Kenny,¹¹⁰ the product of coefficients approach calculates the indirect effect (that X affects Y through the compound pathway of a and b) and tests its significance.¹⁰⁹ Second, the product of coefficients approach produces fewer Type II errors than the four step method, allowing it to detect true mediation effects that the Barron and Kenny approach may miss.^{109,111} Finally, the product of coefficients approach is more robust than similar methods of mediation analysis that also estimate the indirect coefficient, namely the difference of coefficients approach.

3.4.4 Power Considerations

3.4.4.1 Objective 1

A power analysis was conducted using the Statistical Analysis Software (SAS) macro developed by West et al.¹¹² For the estimation of input parameters, the MY LIFE data were used to run two unconditional linear mixed models, each with a random intercept; one used the EBS internalizing score as the outcome and the other used the externalizing score. Both models included 151 subjects with 501 observations. Based on 100 replications with a sample size of 70 and 4 time points, the macro results in a computed power value of 0.99 (99%) for both EBS internalizing and externalizing scores. As a result, the linear mixed models in the current study had sufficient statistical power.

3.4.4.2 Objective 2

A power analysis was conducted using the InteractionPowerR package for the R statistical software.¹¹³ This analysis gave a statistical power of 15% for a sample size of 70 participants. Despite the inadequate statistical power, the moderation effects of birth order and child-sibling sex pairs were still investigated in an exploratory nature.

3.4.4.3 Objective 3

According to Pan et al.¹¹⁴, the mediation analysis should have adequate statistical power to detect small to medium effects. Pan et al.¹¹⁴ estimate that a sample size of at least 59 is necessary for a 4 time-point study with small to medium effect sizes and a within-subject correlation of 0.2. As the sample size for the current study is 78 participants, there was sufficient statistical power for the mediation analysis.

4.0 RESULTS

4.1 Descriptive Statistics

4.1.1 *Baseline Characteristics*

The sample for the current study consisted of 78 children with chronic physical illnesses. The mean age was 13.4 years (SD=2.2). Of these children, 52.6% (n=41) were female. The mean chronic physical illness duration was 6.0 years (SD=5.1), with the most common category of physical illness being rheumatological disorders, affecting 35.9% of children (n=28).

The current study sample also included 78 parents. The mean age of parents in the sample was 43.7 years (SD=5.4), and 92.3% of parents (n=72) were female. Of all parents, 88.5% (n=69) were white, and 16.7% (n=13) were immigrants. The sample consisted of 97.4% (n=76) biological parents, and 87.2% (n=68) of parents were partnered. Of all parents in the sample, 53.8% (n=42) reported a household income of ≥90,000 CAD.

Finally, the current study sample included 78 closest-age siblings of children with chronic physical illnesses. The mean age of these siblings was 12.8 years (SD=3.2), and 52.6% (n=41) were female. Of all siblings in the sample, 47.4% (n=37) were older than their brother or sister, and 48.7% (n=38) were the same sex as their brother or sister.

For more information regarding baseline sample characteristics, see Table 1 in the appendix of this document.

4.1.2 *Baseline Questionnaire Results*

4.1.2.1 Sibling Inventory of Differential Experiences (SIDE)

Of the 78 children with chronic physical illnesses in the sample, 98.7% (n=77) completed the SIDE questions that pertained to perceived differential maternal treatment at baseline, and 93.6% (n=73) completed the SIDE with respect to both perceived maternal and paternal differential treatment at baseline. Mean baseline scores for perceived differential maternal affection and control were 3.0 (SD=0.4) and 2.9 (SD=0.4), respectively. In contrast, mean baseline scores for perceived differential paternal treatment were 3.0 (SD=0.3) and 3.0 (SD=0.5), respectively.

For more information regarding baseline SIDE scores, see Table 2 in the appendix of this document.

4.1.2.2 Emotional Behavioural Scale (EBS)

Of the 78 children with chronic physical illnesses in the current study sample, 98.7% (n=77) completed the EBS questionnaire at baseline. The mean baseline score for externalizing symptoms was 6.7 (SD=4.9), while the mean baseline score for internalizing symptoms was 11.7 (SD=8.7).

For more information regarding baseline EBS scores, see Table 2 in the appendix of this document.

4.1.2.3 Self Perception Profile for Children (SPPC)

All 78 children with chronic physical illnesses in the current study sample completed the SPPC at baseline. Mean baseline scores for each domain of self-concept were as follows:

scholastic competence (mean=2.9, SD=0.8), social competence (mean=3.0, SD=0.7), athletic competence (mean=2.7, SD=0.8), physical appearance (mean=2.9, SD=0.8), behavioural conduct (mean=3.3, SD=0.6), and global self-worth (mean=3.3, SD=0.5).

For more information regarding baseline SPPC scores, see Table 2 in the appendix of this document.

4.1.2.4 World Health Organization Disability Assessment Schedule (WHODAS) 2.0

All 78 children with chronic physical illnesses in the current study sample completed the WHODAS 2.0. The mean baseline score for the WHODAS 2.0 was 19.4 (SD= 6.2).

For more information regarding baseline WHODAS 2.0 scores, see Table 2 in the appendix of this document.

4.1.2.5 Parent Psychopathology

All 78 parents in the current study sample completed both the CES-D and GAD-7 questionnaires. These results were combined to create an overall rating of parent psychopathology. The mean baseline score for parent psychopathology was 14.2 (SD=12.5).

For more information regarding baseline parent psychopathology scores, see Table 2 in the appendix of this document.

4.1.2.6 Family Functioning

All 78 parents in the current study sample completed the General Functioning sub-scale of the McMaster Family Assessment device. The mean baseline score was 27.8 (SD=5.1).

For more information regarding baseline family functioning scores, see Table 2 in the appendix of this document.

4.2 Objective 1

Regression analysis suggested a statistically significant negative association between SIDE sub-scale scores for perceived maternal affection and EBS internalizing symptom scores. This association was present in both the unadjusted ($B=-2.64$, $SE=1.14$, $p=0.02$) and fully-adjusted ($B=-2.17$, $SE=1.07$, $p=0.04$) models. A similar association was observed between SIDE sub-scale scores for perceived paternal affection and EBS internalizing symptom scores in the unadjusted model ($B=-2.63$, $SE=1.32$, $p=0.04$); however, this association was not statistically significant in the fully-adjusted model ($B=-2.20$, $SE=1.25$, $p=0.08$). Other statistically significant predictors of EBS internalizing scores in the fully-adjusted model included whether the participating child was female ($B=6.43$, $SE=1.39$, $p<0.01$), the level of child disability ($B=0.65$, $SE=0.13$, $p<0.01$) and parent psychopathology ($B=0.18$, $SE=0.07$, $p=0.02$).

No statistically significant relationships between any SIDE sub-scale scores and EBS externalizing scores were found. However, other significant predictors of EBS externalizing symptom scores were level of child disability ($B=0.37$, $SE=0.07$, $p<0.01$) and family functioning ($B=-0.32$, $SE=0.08$, $p<0.01$).

For the full results of all regression analyses, see Table 3 in the appendix of this document.

4.3 Objective 2

Stratified analyses showed that birth order had a statistically significant moderating effect on the association between SIDE sub-scale scores for perceived maternal affection and EBS internalizing symptom scores (difference= 4.42 , $CI=0.38$ to 8.45). More specifically, among participating children with an older sibling, a statistically significant negative association was found between SIDE sub-scale scores for perceived maternal affection and EBS internalizing symptom scores (estimate= -3.97 , $CI=-6.91$ to -1.03), whereas no such association was observed among participating children with a younger sibling. While birth order was also found to have a statistically significant moderating effect on the association between SIDE sub-scale scores for paternal control and EBS internalizing symptom scores (difference= 4.56 , $CI=0.29$ to 8.83), the main effects in each stratum-specific model were not statistically significant. Concordant/discordant child-sibling sex pairs were not found to have any statistically significant moderating effects.

For the full results of all moderation analyses, see Table 4 and Table 5 in the appendix of this document.

4.4 Objective 3

Mediation analyses suggested that five of the six SPPC domain scores had a statistically significant mediating effect on the association between SIDE sub-scale scores for perceived maternal affection and EBS internalizing symptom scores: scholastic competence (indirect effect= -0.87 , indirect $SE=0.34$, $p=0.01$), social competence (indirect effect= -0.94 , indirect $SE=0.37$, $p=0.01$), athletic competence

(indirect effect=-0.58, indirect SE=0.27, $p=0.03$), behavioural conduct (indirect effect=-0.86, indirect SE=0.34, $p=0.01$), global self-worth (indirect effect=-1.50, indirect SE=0.50, $p<0.01$). These same five SPPC domain scores were also found to have a statistically significant mediating effect on the association between SIDE sub-scale scores for perceived maternal affection and EBS externalizing symptom scores: scholastic competence (indirect effect=-0.51, indirect SE=0.20, $p=0.01$), social competence (indirect effect=-0.30, indirect SE=0.15, $p=0.04$), athletic competence (indirect effect=-0.37, indirect SE=0.16, $p=0.02$), behavioural conduct (indirect effect=-0.97, indirect SE=0.28, $p<0.001$), global self-worth (indirect effect=-0.59, indirect SE=0.21, $p=0.01$).

For the full results of all mediation analyses, see Table 6 and Table 7 in the appendix of this document.

5.0 DISCUSSION

5.1 Objective 1

In the current study, it was found that higher perceived maternal affection toward children with a chronic physical illness (relative to their siblings) was associated with decreased reports of internalizing symptoms. No other statistically significant relationships were observed between perceived differential parenting and child psychopathology. This contrasts with similar research involving physically healthy children conducted by Kowal et al.³² The only statistically significant relationship observed by Kowal et al.³² was a positive association between the level of preferential control and the level of externalizing behaviour problems; children who reported receiving more parental control relative to their sibling demonstrated higher levels of externalizing behaviour problems.

As such, the findings of the current research may be explained by the unique nature of the population being studied, namely, children and adolescents living with chronic physical illnesses. One factor unique to this population is a relatively high level of dependency on parents compared to physically healthy children and adolescents. Previous research^{115,116} has indicated that these individuals often have a greater dependency on parents than their physically healthy counterparts. Moreover, the process of acquiring autonomy from parents is often delayed among adolescents with chronic physical illnesses and is more complex when it eventually occurs.¹¹⁵

Given the increased dependency on parents and limited autonomy of this population, it may be assumed that greater perceived parental involvement always leads to positive psychological outcomes. However, a substantial body of prior research has demonstrated that this is not the case. Parental involvement that is high in control but low in affection, also known as authoritarian parenting,¹¹⁷ has been shown to lead to negative psychological outcomes among children and adolescents living with chronic physical illnesses.¹¹⁸⁻¹²⁰ In contrast, parental involvement that is high in both affection and control, otherwise known as authoritative parenting,¹¹⁷ is associated with the inverse.^{118,121}

Although the current study only found a negative association between perceived affection relative to siblings and child psychopathology, there is reason to believe that an authoritative parenting style (involving both affection and control) relative to siblings

is in fact driving this reduction in mental illness symptoms among participants. Research conducted by Helgeson et al.¹²² studied the association between perceived parental control in early adolescence and various health outcomes in young adulthood among individuals with and without type 1 diabetes. In alignment with prior research, Helgeson et al.¹²² observed that parental behaviour perceived as controlling was associated with a range of poor outcomes among offspring without diabetes, such as depressive symptoms, an increased risk of smoking, and reduced school attendance. However, among offspring with diabetes, the same perceived parental behaviour was instead associated with a reduced risk of depressive symptoms, a reduced risk of clinical depression, and better diabetes management.¹²² In light of these findings, Helgeson et al.¹²² reflected on the importance of parental involvement in the lives of young people living with diabetes, and postulated that, among these individuals, as well as those living with other chronic physical illnesses, a perceived lack of parental control may be interpreted as a lack of parental involvement.¹¹⁸ As a result, many parental behaviours that would be perceived as controlling among those without chronic physical illnesses may instead be taken for granted as necessary support and guidance among young people living with such conditions.¹¹⁸

Taking this evidence into account, the lack of a statistically significant impact from perceived differential parental control on child psychopathology in the current study may be related to a combination of how children living with chronic physical illnesses perceive parental control, as well as the issue of equity versus equality. According to the distributive justice framework, people judge the appropriateness of rewards they receive based on fairness, as well as their appraisals of the rewards received by others.¹²³ In the context of perceived differential treatment, this means that children will make judgements regarding who in their family receives preferential treatment, and whether or not this treatment is legitimate.³² When dealing with matters involving siblings, among children and early adolescents, Kowal et al.³² have found that issues of equity rather than equality appear to be of chief importance.³² As such, children will often tolerate what they perceive to be differential treatment relative to their sibling if they believe this perceived treatment is fair.³² When examining the results of the current study through this lens, and considering the evidence presented by Helgeson et al.,¹²² perhaps participants in the current study viewed the parental control they perceived relative to their sibling as necessary support from caregivers, and therefore believed that this perceived differential parental treatment was fair.

5.2 Objective 2

5.2.1 Birth Order

The current study found that, among participating children with an older sibling, higher perceived maternal affection toward themselves (relative to their older sibling) was associated with decreased reports of internalizing symptoms. However, this association was not observed among participating children with a younger sibling. These observations align with the findings of several other studies that, when taken together, suggest that later-born children and adolescents face a unique set of circumstances which, if left unchecked, can put them at an increased risk of internalizing mental health symptoms relative to their older siblings.

Later-born children are more likely to face a lack of parental attention, time and financial resources compared to their older siblings,^{79,80} In other words, these children often experience an uninvolved parenting style,¹¹⁷ characterized by both low affection and control. Although such parenting practices allow children a significant amount of freedom, parents may be, or children may perceive them to be, uninterested in how they are faring.¹¹⁷

Past research indicates that such family dynamics put later-born children at risk for a myriad of poor mental health outcomes. Gates et al.⁷⁵ have reported that later-born children display higher levels of anxiety and depression relative to earlier-born children. Moreover, studies by Easey et al.,⁷⁶ Bjorngaard et al.,⁷⁷ and Rostila et al.⁷⁸ have all noted that later-born adolescents demonstrated higher rates of suicidal behaviour compared to their earlier-born counterparts. Considering this evidence, it is understandable how the level of perceived maternal affection relative to siblings would play a more significant role in the development of internalizing symptoms among later-born participants in the current study.

In the current study, factors unique to children with chronic physical illnesses may also exacerbate the aforementioned issues faced by later-born children. As discussed in section 5.1, these individuals are often more dependent on parents than their healthy counterparts.^{115,116} Despite this fact, as later-born children, they may not receive the necessary amount of attention and warmth from their parents.^{79,80} As such, those in need of a higher-than-normal level of parental affection may not be receiving it.

Alternatively, other researchers have observed that later-born children often have fewer parental expectations placed on them relative to their elder siblings.^{124,125} From this standpoint, it could be argued that later-born children often experience what is known as a permissive parenting style, characterized by high affection and low control.¹¹⁷ Permissive parents are usually warm and supportive, but reluctant to set limits or place demands on their children.^{117,118} This, in turn, may make it challenging for children to learn behaviour regulation or consistently follow routines.^{117,118} In the context of the current study, the mental health of participants may suffer if these children believe that their siblings are receiving more affection than they are. While children living with chronic physical illnesses are indeed likely to require more parental support than their physically healthy counterparts,^{115,116} and a substantial body of evidence suggests that a lack of parental affection is damaging to the mental well-being of later-born individuals,⁷⁵⁻⁸⁰ an overly-permissive parenting style may be just as detrimental.

5.2.2 Concordant and Discordant Sibling Sex Pairs

In the current study, whether the sex of participating children and their siblings was concordant or discordant had no statistically significant moderating effect on the relationship between perceived differential parenting and child psychopathology. This result contrasts with similar research conducted on physically healthy adolescents by Tamrouti-Makkink et al.⁸¹ Tamrouti-Makkink et al.⁸¹ reported no statistically significant direct association between perceived differential parental treatment and internalizing or externalizing problem behaviour in same-gender sibling pairs, but found a statistically significant negative relationship between paternal warmth and externalizing problem behaviour of older siblings in mixed-gender sibling pairs. The difference between the

results of the current study and those observed by Tamrouti-Makkink et al.⁸¹ is likely caused by differences in the study samples. First, all participating children in the current study had a chronic physical illness,^{62,84} whereas the sample in the study conducted by Tamrouti-Makkink et al.⁸¹ only contained physically healthy participants. As such, characteristics unique to children living with chronic physical illnesses may factor into the results of the current study. Second, Tamrouti-Makkink et al.⁸¹ noted that their study sample was comprised of well-functioning families that lack extreme forms of problem behaviours. In contrast, the current study sample contained a substantial number of participating children with pre-existing psychopathology.

5.3 Objective 3

In the current study, it was found that higher perceived maternal affection toward participating children (relative to their siblings) was associated with decreased reports of both internalizing and externalizing symptoms via five domains of self-concept; scholastic competence, social competence, athletic competence, behavioural conduct, and global self-worth. However, the self-concept domain of physical appearance did not have a statistically significant influence on the relationship between perceived differential parenting and child psychopathology. This lack of an impact from physical appearance may provide valuable information as to why the other domains of self-concept did have a statistically significant mediating effect.

As noted by Schwartz and Axelrad,¹¹⁸ parenting is often a response to child behaviours. In the context of the current study, perhaps parents are more inclined to direct their energy and time toward behaviours they can control, instead of focusing on characteristics they may believe to be relatively immutable, such as physical appearance. In a family of a child with a chronic physical illness, for example, a mother may attempt to help her child with illness management routines if she notices that their adherence behaviours are declining.¹¹⁸ However, if the child believes these attempts at assistance are intrusive, coercive or overly critical, they may shut out her efforts to help.¹¹⁸ In response, the mother may redouble her efforts, thereby leading the child to resist further, in a feedback loop known as miscarried helping.^{118,126,127} Ultimately, this cycle can result in feelings of inadequacy on the part of the child, or a long-standing pattern of parent-child conflict.¹¹⁸

Although chronic illness management was not a domain of self-concept measured in the current study, similar phenomena have been observed in relation to domains of self-concept that were measured, such as scholastic competence. In a prior study, Ahn and Lee¹²⁸ noted that adolescents with chronic physical illnesses tend to perceive their parents as being over-involved in their school lives. This over-involvement was shown to result in decreased self-concept, which can, in turn, lead to poor school adjustment.¹²⁸

When considering this evidence, it is likely that the five domains of self-concept that have a statistically significant mediating effect in the current study do so because they are related to areas that parents may feel they have some degree of influence over. If parents make attempts to assist their children with these five areas of life in a manner that is perceived as warm and unintrusive by their children, this may foster

positive self-concept, which, in turn, may lead to decreased symptoms of child psychopathology.

6.0 LIMITATIONS

This current research has several limitations. First, the MY LIFE study contains two sources of potential selection bias:⁸⁴ all participants were recruited from a single site; and, only participants with adequate English language skills were included. As the current research is a secondary analysis of the MY LIFE data, little can be done to minimize this potential bias.

The second limitation regarding the MY LIFE study concerns the type of data that was collected, specifically the lack of data on gender in addition to biological sex. Although investigating the effect of child gender (as opposed to biological sex) on the relationship between perceived differential parenting and multimorbidity could also yield valuable insights, the data available for this study does not allow for such comparisons, as only data on biological sex were collected.

The final limitation is the small sample size. A cross-lagged panel analysis was originally proposed to examine the strength and directionality of the relationship between perceived differential parenting and multimorbidity. However, after conducting a power analysis, it was found that there was insufficient statistical power given the sample size.

7.0 IMPLICATIONS

The results of the current study have several implications for future research. First, future research examining the relationship between perceived differential parenting and psychopathology among children living with chronic physical illnesses should take the dimension of perceived fairness of differential parenting into account. Second, future studies should examine why perceived differential parenting leads to child psychopathology among later-born children with chronic physical illnesses, but has no statistically significant effect among earlier-born children. Third, future studies should examine why concordant versus discordant child-sibling sex pairs has no statistically significant moderating effect on the relationship between perceived differential parenting and psychopathology among children with chronic physical illnesses. Finally, if possible, these three aforementioned issues should all be investigated with a larger, more diverse sample of children and parents.

The current study also has implications for the provision of family-centered approaches to healthcare for children with chronic physical illnesses. Specifically, it underscores the importance of evidence-based interventions that promote authoritative parenting. Several such interventions exist,¹¹⁸ however, The Positive Parenting Program, also known as Triple P,¹²⁹ and the Nurturing Parenting intervention¹³⁰ may both be of particular interest to providers of family-centered care for children with chronic physical illnesses. A substantial body of literature supports the effectiveness of both interventions,¹³¹⁻¹³⁴ and both interventions contain components tailored specifically for families of children with chronic physical illnesses.^{135,136}

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APPENDIX

Table 1. Baseline Characteristics

Characteristics:	Full Sample	Sub-Sample
Children:		
<i>N</i>	263	78
Age (years)	9.5 (4.2)	13.4 (2.2)
Female	125 (47.5)	41 (52.6)
Immigrant	15 (5.7)	8 (10.3)
Diagnosis:		
Dermatological	23 (8.7)	4 (5.1)
Endocrine	38 (14.4)	8 (10.3)
Gastroenterological	34 (12.9)	13 (16.7)
Hematological	29 (11.0)	11 (14.1)
Neurological	12 (4.6)	2 (2.6)
Respiratory	54 (20.5)	12 (15.4)
Rheumatological	73 (27.8)	28 (35.9)
Physical illness duration (years)	4.4 (4.1)	6.0 (5.1)
New-onset illness (duration < 1 year)	69 (26.2)	19 (24.4)
Parents:		
<i>N</i>	263	78
Age (years)	40.5 (6.5)	43.7 (5.4)
Female	237 (90.1)	72 (92.3)
Immigrant	40 (15.2)	13 (16.7)
Biological parent	258 (98.1)	76 (97.4)
White	232 (88.2)	69 (88.5)
Partnered	228 (86.7)	68 (87.2)
Household income ≥90,000 CAD	157 (59.7)	42 (53.8)
Postsecondary graduate	200 (76.0)	57 (73.1)
Siblings:		
<i>N</i>	171	78
Age (years)	9.1 (4.7)	12.8 (3.2)
Female	95 (55.6)	41 (52.6)
Older sibling	79 (46.2)	37 (47.4)
Concordant sex pair	90 (52.6)	38 (48.7)

Data presented as n (%), except for age and illness duration which are reported as mean (standard deviation). Partnered relationships include married and common law relationships. Child-reported sibling data and disability are used in the analysis.

Table 2. Baseline Questionnaire Results

Measure:	N	Mean	SD	Range
Child-reported:				
SIDE mother, affection	77	3.0	0.4	1.4 - 4.0
SIDE mother, control	77	2.9	0.4	1.5 - 3.8
SIDE father, affection	73	3.0	0.3	2.0 - 4.6
SIDE father, control	73	3.0	0.5	1.0 - 4.5
EBS, externalizing symptoms	77	6.7	4.9	0 - 21.0
EBS, internalizing symptoms	77	11.7	8.7	0 - 41.0
SPPC, scholastic competence	78	2.9	0.8	1.2 - 4.0
SPPC, social competence	78	3.0	0.7	1.3 - 4.0
SPPC, athletic competence	78	2.7	0.8	1.2 - 4.0
SPPC, physical appearance	78	2.9	0.8	1.0 - 4.0
SPPC, behavioural conduct	78	3.3	0.6	1.3 - 4.0
SPPC, global self-worth	78	3.3	0.5	2.0 - 4.0
Child disability, WHODAS 2.0	78	19.4	6.2	12.0 - 35.0
Parent-reported:				
Parent psychopathology	78	14.2	12.5	1.0 - 59.0
Family functioning	78	27.8	5.1	13.0 - 36.0

Parent psychopathology is a composite measure of CES-D and GAD-7 scores.

Table 3. Linear Mixed Analysis

	Unadjusted (external)	Unadjusted (external)	Unadjusted (internal)	Unadjusted (internal)	Fully-Adjusted (external)	Fully-Adjusted (external)	Fully-Adjusted (internal)	Fully-Adjusted (internal)
Number of observations	390		390		390		390	
Number of participants	75		75		74		74	
Model fit measure, AIC	1795.0		2159.7		1730.1		2088.5	
Parameter	B (SE)	p	B (SE)	p	B (SE)	p	B (SE)	p
Intercept	4.58 (3.58)	0.20	25.2 (6.02)	<0.01	3.97 (3.54)	0.26	16.79 (5.95)	0.01
Time (linear)	-1.09 (0.46)	0.02	-2.27 (0.76)	<0.01	-1.02 (0.46)	0.03	-2.22 (0.76)	<0.01
Time (quadratic)	0.27 (0.11)	0.01	0.70 (0.19)	<0.01	0.25 (0.11)	0.02	0.69 (0.19)	<0.01
SIDE mother, affection	-0.71 (0.66)	0.28	-2.64 (1.14)	0.02	-0.99 (0.62)	0.11	-2.17 (1.07)	0.04
SIDE father, affection	0.23 (0.77)	0.76	-2.63 (1.32)	0.04	0.67 (0.73)	0.35	-2.20 (1.25)	0.08
SIDE mother, control	0.73 (0.67)	0.27	1.13 (1.14)	0.32	0.78 (0.65)	0.23	1.34 (1.10)	0.23
SIDE father, control	0.46 (0.63)	0.47	-0.25 (1.08)	0.82	0.60 (0.61)	0.33	0.07 (1.03)	0.95
Child age, years					-0.34 (0.20)	0.09	0.67 (0.37)	0.08
Female child					0.13 (0.74)	0.86	6.43 (1.39)	<0.01
Parent age, years					0.09 (0.09)	0.34	-0.15 (0.17)	0.37
Household income ≥\$90,000					-0.38 (0.85)	0.65	1.95 (1.58)	0.22
Child physical illness duration, years					-0.04 (0.08)	0.60	-0.01 (0.15)	0.93
Child disability					0.37 (0.07)	<0.01	0.65 (0.13)	<0.01
Parent psychopathology					0.04 (0.04)	0.30	0.18 (0.07)	0.02
Family functioning					-0.32 (0.08)	<0.01	-0.17 (0.15)	0.25

Abbreviations – AIC: Akaike Information Criterion; SE: Standard Error.

Note - Parent psychopathology is a composite measure of CES-D and GAD-7 scores.

Table 4. Moderation Analysis - Birth Order

Outcome	Predictor	Subgroup 1 Moderator	Subgroup 1 Estimate	Subgroup 1 Lower CI	Subgroup 1 Upper CI	Subgroup 1 Significance	Subgroup 2 Moderator	Subgroup 2 Estimate	Subgroup 2 Lower CI	Subgroup 2 Upper CI	Subgroup 2 Significance	Difference by MOVER	Difference Lower CI	Difference Upper CI	Difference Significance
EBS externalizing	SIDE mother, affection	Older sibling	-1.75	-3.41	-0.10	$p<0.05$	Younger sibling	0.19	-1.35	1.72	NS	1.94	-0.32	4.20	NS
EBS externalizing	SIDE father, affection	Older sibling	-0.19	-2.91	2.53	NS	Younger sibling	0.76	-0.82	2.35	NS	0.96	-2.19	4.11	NS
EBS externalizing	SIDE mother, control	Older sibling	1.94	0.12	3.76	$p<0.05$	Younger sibling	-0.13	-1.86	1.59	NS	-2.07	-4.58	0.44	NS
EBS externalizing	SIDE father, control	Older sibling	0.01	-1.93	1.96	NS	Younger sibling	1.35	-0.23	2.93	NS	1.34	-1.17	3.84	NS
EBS internalizing	SIDE mother, affection	Older sibling	-3.97	-6.91	-1.03	$p<0.01$	Younger sibling	0.45	-2.31	3.20	NS	4.42	0.38	8.45	$p<0.05$
EBS internalizing	SIDE father, affection	Older sibling	0.54	-4.31	5.38	NS	Younger sibling	-3.65	-6.41	-0.89	$p<0.01$	-4.19	-9.77	1.39	NS
EBS internalizing	SIDE mother, control	Older sibling	-0.10	-3.04	2.83	NS	Younger sibling	1.39	-1.60	4.39	NS	1.50	-2.69	5.69	NS
EBS internalizing	SIDE father, control	Older sibling	-2.60	-5.92	0.71	NS	Younger sibling	1.96	-0.74	4.65	NS	4.56	0.29	8.83	$p<0.05$

Abbreviations – CI: 95% confidence interval; MOVER: method of variance estimate recovery; NS: non-significant.

Table 5. Moderation Analysis - Concordant/Discordant Child-Sibling Sex Pairs

Outcome	Predictor	Sub group 1 Moderator	Sub group 1 Estimate	Sub group 1 Lower CI	Sub group 1 Upper CI	Sub group 1 Significance	Sub group 2 Moderator	Sub group 2 Estimate	Sub group 2 Lower CI	Sub group 2 Upper CI	Sub group 2 Significance	Difference by MOVER	Difference Lower CI	Difference Upper CI	Difference Significance
EBS externalizing	SIDE mother, affection	Concordant Sex Pair	-0.63	-2.43	1.17	NS	Discordant Sex Pair	-1.26	-3.06	0.53	NS	-0.63	-3.18	1.91	NS
EBS externalizing	SIDE father, affection	Concordant Sex Pair	-0.47	-2.81	1.87	NS	Discordant Sex Pair	0.92	-0.78	2.63	NS	1.39	-1.50	4.29	NS
EBS externalizing	SIDE mother, control	Concordant Sex Pair	1.95	0.00	3.90	NS	Discordant Sex Pair	-0.46	-2.09	1.17	NS	-2.40	-4.95	0.14	NS
EBS externalizing	SIDE father, control	Concordant Sex Pair	-0.52	-2.67	1.62	NS	Discordant Sex Pair	0.86	-0.56	2.28	NS	1.38	-1.19	3.95	NS
EBS internalizing	SIDE mother, affection	Concordant Sex Pair	-0.59	-3.36	2.17	NS	Discordant Sex Pair	-1.72	-5.09	1.65	NS	-1.12	-5.49	3.24	NS
EBS internalizing	SIDE father, affection	Concordant Sex Pair	-4.08	-7.76	-0.41	$p<0.05$	Discordant Sex Pair	-0.72	-3.81	2.38	NS	3.36	-1.44	8.17	NS
EBS internalizing	SIDE mother, control	Concordant Sex Pair	3.06	0.25	5.87	$p<0.05$	Discordant Sex Pair	0.55	-2.41	3.51	NS	-2.52	-6.60	1.57	NS
EBS internalizing	SIDE father, control	Concordant Sex Pair	-3.10	-6.38	0.19	NS	Discordant Sex Pair	0.74	-1.70	3.19	NS	3.84	-0.26	7.94	NS

Abbreviations – CI: 95% confidence interval; MOVER: method of variance estimate recovery; NS: non-significant.

Table 6. Mediation Analysis - Statistically Significant Findings

Row #	Outcome	Mediator	Predictor	Path a Estimate	Path a SE	Path a p-value	Path b Estimate	Path b SE	Path b p-value	Indirect Effect	Indirect SE	Indirect p-value
1	EBS externalizing	SPPC, scholastic competence	SIDE mother, affection	0.25	0.08	<0.01	-2.01	0.38	<0.001	-0.51	0.20	0.01
5	EBS externalizing	SPPC, social competence	SIDE mother, affection	0.26	0.09	<0.01	-1.15	0.38	<0.01	-0.30	0.15	0.04
9	EBS externalizing	SPPC, athletic competence	SIDE mother, affection	0.26	0.09	<0.01	-1.44	0.39	<0.001	-0.37	0.16	0.02
17	EBS externalizing	SPPC, behavioural conduct	SIDE mother, affection	0.29	0.07	<0.001	-3.35	0.48	<0.001	-0.97	0.28	<0.001
21	EBS externalizing	SPPC, global	SIDE mother, affection	0.26	0.08	<0.01	-2.27	0.41	<0.001	-0.59	0.21	0.01
29	EBS internalizing	SPPC, scholastic competence	SIDE mother, affection	0.25	0.08	<0.01	-3.43	0.68	<0.001	-0.87	0.34	0.01
33	EBS internalizing	SPPC, social competence	SIDE mother, affection	0.26	0.09	<0.01	-3.62	0.66	<0.001	-0.94	0.37	0.01
37	EBS internalizing	SPPC, athletic competence	SIDE mother, affection	0.26	0.09	<0.01	-2.24	0.71	<0.01	-0.58	0.27	0.03
45	EBS internalizing	SPPC, behavioural conduct	SIDE mother, affection	0.29	0.07	<0.001	-2.99	0.88	<0.01	-0.86	0.34	0.01
49	EBS internalizing	SPPC, global	SIDE mother, affection	0.26	0.08	<0.01	-5.78	0.71	<0.001	-1.50	0.50	<0.01

Abbreviations – X: predictor; M: mediator; Y: outcome. SE: standard error.

Path a refers to the effect of X on M.

Path b refers to the effect of M on Y, adjusted for X.

The term “Indirect” refers to paths ab – indirect effect of X onto Y through M (i.e., Sobel product of coefficients).

Table 7. Mediation Analysis - All Findings

Row #	Outcome	Mediator	Predictor	Path a Estimate	Path a SE	Path a p-value	Path b Estimate	Path b SE	Path b p-value	Indirect Effect	Indirect SE	Indirect p-value
1	EBS externalizing	SPPC, scholastic competence	SIDE mother, affection	0.25	0.08	<0.01	-2.01	0.38	<0.001	-0.51	0.20	0.01
2	EBS externalizing	SPPC, scholastic competence	SIDE father, affection	0.11	0.10	0.25	-2.01	0.38	<0.001	-0.22	0.20	0.26
3	EBS externalizing	SPPC, scholastic competence	SIDE mother, control	-0.02	0.08	0.79	-2.01	0.38	<0.001	0.04	0.17	0.80
4	EBS externalizing	SPPC, scholastic competence	SIDE father, control	0.02	0.08	0.81	-2.01	0.38	<0.001	-0.04	0.16	0.81
5	EBS externalizing	SPPC, social competence	SIDE mother, affection	0.26	0.09	<0.01	-1.15	0.38	<0.01	-0.30	0.15	0.04
6	EBS externalizing	SPPC, social competence	SIDE father, affection	-0.002	0.10	0.98	-1.15	0.38	<0.01	0.003	0.12	0.98
7	EBS externalizing	SPPC, social competence	SIDE mother, control	-0.07	0.09	0.47	-1.15	0.38	<0.01	0.07	0.11	0.50
8	EBS externalizing	SPPC, social competence	SIDE father, control	-0.09	0.09	0.31	-1.15	0.38	<0.01	0.10	0.11	0.36
9	EBS externalizing	SPPC, athletic competence	SIDE mother, affection	0.26	0.09	<0.01	-1.44	0.39	<0.001	-0.37	0.16	0.02
10	EBS externalizing	SPPC, athletic competence	SIDE father, affection	-0.01	0.10	0.95	-1.44	0.39	<0.001	0.01	0.15	0.95
11	EBS externalizing	SPPC, athletic competence	SIDE mother, control	-0.06	0.08	0.47	-1.44	0.39	<0.001	0.09	0.13	0.49
12	EBS externalizing	SPPC, athletic competence	SIDE father, control	0.05	0.08	0.56	-1.44	0.39	<0.001	-0.07	0.12	0.58
13	EBS externalizing	SPPC, physical appearance	SIDE mother, affection	0.22	0.11	0.04	-0.47	0.33	0.15	-0.10	0.10	0.28
14	EBS externalizing	SPPC, physical appearance	SIDE father, affection	0.20	0.12	0.10	-0.47	0.33	0.15	-0.10	0.10	0.33
15	EBS externalizing	SPPC, physical appearance	SIDE mother, control	-0.08	0.11	0.44	-0.47	0.33	0.15	0.04	0.07	0.56
16	EBS externalizing	SPPC, physical appearance	SIDE father, control	-0.11	0.10	0.30	-0.47	0.33	0.15	0.05	0.07	0.46
17	EBS externalizing	SPPC, behavioural conduct	SIDE mother, affection	0.29	0.07	<0.001	-3.35	0.48	<0.001	-0.97	0.28	<0.001

Row #	Outcome	Mediator	Predictor	Path a Estimate	Path a SE	Path a p-value	Path b Estimate	Path b SE	Path b p-value	Indirect Effect	Indirect SE	Indirect p-value
18	EBS externalizing	SPPC, behavioural conduct	SIDE father, affection	-0.12	0.08	0.12	-3.35	0.48	<0.001	0.42	0.27	0.13
19	EBS externalizing	SPPC, behavioural conduct	SIDE mother, control	-0.09	0.07	0.23	-3.35	0.48	<0.001	0.29	0.25	0.24
20	EBS externalizing	SPPC, behavioural conduct	SIDE father, control	-0.11	0.07	0.11	-3.35	0.48	<0.001	0.37	0.24	0.12
21	EBS externalizing	SPPC, global	SIDE mother, affection	0.26	0.08	<0.01	-2.27	0.41	<0.001	-0.59	0.21	0.01
22	EBS externalizing	SPPC, global	SIDE father, affection	0.17	0.09	0.06	-2.27	0.41	<0.001	-0.40	0.22	0.08
23	EBS externalizing	SPPC, global	SIDE mother, control	-0.14	0.08	0.08	-2.27	0.41	<0.001	0.33	0.20	0.10
24	EBS externalizing	SPPC, global	SIDE father, control	-0.11	0.08	0.15	-2.27	0.41	<0.001	0.25	0.18	0.17
25	EBS externalizing	Family functioning	SIDE mother, affection	0.29	0.74	0.69	-0.13	0.05	0.01	-0.04	0.10	0.71
26	EBS externalizing	Family functioning	SIDE father, affection	-0.63	0.86	0.47	-0.13	0.05	0.01	0.08	0.12	0.51
27	EBS externalizing	Family functioning	SIDE mother, control	0.48	0.73	0.51	-0.13	0.05	0.01	-0.06	0.10	0.55
28	EBS externalizing	Family functioning	SIDE father, control	-0.86	0.70	0.22	-0.13	0.05	0.01	0.11	0.10	0.29
29	EBS internalizing	SPPC, scholastic competence	SIDE mother, affection	0.25	0.08	<0.01	-3.43	0.68	<0.001	-0.87	0.34	0.01
30	EBS internalizing	SPPC, scholastic competence	SIDE father, affection	0.11	0.10	0.25	-3.43	0.68	<0.001	-0.38	0.34	0.27
31	EBS internalizing	SPPC, scholastic competence	SIDE mother, control	-0.02	0.08	0.79	-3.43	0.68	<0.001	0.07	0.29	0.80
32	EBS internalizing	SPPC, scholastic competence	SIDE father, control	0.02	0.08	0.81	-3.43	0.68	<0.001	-0.06	0.28	0.82
33	EBS internalizing	SPPC, social competence	SIDE mother, affection	0.26	0.09	<0.01	-3.62	0.66	<0.001	-0.94	0.37	0.01
34	EBS internalizing	SPPC, social competence	SIDE father, affection	-0.002	0.10	0.98	-3.62	0.66	<0.001	0.01	0.38	0.98

Row #	Outcome	Mediator	Predictor	Path a Estimate	Path a SE	Path a p-value	Path b Estimate	Path b SE	Path b p-value	Indirect Effect	Indirect SE	Indirect p-value
35	EBS internalizing	SPPC, social competence	SIDE mother, control	-0.07	0.09	0.47	-3.62	0.66	<0.001	0.24	0.33	0.48
36	EBS internalizing	SPPC, social competence	SIDE father, control	-0.09	0.09	0.31	-3.62	0.66	<0.001	0.31	0.32	0.33
37	EBS internalizing	SPPC, athletic competence	SIDE mother, affection	0.26	0.09	<0.01	-2.24	0.71	<0.01	-0.58	0.27	0.03
38	EBS internalizing	SPPC, athletic competence	SIDE father, affection	-0.01	0.10	0.95	-2.24	0.71	<0.01	0.01	0.23	0.95
39	EBS internalizing	SPPC, athletic competence	SIDE mother, control	-0.06	0.08	0.47	-2.24	0.71	<0.01	0.13	0.20	0.50
40	EBS internalizing	SPPC, athletic competence	SIDE father, control	0.05	0.08	0.56	-2.24	0.71	<0.01	-0.11	0.19	0.59
41	EBS internalizing	SPPC, physical appearance	SIDE mother, affection	0.22	0.11	0.04	-2.31	0.58	<0.001	-0.50	0.29	0.08
42	EBS internalizing	SPPC, physical appearance	SIDE father, affection	0.20	0.12	0.10	-2.31	0.58	<0.001	-0.47	0.32	0.14
43	EBS internalizing	SPPC, physical appearance	SIDE mother, control	-0.08	0.11	0.44	-2.31	0.58	<0.001	0.19	0.26	0.46
44	EBS internalizing	SPPC, physical appearance	SIDE father, control	-0.11	0.10	0.30	-2.31	0.58	<0.001	0.24	0.25	0.33
45	EBS internalizing	SPPC, behavioural conduct	SIDE mother, affection	0.29	0.07	<0.001	-2.99	0.88	<0.01	-0.86	0.34	0.01
46	EBS internalizing	SPPC, behavioural conduct	SIDE father, affection	-0.12	0.08	0.12	-2.99	0.88	<0.01	0.37	0.27	0.17
47	EBS internalizing	SPPC, behavioural conduct	SIDE mother, control	-0.09	0.07	0.23	-2.99	0.88	<0.01	0.26	0.24	0.28
48	EBS internalizing	SPPC, behavioural conduct	SIDE father, control	-0.11	0.07	0.11	-2.99	0.88	<0.01	0.33	0.23	0.16
49	EBS internalizing	SPPC, global	SIDE mother, affection	0.26	0.08	<0.01	-5.78	0.71	<0.001	-1.50	0.50	<0.01
50	EBS internalizing	SPPC, global	SIDE father, affection	0.17	0.09	0.06	-5.78	0.71	<0.001	-1.01	0.55	0.07
51	EBS internalizing	SPPC, global	SIDE mother, control	-0.14	0.08	0.08	-5.78	0.71	<0.001	0.83	0.49	0.09
52	EBS internalizing	SPPC, global	SIDE father, control	-0.11	0.08	0.15	-5.78	0.71	<0.001	0.64	0.46	0.16
53	EBS internalizing	Family functioning	SIDE mother, affection	0.29	0.74	0.69	-0.17	0.08	0.047	-0.05	0.14	0.73

Row #	Outcome	Mediator	Predictor	Path a Estimate	Path a SE	Path a p-value	Path b Estimate	Path b SE	Path b p-value	Indirect Effect	Indirect SE	Indirect p-value
54	EBS internalizing	Family functioning	SIDE father, affection	-0.63	0.86	0.47	-0.17	0.08	0.047	0.10	0.17	0.54
55	EBS internalizing	Family functioning	SIDE mother, control	0.48	0.73	0.51	-0.17	0.08	0.047	-0.08	0.14	0.57
56	EBS internalizing	Family functioning	SIDE father, control	-0.86	0.70	0.22	-0.17	0.08	0.047	0.14	0.15	0.34

Abbreviations – X: predictor; M: mediator; Y: outcome. SE: standard error.

Path a refers to the effect of X on M.

Path b refers to the effect of M on Y, adjusted for X.

The term “Indirect” refers to paths ab – indirect effect of X onto Y through M (i.e., Sobel product of coefficients).