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PREDICTORS OF HEALTH-RELATED QUALITY OF LIFE IN URBAN DISADVANTAGED CHILDREN

A dissertation submitted to the University of Dublin, Trinity College for the degree of Doctor of Philosophy

2013

By

Ciara Elizabeth Wynne

BSc (Hons) Psychology, PG Dip Stats.
DECLARATION

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SUMMARY

BACKGROUND: The aim of this study was to ascertain, for families exposed to high levels of urban disadvantage, the nature and extent of the relationship between children's Health-Related Quality of Life (HRQoL) and their Body Mass Index (BMI), depressive symptoms and the mental health status of their parents. Within the context of a prospective longitudinal cohort design over two time points (i.e. year one and two), the objectives of this study were to test the following: (1) if BMI, depressive symptoms and parent's mental health have a direct effect on HRQoL and if they predict HRQoL a year later; (2) if the negative effect these have on HRQoL is intensified by being older and female and having a depressed parent or reduced by having parents with strong perceived social support; and (3) if BMI indirectly effects HRQoL through body image perception and depressive symptoms, if parental mental health indirectly effects HRQoL through parenting self-efficacy and children's depressive symptoms, and if this only occurs for older children and females. Across seven schools, 255 children aged 7 to 12 years (50% male) and one of their parents/guardians (N = 219) were recruited. This study was located within a larger project evaluating the impact and implementation of a Health Promoting School (HPS) initiative over three time points (baseline, year one and year two), but which to date has had no effect on children's health outcomes.

METHODS: The study was conducted within, and guided by, a post-positivist worldview and a conceptual framework of children's HRQoL. At year one and two, a battery of self-reported measures was administered to children in school and their height and weight were taken. In addition, one of their parents were assessed at year one with a battery of self-reported measures over the phone. Measures of children's health included the Kidscreen-27, the Children's Depression Inventory, and age- and gender- specific BMI z-scores. Measures of parental health included the Short Form-36 and the Hospital Anxiety and Depression Scale. Analysis involved moderation, simple-, multiple-, half-longitudinal-, and moderated- mediation with bootstrapping.

RESULTS: At year one, BMI was weakly inversely associated with total HRQoL (r = -.15, p < .05), physical well-being (r = -.17, p < .01), and autonomy and parent relations (r = -.13, p < .05), and marginally inversely associated with psychological well-being. Obese children scored significantly worse than those of normal weight on all the aforementioned but autonomy and parent relations. Neither weight group, however, fell below the average European HRQoL range. Unexpectedly, BMI predicted physical well-being a year later and vice versa, whilst autonomy and parent relations also predicted BMI a year later. In terms of 'overweight' children (38%), those approaching
adolescence had poorer physical and school well-being than younger children, and those whose parents had moderate to severe levels of depression fared worse on school well-being than children whose parents were not depressed. According to both cross-sectional and longitudinal mediation analysis, concerns about body image (39% had concerns) and subsequent depressed thoughts lead, in large part, to poorer psychological well-being rather than weight status (in boys and girls aged 7 to 12). At year one, children’s depressive symptoms were moderately to strongly inversely associated with all dimensions of HRQoL, but psychological well-being was most affected ($\beta = -.60$, $p < .01$). In addition, it predicted HRQoL a year later and vice versa. Furthermore, a significant improvement in depressive symptoms over time predicted an improvement in all HRQoL dimensions except for physical well-being. Finally, parental mental health status was weakly positively associated with children’s total HRQoL ($\rho = .14$, $p < .05$), social support and peer relations ($\rho = .13$, $p < .05$), and school well-being ($\rho = .17$, $p < .01$) at year one, but only predicted school and physical well-being a year later. Although parenting self-efficacy was also weakly positively associated with parental mental health and children’s school well-being, it did not mediate the effect of parental mental health on children’s HRQoL. Finally, parent’s perceived social support weakly positively correlated with parenting self efficacy.

CONCLUSIONS: Prevention, intervention and treatment programmes that aim to prevent or reduce obesity, body image concerns and depression in children, and parenting inefficacy and mental-ill health in parents living in urban disadvantage, may also need to optimise children’s HRQoL. These programmes could also intervene at the HRQoL level targeting dimensions that are impaired. Furthermore, prevention programmes should have procedures in place to identify those children with said signs and symptoms and ensure that both children and their parents (where relevant) receive appropriate, effective and timely intervention/treatment. More specifically, obesity programmes should encourage (not stigmatise) regular physical activity and healthy eating in children for the purposes of reducing and managing weight, and in turn, reducing the cognitive dissonance of those with some body image concerns. However, efforts to reduce chronic body image concerns through positive rational acceptance should also be considered. These programmes may also need to effectively prevent or reduce depressive symptoms in children (e.g. by promoting effective coping and emotional resilience) and their parents (e.g. by teaching effective parenting skills). It is possible that other factors such as weight-related teasing might mediate the relationship between BMI and HRQoL and this warrants further attention. It would also be useful to develop a theory of children’s HRQoL that maps important causal pathways and allows different interactions to be identified and further tested.
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### TABLE OF CONTENTS

**CHAPTER ONE: Introduction** ........................................................................................................ 1

**CHAPTER TWO: The historical context of health-related quality of life and a conceptual framework for this study** ........................................... 12

2.1 Historical context of health-related quality of life................................................................. 12

2.1.1 Origins of the health-related quality of life concept .................................................... 12

2.1.2 Definitions of health-related quality of life ................................................................ 12

2.1.3 Theories of health-related quality of life .................................................................... 13

2.1.4 Measuring health-related quality of life ...................................................................... 18

2.2 Conceptual framework of the health-related quality of life of children .............................................. 19

2.2.1 Dimensions of the health-related quality of life in children .................................... 20

2.2.2 Factors interacting with the health-related quality of life of children.......................... 21

2.2.3 Health-related quality of life - response shift .............................................................. 29

2.2.4 Promotion of health-related quality of life .................................................................. 30

2.3 Conclusion ............................................................................................................................. 31

**CHAPTER THREE: Literature review: predictors of health-related quality of life in young people** ......................................................................................... 32

3.1 Introduction............................................................................................................................... 32

3.2 Literature search methods ...................................................................................................... 32

3.3 The risks to health-related quality of life of young people.................................................. 34

3.3.1 The risk of childhood depression .................................................................................. 34

3.3.1.1 Clinical and general population studies ............................................................ 34

3.3.1.2 Mediators .............................................................................................................. 37

3.3.2 The risk of childhood obesity ...................................................................................... 38

3.3.2.1 Clinical and general population studies ............................................................ 38

3.3.2.2 Mediators .............................................................................................................. 39

3.3.3 The risk of parental mental ill-health .......................................................................... 41

3.3.3.1 Clinical and general population studies ............................................................ 41

3.3.3.2 Mediators .............................................................................................................. 43

3.4 Moderators of the risks to the health-related quality of life of young people...................................................... 47

3.4.1 Parent social support ...................................................................................................... 47

3.4.2 Child age ......................................................................................................................... 49

3.4.3 Child gender .................................................................................................................. 50
Summary of gaps in the health-related quality of life literature...... 51

A model of health-related quality of life of children and the
research questions for this study................................................................. 52

CHAPTER FOUR: Epistemological approach to the study of health-related
quality of life in children............................................................... 55

Introduction...................................................................................................... 55

Post-positivism................................................................................................. 55

Advantages and disadvantages of post-positivism....................................... 56

Conclusion......................................................................................................... 59

CHAPTER FIVE: Research methodology and procedures..................................... 60

Introduction...................................................................................................... 60

Study design, setting and participants......................................................60

Setting.......................................................................................................... 61

Eligibility criteria............................................................................................... 62

Sample size estimation.................................................................................... 62

Procedure: recruitment.................................................................................63

Measures......................................................................................................... 65

Procedure: data collection.............................................................................73

Ethical considerations.................................................................................. 74

Data analysis methods.................................................................................... 77

Data audit and quality control of results................................................. 88

Summary of study design..............................................................................88

CHAPTER SIX: Pre-modelling analysis and discussion.........................................91

Introduction...................................................................................................... 91

Description of the samples............................................................................ 91

Changes over time........................................................................................... 98

Bivariate analysis between all study variables at year one.........................101

Implications for modelling and directions for future research.............112

CHAPTER SEVEN: The relationship between depressive symptoms and
health-related quality of life in children.....................................................116

Introduction...................................................................................................... 116

Direct effect of depressive symptoms on health-related quality of
life in children when controlling for confounders................................... 116
7.3 Depressive symptoms and the prediction of health-related quality of life in children a year later ..................................................... 118

7.4 Moderator effects in the relationship between depressive symptoms and health-related quality of life in children at year one ....................................................................................................................... 120

7.5 Conclusion .........................................................................................................121

CHAPTER EIGHT: The relationship between body mass index and health-related quality of life in children ................................................122

8.1 Introduction ....................................................................................................... 122

8.2 Direct effect of body mass index on health-related quality of life in children when controlling for confounders ............................ 122

8.3 Body mass index and the prediction of health-related quality of life in children a year later .............................................................. 124

8.4 Moderator effects in the relationship between body mass index and health-related quality of life in children at year one .....................126

8.5 Mediator effects in the relationship between body mass index and health-related quality of life in children ........................................... 132

8.5.1 Model 1; Simple mediator effect of body image perception ...................... 132

8.5.2 Model 2: Multiple mediator effect of body image perception and depressive symptoms ................................................................. 135

8.5.3 Model 3: Moderated mediator effect of body image perception by age .............................................................................................. 138

8.5.4 Model 4: Moderated mediator effect of body image perception by gender .................................................................................... 139

8.5.5 Model 5: Half-longitudinal mediator effect of body image perception .... 141

8.5.6 Model 6: Half-longitudinal mediator effect of depressive symptoms ... 144

8.6 Conclusion .........................................................................................................147

CHAPTER NINE: The relationship between parent/guardian mental health and health-related quality of life in children ................................ 148

9.1 Introduction ....................................................................................................... 148

9.2 Direct effect of parental mental health on the health-related quality of life in children when controlling for confounders ............... 148

9.3 Parental mental health and the prediction of health-related quality of life in children a year later .................................................. 149
LIST OF APPENDICES

Appendix 1: Main source of information on the health and well-being of young people in Ireland................................................................. 270
Appendix 2: Estimated sample size for each statistical test used in this study. 272
Appendix 3: Kidscreen 27.................................................................................................................. 276
Appendix 4: Children’s Depression Inventory – short form.................................................. 282
Appendix 5: Health Behaviour in School Aged Children......................................................... 284
Appendix 6: Parenting Sense of Competence scale............................................................... 286
Appendix 7: Oslo Social Support scale......................................................................................... 288
Appendix 8: Quality Metric Short Form 36............................................................................ 289
Appendix 9: Hospital Anxiety and Depression Scale............................................................. 293
Appendix 10: Results from Exploratory Data Analysis: Sections A – E......................... 296
Appendix 11: Children’s demographics and health at year one and two................. 307
TABLE OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
<td>General population studies investigating the relationship between the mental health and HRQoL of young people.</td>
</tr>
<tr>
<td>3.2</td>
<td>Study research questions.</td>
</tr>
<tr>
<td>6.2(a)</td>
<td>Description of the child sample.</td>
</tr>
<tr>
<td>6.2(b)</td>
<td>Description of the parent/guardian sample.</td>
</tr>
<tr>
<td>6.3</td>
<td>Changes in children’s health and well-being over one year.</td>
</tr>
<tr>
<td>6.4.1</td>
<td>Relationship between physical and psychological aspects and HRQoL at year one.</td>
</tr>
<tr>
<td>6.4.2</td>
<td>Pearson’s r correlations between all study variables.</td>
</tr>
<tr>
<td>6.4.3</td>
<td>Relationship between body image perception and HRQoL at year one.</td>
</tr>
<tr>
<td>7.2</td>
<td>Standardised coefficients in the relationship between depressive symptoms and HRQoL in children at year one and two when controlling for a confounder.</td>
</tr>
<tr>
<td>7.3(a)</td>
<td>Pearson’s r correlation between depressive symptoms at year one and HRQoL in children at year two.</td>
</tr>
<tr>
<td>7.3(b)</td>
<td>Pearson’s r correlation between the change in depressive symptoms and in HRQoL in children over time.</td>
</tr>
<tr>
<td>8.2</td>
<td>Relationship between children’s HRQoL and both BMI and weight categories at year one and two.</td>
</tr>
<tr>
<td>8.3(a)</td>
<td>Pearson’s r correlation between BMI at year one and HRQoL in children at year two.</td>
</tr>
<tr>
<td>8.3(b)</td>
<td>Pearson’s r correlation between the change in BMI and in HRQoL in children over time.</td>
</tr>
<tr>
<td>8.5.1</td>
<td>Path coefficients and the indirect effect confidence interval for Model 1: Simple mediator effect of body image perception in the relationship between BMI and HRQoL in children at year one.</td>
</tr>
<tr>
<td>8.5.2</td>
<td>Path coefficients and the indirect effect confidence interval for Model 2: Multiple mediator effect of body image perception and depressive symptoms in the relationship between BMI and HRQoL in children at year one.</td>
</tr>
<tr>
<td>8.5.3</td>
<td>Path coefficients and indirect effect confidence interval for Model 3: Moderated mediator effect of body image perception in the relationship between BMI and HRQoL in children at year one by age.</td>
</tr>
</tbody>
</table>
Table 8.5.4: Path coefficients and indirect effect confidence interval for
Model 4: Moderated mediator effect of body image perception in
the relationship between BMI and HRQoL in children at year
one by gender.................................................................140

Table 8.5.5: Path coefficients and the indirect effect confidence interval for
Model 5: Half-longitudinal mediator effect of body image
perception in the relationship between BMI and HRQoL in
children between year one and two.................................142

Table 8.5.6: Path coefficients and the indirect effect confidence interval for
Model 6: Half-longitudinal mediator effect of depressive
symptoms in the relationship between body image perception
and HRQoL in children between year one and two..............145

Table 9.2: Spearman’s rho correlations between parental mental health
and HRQoL in children at year one.....................................149

Table 9.3: Spearman’s rho correlations between parental mental health at
year one and HRQoL in children at year two........................149

Table 9.5.1: Path coefficients and the indirect effect confidence interval for
Model 1: Simple mediator effect of parenting self-efficacy in the
relationship between parental mental health status and total
HRQoL in children at year one.............................................151

Table 9.5.2: Path coefficients and the indirect effect confidence interval for
Model 2: Mediator effect of child depressive symptoms in the
relationship between parental mental health status and total
HRQoL in children at year one.............................................152

Table 9.5.3: Path coefficients and indirect effect confidence interval for
Model 3: Moderated mediator effect of child depressive
symptoms in the relationship between parental mental health
status and total HRQoL in children at year one by age..........154

Table 9.5.4: Path coefficients and indirect effect confidence interval for
Model 4: Moderated mediator effect of child depressive
symptoms in the relationship between parental mental health
status and total HRQoL in children at year one by gender......156

Table 9.5.5: Path coefficients and the indirect effect confidence interval for
Model 5: Mediator effect of child depressive symptoms in the
relationship between parent/guardian mental health and total
HRQoL in children between year one and two........................157
Table A2: Estimated sample sizes based on a 5% alpha level, 80% power, several effect sizes, and two attrition rates when using various statistical tests ......................................................................................................................... 273

Table A10A(i): Outliers from univariate analysis ................................................................................................................................. 296

Table A10A(ii): Skewness and kurtosis from univariate analysis .................................................................................................................. 297

Table A10A(iii): Tests of normality from univariate analysis ......................................................................................................................... 298

Table A10B(i): Levene's test for equality of variances in bivariate analysis ............................................................................................................. 300

Table A10B(ii): Spearman's rho coefficients for relationship between continuous study variables and health-related quality of life in children at year one .................................................................................................................. 302

Table A11: Children's demographics and health at year one and two ............................................................................................................. 308
# TABLE OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 2.1</td>
<td>Conceptual model of health-related quality of life</td>
<td>16</td>
</tr>
<tr>
<td>Figure 2.2</td>
<td>Bronfenbrenner’s ecological theory of child development</td>
<td>17</td>
</tr>
<tr>
<td>Figure 2.3</td>
<td>Four interrelated contexts in which children live</td>
<td>23</td>
</tr>
<tr>
<td>Figure 2.4</td>
<td>The aspects of health that affect health-related quality of life in children</td>
<td>25</td>
</tr>
<tr>
<td>Figure 2.5</td>
<td>Health-related quality of life response shift due to adaptation</td>
<td>30</td>
</tr>
<tr>
<td>Figure 2.6</td>
<td>Overall conceptual framework of health-related quality of life in children</td>
<td>31</td>
</tr>
<tr>
<td>Figure 3.1</td>
<td>Relationship between depressive symptoms and HRQoL in children</td>
<td>38</td>
</tr>
<tr>
<td>Figure 3.2</td>
<td>Relationship between overweight/obesity and HRQoL in children</td>
<td>41</td>
</tr>
<tr>
<td>Figure 3.3</td>
<td>Relationship between parental mental-ill health and children's HRQoL</td>
<td>46</td>
</tr>
<tr>
<td>Figure 3.4</td>
<td>Summary model of potential predictors of health-related quality of life in children</td>
<td>53</td>
</tr>
<tr>
<td>Figure 5.1</td>
<td>Administration of measures: graphical summary</td>
<td>61</td>
</tr>
<tr>
<td>Figure 5.2</td>
<td>Recruitment and participation rates: graphical summary</td>
<td>64</td>
</tr>
<tr>
<td>Figure 5.3</td>
<td>Study’s ethical framework for researching children</td>
<td>77</td>
</tr>
<tr>
<td>Figure 5.4</td>
<td>Path coefficients in a moderation model</td>
<td>82</td>
</tr>
<tr>
<td>Figure 5.5</td>
<td>Path coefficients in a simple mediation model</td>
<td>84</td>
</tr>
<tr>
<td>Figure 5.6</td>
<td>Path coefficients in a multiple-step multiple-mediation model</td>
<td>85</td>
</tr>
<tr>
<td>Figure 5.7</td>
<td>Path coefficients in a three wave longitudinal mediation model</td>
<td>86</td>
</tr>
<tr>
<td>Figure 5.8</td>
<td>Path coefficients in moderated mediation model</td>
<td>87</td>
</tr>
<tr>
<td>Figure 5.9</td>
<td>Study execution process</td>
<td>89</td>
</tr>
<tr>
<td>Figure 6.1(a)</td>
<td>Percentage concerned about body image of all normal weight children, boys and girls</td>
<td>95</td>
</tr>
<tr>
<td>Figure 6.1(b)</td>
<td>Percentage concerned about body image of all overweight children, boys and girls</td>
<td>95</td>
</tr>
<tr>
<td>Figure 6.1(c)</td>
<td>Percentage concerned about body image of all obese children, boys and girls</td>
<td>95</td>
</tr>
<tr>
<td>Figure 6.2</td>
<td>Pearson correlations between variables in the path between BMI and HRQoL</td>
<td>108</td>
</tr>
<tr>
<td>Figure 6.3</td>
<td>Pearson correlations between variables in the path between parent/guardian mental health status and HRQoL</td>
<td>109</td>
</tr>
</tbody>
</table>
Figure 7.1: The relation between depressive symptoms and the school well-being of children aged 7, 8 to 11, and 12 years.............. 121

Figure 8.1(a): The relation between BMI z-scores and physical well-being for children aged 7, 8 to 11, and 12 years................................. 126

Figure 8.1(b): The relation between BMI z-scores and school environment for children aged 7, 8 to 11, and 12 years........................................ 127

Figure 8.1(c): The relation between BMI z-scores and total HRQoL for children aged 7, 8 to 11, and 12 years........................................ 128

Figure 8.2(a): The relation between BMI z-scores and physical well-being for children from one-parent and two-parent families........................ 129

Figure 8.2(b): The relation between BMI z-scores and social support and peer relations for children from one-parent and two-parent families.................................................................................................. 130

Figure 8.3: The relation between BMI z-scores and school environment in children whose parent/guardian has normal and moderate to severe depressive symptoms........................................ 131

Figure 8.4: Standardised coefficients for the simple mediator effect of body image perception in the relationship between BMI z-scores and total HRQoL................................................................. 133

Figure 8.5: Standardised coefficients for the multiple mediator effects of body image perception and depressive symptoms in the relationship between BMI z-scores and total HRQoL......................... 135

Figure 8.6: Standardised coefficients for body image perception as a mediator in the relationship between BMI z-scores and total HRQoL moderated by age................................................................. 138

Figure 8.7: Standardised coefficients for body image perception as a mediator in the relationship between BMI z-scores and total HRQoL moderated by gender................................................................. 140

Figure 8.8: Standardised regression coefficients for the relationship between BMI and total HRQoL as mediated by body image perception between year one and two........................................ 141

Figure 8.9: Standardised regression coefficients for the relationship between body image perception and total HRQoL as mediated by depressive symptoms between year one and two.............. 144

Figure 9.1: Standardised coefficients for simple mediation of parenting self-efficacy in the relationship between parent mental health status and child total HRQoL................................................................. 151
Figure 9.2: Standardised coefficients for simple mediation of child depressive symptoms in the relationship between parent mental health status and child total HRQoL ................................... 152
Figure 9.3: Standardised coefficients for child depressive symptoms as a mediator in the relationship between parent mental health status and child total HRQoL moderated by age.................. 154
Figure 9.4: Standardised coefficients for child depressive symptoms as a mediator in the relationship between parent mental health status and child total HRQoL moderated by gender.............. 155
Figure 9.5: Standardised regression coefficients for the relationship between parent mental health status and total HRQoL over two years as mediated by child depressive symptoms.................. 157
Figure 10.1: A Health Promotion Model................................................................... 177
Figure 10.2: Key steps to effectively implementing a Health Promoting School's programme (ACE: Physical Activity, Confidence and Healthy Eating)..................................................................................... 188
Figure 10.3: Optimising or improving children's HRQoL by intervening at the HRQoL level........................................................................................................... 198
Figure A10B: Scatterplots for Pearson’s r correlations.......................................... 301
Figure A10C: Normal Q-Q plot and residual plot in relationship between depressive symptoms and HRQoL controlling for confounder.... 303
Figure A10D: Scatterplots for Pearson’s r correlations.......................................... 304
Figure A10E(i): Normal Q-Q plot and residual plot in multivariate analysis........... 305
Figure A10E(ii): Normal Q-Q plot and residual plot in multivariate analysis........... 306
Figure A10E(iii): Normal Q-Q plot and residual plot in multivariate analysis........... 307
CHAPTER ONE
Introduction

The Health-Related Quality of Life (HRQoL) of children and adolescents (i.e. young people) has attracted increasing concern from government bodies, researchers and practitioners both nationally and internationally (Bullinger & Ravens-Sieberer 1995, Connolly & Johnson 1999, De Civita et al. 2005, Hanafin et al. 2008, Erhart et al. 2009). HRQoL is a subjective, multidimensional and dynamic construct that comprises physical, psychological and social well-being, and is, amongst other things, influenced by the person's health status (Taylor et al. 2008a). Well-being is considered an “end result” measure of health and refers to “subjective perceptions, including reports of unpleasant or pleasant sensations and global evaluations of health” (Topolski et al. 2004, p. 2). It is important to note though, from the outset, that the HRQoL construct is not without controversy and a wide range of definitions, theoretical frameworks, and measurements are used to describe and assess it. Further information is provided in Chapter Two.

The monitoring of young people's health, both nationally and internationally, has generally focused on measures of poor health (e.g. mortality and morbidity, disability and risk behaviours) (e.g. Wilson & Drury 1984, Singh & Yu 1996, Census 2011, Kelly et al. 2012), but recently there has been a shift in focus to the consideration of well-being indicators such as HRQoL (Varni et al. 2005, Bradshaw et al. 2007, Hanafin et al. 2007, Hanafin et al. 2008, Organisation for Economic Co-operation and Development (OECD) 2009). It is noteworthy that, in the United Nations Children's Fund (UNICEF 2007) influential report card on child well-being in rich countries, Ireland was ranked 5th on subjective well-being out of 20 OECD countries. In this country, most of the information on the health and well-being of young people is derived from in-depth, ongoing and nationally representative surveys that include both cross-sectional and longitudinal elements. The results of these are presented biennially in the State of the Nation's Children report (Department of Children and Youth Affairs (DCYA) 2012). Information is compiled from a range of data sources including the Health Behaviour in School-Aged Children (HBSC) survey, Kidscreen’s HRQoL project and more recently the Growing Up in Ireland (GUI) study (Keenaghan & Kilroe 2008, Williams et al. 2009, Kelly et al. 2012). Each of these projects assesses young people’s well-being (see Appendix 1 for further information). For example, the Kidscreen project assessed the HRQoL of young people across Europe from which a HRQoL instrument was developed and, since the project was launched in Ireland in 2005, HRQoL has been recognised by the DCYA as an important indicator of young people's well-being.
HRQoL has also been recommended for inclusion into the mandatory survey in the HBSC project (Erhart et al. 2009), which is an ongoing large-scale international study spanning 41 countries that focuses on the health behaviours and well-being of young people.

The growing global interest in monitoring HRQoL reflects a need to capture the perceptions of those with poor and good health in the ‘here and now’ and to assess the well-being of future generations (Topolski et al. 2004). Thus, these kinds of surveys provide invaluable information as to whether certain sub-groups within the general population differ in terms of their well-being and if any changes in well-being occur over time. This information is important for predicting future HRQoL as these young people move into adulthood and for assessing the potential costs to the state arising from recurrent patterns of poor HRQoL (Topolski et al. 2004, Coghill et al. 2009). These findings are generally used to produce more beneficial outcomes for this and the next generation of children through informed and effective policies and interventions (Hanafin et al. 2008).

Since the 1940s, practitioners have been interested in improving the physical, psychological and social well-being of their adult patients as well as reducing their clinical symptoms (Armstrong & Caldwell 2004), but only in the last two decades, have they focused their attention on the HRQoL of young people (Bullinger & Ravens-Sieberer 1995). The measurement of a patient’s HRQoL both initially and throughout treatment, can have a number of potential benefits (see Coghill et al. 2009). For instance, an initial assessment can help to identify related, but hidden psychosocial morbidities which may, in turn, assist practitioners in making appropriate referrals and in tailoring interventions to the specific needs of the patient. This approach can also help to promote better communication between the patient and the practitioner thereby also increasing the possibility of better compliance and treatment adherence. An ongoing assessment of HRQoL may also lead to a better understanding of the impact of treatment and the significance of treatment effects from the patient’s point of view. Whilst it is important that such findings, collectively, can be used to inform the development of more effective interventions and policies, it is important to explore and understand more fully the nature and extent of the relationship between risks factors and young people’s HRQoL.

Only in the last two decades have researchers become interested in the direct effect of health states on young people’s HRQoL (Bullinger & Ravens-Sieberer 1995). To date, more studies have been conducted evaluating the HRQoL of young people with
physical than with mental health conditions (Dey et al. 2012). Recently however, researchers have become interested in other more external risk factors including poverty (e.g. Von Rueden et al. 2006) and parental mental health (e.g. Giannakopoulos et al. 2009). Moreover, only few studies have explored how such conditions predict HRQoL over time (e.g. Wilkins et al. 2004, Rajmil et al. 2009b, Herman et al. 2010).

Whilst this research is helpful in increasing our knowledge and awareness of the impact of physical and mental ill-health (and other risk factors) on young people’s subjective well-being, a number of authors have called for a more systematic and comprehensive investigation of the nature and extent of the relationship between such conditions and young people’s HRQoL (Coghill et al. 2009, Tsiros et al. 2009). This may include an investigation of the actual mechanisms by which a condition affects HRQoL, and the various other inter-relationships involved (Matza et al. 2004b, Ferrans et al. 2005). This information may also be used to inform health policy and the development of effective treatments and preventive interventions aimed at improving the HRQoL of young people.

As child poverty remains one of the biggest barriers to improving outcomes for young people, combating child poverty as well as improving the well-being of young people have become key issues on the policy agenda both nationally and internationally (Government of Ireland 2000b, 2002, Department of the Taoiseach 2006, Hirsch 2008, Bradshaw 2010). Through the 1990s, Ireland moved from being one of the poorest countries in Europe to (for a time) one of the richest in the world. However, the percentage of children under 18 years at risk of poverty or social exclusion has increased over the last four years (Central Statistics Office (CSO) 2013) and children remain one of the most vulnerable groups in society with higher poverty rates than any other group: 37% of children under 18 are considered to be at risk of poverty or social exclusion in Ireland compared to 27% in Europe (EuroStat & Vilaplana 2013). The economic downturn in 2007 is very likely to have exacerbated this situation (Honohan 2009). This recession has pushed many families deeper into poverty and many have fallen below the poverty-line for the first time. Ireland has a high degree of economic inequality when compared with other OECD and European Union countries (Whelan et al. 2008) and ranks in the middle of 24 OECD countries for how far they allow their most vulnerable children fall behind the average child on health and well-being (Adamson 2010).

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1 The rapid downturn in Ireland since 2007 is marked by high rates of unemployment (14.6%, CSO 2012), emigration (i.e. between 46,000 and 87,000 have emigrated yearly since 2007, CSO 2012) and large cuts in expenditure across the public sector including health and education.
It is now widely acknowledged that socioeconomic disadvantage can have far reaching consequences for young people’s physical and mental health (see Shonkoff & Phillips 2000, Feinstein et al. 2008, Kiernan & Huerta 2008, Kiernan & Mensah 2009) including an increased risk of obesity (e.g. Melchior et al. 2007, Whelton et al. 2007, Manios & Costarelli 2011, Hollywood et al. 2012, Knai et al. 2012) and depression (see Melchior et al. 2007). Low Socioeconomic Status (SES) is also associated with poor HRQoL in young people (Von Rueden et al. 2006, Palacio-Vieira et al. 2008, Wu et al. 2011). However, it is inconclusive whether health outcomes fair worse for young people living in urban or rural disadvantage (Amato & Zuo 1992, Reading et al. 1993, Stewart et al. 2007, Davis et al. 2011, Stöcklin et al. 2012). Nonetheless, the need and urgency to improve the health and well-being of young people living in urban disadvantage is reflected in a number of international and national policies (Ireland & Department of the Taoiseach 2006, National Development Plan 2007-2013, Department of Social and Family Affairs 2009, European Commission 2010). Since the shift away from the manufacturing industry in the 1950s to a heavy reliance on finance, services, and technology, there have been a number of trends including: industrial decentralisation to an elusive periphery; residential suburbanisation; and within urban areas there has been physical deterioration, political neglect, multiethnic rebellion and a growing inequality in the distribution of income leaving working- and middle-class families struggling (Danziger and Gottschalk 1995; Levy 1998; Mishel, Bernstein, and Schmitt 1999).

A low income can adversely affect children’s health and well-being because of a lack of access to specific resources (e.g. healthcare, well resourced schools, nutritional food, physical activity resources) and also because it increases the likelihood that children will be exposed to parental mental ill-health (Gelfand et al. 1996, Deal & Holt 1998, Reading & Reynolds 2001, Kiernan & Huerta 2008). Urban disadvantaged children may fair worse than rural disadvantaged because urban environments can be more stressful than rural settings (e.g. greater geographical concentration of poor individuals, poorly funded schools, deteriorating facilities, higher rates of crime, psychological disorders and divorce, and poorer social networks) (Glass & Singer 1972, Krupat & Guild 1980, Amato & Zuo 1992) and a greater density of people reside therein. However, the stigma of poverty is greater in rural than urban areas and this can be debilitating to health (Rank & Hirsch & 1988) as can the inaccessibility to healthcare services experienced by rural communities (Sibley & Weiner 2011). Whilst socioeconomic deprivation can lead to poor health outcomes for parents and children, parental mental ill-health and depression in children are more generally caused by the joint action and interaction of genes and the environment (e.g. Jorm et al. 1997, Link et
Similarly, young people can become obese for a number of reasons including the increase in sedentary behaviour and access to more foods with high fat content (Frank et al. 2004, Rey-López et al. 2008).

The implications, for the HRQoL of urban disadvantaged children, of depression, obesity and exposure to parental mental ill-health are a source of considerable concern and provide the rationale for the study reported here. Obesity refers to a condition of excess body fat (Himes & Dietz 1994) and can be reliably estimated using the Body Mass Index (BMI) (Center for Disease Control and Prevention (CDC) 2012). Mental ill-health can be described in terms of sub-clinical mental health symptoms or clinical mental health disorders, where a mental health disorder refers to the ‘existence of a clinically recognisable set of symptoms or behaviours associated in most cases with distress and interference with personal functions’ (ICD-10, World Health Organization (WHO) 1992, American Psychiatric Association (APA) 2000). Both depression and anxiety are examples of common mental health problems (see below). Depression refers to episodes of or prolonged periods of sadness and a loss of interest/pleasure in activities, while uncontrolable excessive worry and associated physiological symptoms, among other things, is indicative of anxiety (Diagnostic Statistical Manual (DSM)-IV, American Psychiatric Association (APA) 2000).

Both national and international policy recognises the potential vulnerability of children when parents have mental health difficulties (Department of Health (DoH) 2001, Department of Health and Social Services and Police Service of Northern Ireland (DHSS & PSNI) 2006, Government of Ireland 2006, Health Service Executive (HSE) 2011) and globally, there is increasing awareness of the parenting status of mental health service users (Handley et al. 2001, Östman & Hansson 2002, Thomas & Bromet 2004). It has been estimated that, at any one time, between 20% and 55% of adults in Europe have a mental health disorder (see Serrano-Bianco et al. 2010), but mood (9%) and anxiety (12%) disorders are the most prevalent (Wittchen & Jacobi 2005), while in Ireland alone, approximately 12% of adults experience psychological distress (Doherty et al. 2007). It is noteworthy that the prevalence of mental health disorders, but particularly depression, is even greater for mothers (i.e. it ranges from 10% to 16%, Reis 1988, O'Hara & Swain 1996) and approximately 60% of these adults with mental health conditions have dependent children (Oates 1997, Reder et al. 2000). Few studies have attempted to estimate the prevalence of children living with parental mental ill-health, but research in Canada suggests that one in every ten children lives with a parent that had at least one mental health disorder in the previous twelve months (Bassani et al. 2009).
The relationship between parental mental ill-health and poor outcomes for their children has long been known (e.g. Rutter 1966). Between 32% and 56% of children whose parents have an enduring mental illness will develop a diagnosable psychiatric disorder during childhood or adolescence (see Oyserman et al. 2000). The overall prevalence increases to 61% for those children exposed to parents with major depression (Lavoie & Hodgins 1994). Poor parental mental health can have numerous adverse consequences for children from infancy to adulthood including psychological (e.g. low self esteem, internalising problems and mood disorders), social (e.g. externalising problems, antisocial behaviour), cognitive (e.g. disrupted academic functioning) and physical (e.g. increased risk of injuries) effects (e.g. Goodman & Gotlib 2002, Ensminger et al. 2003, Hammen & Brennan 2003, Cummings et al. 2005, Schwebel & Brezausk 2008, Van Der Bruggen et al. 2008, Ramchandani & Psychogiou 2009). Children’s HRQoL may also be affected by their parent’s mental health conditions (Wiegand-Grefe et al. 2012).

Worldwide, the mental health needs of young people have been neglected (Kieling et al. 2011), but governments here and abroad have recognised the need for a national child and adolescent mental health policy framework (e.g. Government of Ireland 2000b, 2006, Kutcher et al. 2010). Internationally, the prevalence of depressive disorders remains high for both children (i.e. 2.8%) and adolescents (i.e. 5.6%) (Costello et al. 2006). While there is a lack of prevalence studies in Ireland, Lynch and colleagues (2004) found that 4.5% of 12 to 15-year-olds (N = 720) have depression (Lynch et al. 2004). However, it is important to note that depressive symptoms in school-aged children, at any given time, ranges from 5% to 20% (Edelsohn et al. 1992, Charman & Pervova 1996, Lewinsohn et al. 1998). Moreover, Lewinsohn and colleagues (1998) estimate that approximately 28% of adolescents will have experienced an episode of major depression by the age of nineteen. Depression can have a range of adverse effects on young people including medical (e.g. loss of sleep, change in appetite and weight, and impaired general health), cognitive (e.g. poor concentration and impaired academic performance) and psychosocial (e.g. loss of optimism, problems with interpersonal relationships, suicidal thoughts or acts) (Nolen-Hoeksema et al. 1992, Lewinsohn et al. 1994, Hankin et al. 2001, Angst et al. 2002, Brent & Weersing 2008). HRQoL may also be affected (Bastiaansen 2005, Stevanovic 2012).

Much of current public health policy here and in other countries who provide easy access to palatable diets, and rely increasingly on cars and mechanised manufacturing, is aimed at reducing the obesity epidemic (e.g. European Commission
2007, World Health Organization 2008, Department of Health and Children (HSE) 2009, Khan et al. 2009, HSE 2010, Manios & Costarelli 2011). Rates of overweight and obesity in childhood have rapidly increased over the years (Manios & Costarelli 2011, Wijnhoven et al. 2012). For instance, in Europe, 15% to 35% of children are overweight and obese (Barron et al. 2009, International Association for the Study of Obesity 2012), whilst in Ireland this figure is around one in four (Whelton et al. 2007). Childhood obesity can have adverse psychosocial consequences (e.g. poor self-esteem and body dissatisfaction) as well as many negative effects on physical health (e.g. cardiovascular, pulmonary and musculoskeletal problems) (Dietz 1998, Wabitsch 2000, Russell-Mayhew et al. 2012). Poor HRQoL may also be a consequence of obesity in young people.

In summary, the assessment of young people's HRQoL has become an increasingly important focus both nationally and internationally. Many young people are living in poverty, which can increase the risk of childhood depression and obesity and exposure to parental mental health problems. There are major concerns regarding the implications of these factors for young people’s HRQoL both in Ireland and elsewhere. Arguably, a more comprehensive understanding of young people’s HRQoL is needed in order to appropriately inform the development of effective health policies and interventions for young people at risk of poor HRQoL and, in particular, with regard to the three constructs that are the focus of this thesis - depression, obesity and parental mental ill-health. This might include investigating the mechanisms by which these factors affect HRQoL and any important inter-relationships. An explanation of the terms risk factors, mechanisms and inter-relationships is provided in Chapter Two. A review of the literature on the nature and extent of the relationship between young people's HRQoL and their depression, obesity and their parents' mental ill-health is presented in Chapter Three.

The principal aims of this study, which was guided by a conceptual framework of children's HRQoL (see Chapter Two), were: (1) to establish, for families exposed to high levels of urban disadvantage, the nature and extent of the relationship between children's HRQoL and several separate but related physical and mental health constructs including: (a) depressive symptoms; (b) BMI; and (c) the mental health of their parents; and (2) to explore the direct effects and the role of individual and family factors in mediating and moderating these relationships. Secondary objectives were to assess the mediator effect of child body image perception and depressive symptoms in the relationship between BMI and HRQoL and the indirect effect of parenting self-efficacy and child depressive symptoms in the relationship between parental mental
health and child HRQoL. The moderator effect of the age and gender of the child, and parental social support in the three relationships that are the focus of this study, was also established. Chapter Three presents an illustration of the model to be tested in this study. The ultimate goal of this study was to expand knowledge of these relationships and inform the development of appropriate interventions that can improve or promote positive HRQoL in children.

In this study, parental mental health represents overall mental health status including depressive and anxiety symptoms. Parenting self-efficacy refers to a parent's belief and confidence in his or her parenting role and their ability to positively influence the behaviour and development of their children (Coleman & Karraker 2000). Social support is often conceptualised according to the kind of support that is available such as emotional support, assistance with a problem, the provision of goods and services, and having people who provide advice (Pierce et al. 1996, Demaray & Malecki 2002, Laakso & Paunonen-Ilimonen 2002). Body image comprises two dimensions: body image perception and body image investment. Body image perception refers to cognitive appraisals and associated emotions about one's appearance, and it includes self-ideal discrepancies, body dissatisfaction (e.g. body image concerns) and satisfaction valuations (Cash et al. 2004). Body image concern refers broadly to an individual's negative attitudes and feelings of concern towards their body size and shape (Uys & Wassenaar 1996). Body image investment, a dimension not explored in this study, refers to the cognitive-behavioural importance of appearance in one's personal life and its salience to one's sense of self. This dimension reflects a dysfunctional investment in appearance characterized by an excessive preoccupation and effort devoted to the management of appearance, as opposed to a more adaptive valuing and managing of one's appearance (Cash et al. 2004).

The study was located within a larger evaluation of the implementation and impact of a Health Promoting School (HPS) initiative in urban disadvantaged primary schools over three time points (see Comiskey et al. 2012). The World Health Organisation's HPS model (World Health Organization 1997, St Leger & Nutbeam 2000) is just one health promotion initiative (Denman et al. 2004) that takes an ecological approach to improving children's health. As defined by the WHO (1997), a health promoting school can be characterised as a school constantly strengthening its capacity as a healthy setting for living, learning and working. The internationally recognised model offers guidelines and techniques based on sound theoretical underpinnings to schools to help them become health-promoting schools such as altering the health education curriculum, changing the ethos of the school, up skilling teachers, and forging better
links and partnerships with parents, primary healthcare and the wider community (World Health Organization 1997, Denman et al. 2004). The effective implementation of the HPS model internationally, as documented in many qualitative reports (Allensworth 1994, St Leger & Nutbeam 2000, Young 2002, Clift & Jensen 2005), has lead to improved and sustained health outcomes in children (Aldinger & Whitman 2009, Buijs et al. 2009), as well as other members of the school community. The evaluation of the implementation of the HPS model in the schools of focus in this study revealed that the programme "was very ambitious" and the timeframe of three years for schools to begin to become health-promoting schools "was short" (see Comiskey et al. 2012). It is important to note that no change in children's health outcomes could be attributed to the implementation of the HPS intervention (i.e. there was no difference between outcomes in children from intervention and comparison schools). Indeed, the international literature shows that significant improvements in children's health are typically not seen in the short term, but improvements have been identified in the medium to long term (i.e. 5 to 10 years post adoption of the HPS model) (Aldinger & Whitman 2009, Peters et al. 2009).

In order to fulfil the objectives of this current study (i.e. investigating predictors of HRQoL in urban disadvantaged children), a prospective longitudinal cohort design following the children and their parents/guardians from year one to year two of the original 'baseline, year one and year two' HPS evaluation was employed. Given the latter findings of the HPS evaluation, parent-child dyads from both the intervention and comparison schools of the evaluation were considered as a single unit in this current study instead of being separated out.

The objectives of this study require detailed consideration within a theoretical and empirical context. The final section of this chapter provides a brief outline of the contents of the remainder of the thesis, all of which will be considered in more detail later.

CHAPTER TWO presents the historical development of the concept of HRQoL and provides a conceptual framework for children's HRQoL used to guide and inform this study. This chapter highlights the controversy surrounding the concept in terms of the range of definitions established to describe it, the theories developed to explain it and the measures used to assess it over the years. Drawing on a number of theoretical and conceptual frameworks of adult HRQoL and a bioecological model of child development, a conceptual framework of children's HRQoL is presented which guides and informs the study of the relationship between children's HRQoL and their
depressive symptoms, BMI, and the mental health of their parents. Key concepts and terms that are relevant for structuring and critiquing the literature in Chapter Three are presented within this framework.

**CHAPTER THREE** provides a critical review and synthesis of the research conducted, to date, on the relationship between young people's HRQoL and the constructs that are the focus of this study (i.e. depression, obesity and parental mental ill-health). The review first looks at a range of clinical and general population studies of the direct effect of each factor on young people's HRQoL. This includes a discussion of the mechanisms by which these risk factors are hypothesised to have their effect. A review of the factors that reduce or intensify the effect of each risk factor on young people's HRQoL is then presented, with a specific focus on key individual and family characteristics (i.e. age and gender of the child and parent's social support). This review highlights the current gaps in the literature and presents a model of the relationships to be tested in this study.

**CHAPTER FOUR** outlines the epistemological approach of post-positivism adopted within the study. This chapter emphasises the ways in which the HRQoL phenomenon is viewed and can be studied and analysed by the researcher. The advantages and disadvantages of a post-positivist approach to the study of HRQoL are also highlighted.

**CHAPTER FIVE** presents the research methodology used to study the nature and extent of the relationship between children's HRQoL and the constructs that are the focus of this study. This includes a description of the study design, setting, participants and data collection methods. This chapter also outlines how important ethical issues were addressed within the study. The plan for data analysis is described including the multivariate analysis plan detailing tests of moderation, and simple-, multiple-, half-longitudinal-, and moderated-mediation. The associated findings from exploratory data analysis are also presented here.

**CHAPTER SIX** presents results of pre-modelling analysis and discusses the findings within. More specifically, it provides a description of the sample of children and parents/guardians who participated in the study and details any changes over time. It also presents the results from bivariate analysis of study variables highlighting confounders and potential mediators of the three key relationships under investigation in this study. In addition, it provides a discussion of the findings in the context of the literature. The results of this chapter help contextualise and guide the multivariate
modelling and findings described in Chapters Seven to Nine and also highlight areas in need of further research.

**CHAPTER SEVEN, EIGHT and NINE** are the remaining results chapters that focus on each of the constructs in turn and include consideration of: (1) the direct effect when controlling for confounders; (2) the predictive ability of each; (3) the association between changes in each and HRQoL over time; and (4) moderator effects of children’s age, gender and family structure, and parent's/guardian's perceived social support and (where appropriate) mental health. Mediator effects were also explored in Chapters Eight and Nine, including simple-, multiple- (where appropriate), moderated- and half-longitudinal- mediation. More specifically, mediator effects of body image perception and depressive symptoms in the relationship between BMI and HRQoL and mediator effects of parenting self-efficacy and children’s depressive symptoms in the relationship between parental mental health and children's HRQoL were examined.

**CHAPTER TEN** synthesises and critiques the findings. This chapter discusses the key findings within the context of existing research as well as in terms of the methodological limitations and strengths of the study. The potential implications of the findings for policy, practice, research and theory are also considered, and finally, the areas in need of further research are described.
CHAPTER TWO
The historical context of health-related quality of life and a conceptual framework for this study

This chapter describes the historical development of the concept of HRQoL and highlights the need for a theoretical framework of HRQoL specific to children. A conceptual framework of children's HRQoL is then presented in order to help guide and inform this study.

2.1 Historical context of health-related quality of life
This chapter firstly describes how the HRQoL concept evolved from Quality of Life (QoL) and from discussions within the medical field that stressed a new goal for improving patient health. It highlights the controversy surrounding the concept in terms of the range of definitions established to describe it, the theories developed to explain it and the measures used to assess it over the years.

2.1.1 Origins of the health-related quality of life concept
The concept of HRQoL emerged in the 1970s from a rhetoric that stressed a new goal for medicine in terms of improving people's physical, psychological and social well-being, and not just reducing their clinical symptoms (Armstrong & Caldwell 2004). This was due, at least in part, to a change in the definition of "health" proposed by the WHO (1948) as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity". This acknowledged the holistic nature of human health and the need to take account of people's ability to adjust and cope with their experiences and environment. It was at this time that Quality of Life (QoL), which was considered a holistic indicator of well-being, began to dominate thinking about health and healthcare outcomes, and those who viewed QoL from a multi-dimensional perspective soon adopted a more specific HRQoL focus. Since the 1970s, the number of HRQoL publications in the literature has grown exponentially and now exceeds all other topics in health outcomes research and exceeds the number of non health-related QoL publications (Armstrong 2009). However, despite this dramatic growth and the contribution of HRQoL research, the concept has been controversial in terms of definition, theory and measurement.

2.1.2 Definitions of health-related quality of life
First of all, there is no standardised definition of HRQoL (see Matza et al., 2004). Reviews of HRQoL studies indicate that authors often neglect to define HRQoL in full (Armstrong & Caldwell 2004, Armstrong 2009). For example, Ferrans and colleagues
refer to HRQoL as a term "intended to narrow the focus to the effects of health, illness, and treatment on quality of life" (Ferrans et al. 2005, p. 1). There is, however, no standardised definition for QoL (Emery et al. 2005). Some QoL definitions focus on an individual's ability to function, feelings about functioning, position in life, existence, achievement of goals, happiness, capabilities, social utility, social comparisons and discrepancy between actual and ideal self (Davis et al. 2006, Sirgy et al. 2006). The term has also been used interchangeably with terms such as "happiness", "satisfaction with life", "subjective well-being" and "perceived Quality of Life" (Meeberg 1993).

Unsurprisingly, the HRQoL concept has led to similar confusion and controversy. HRQoL has been variously defined as functioning, feelings about functioning, health, discrepancy between actual and ideal self, and value assigned to duration of life (Eiser et al. 1999, Levi & Drotar 1999, Davis et al. 2006). In addition, it has been used interchangeably with terms that are distinctly different, such as health status and functional status (Davis et al. 2006). There is general agreement, however, that HRQoL refers to an individual's well-being that can be affected by health, illness, treatment and values in health, and that it is subjective and multi-dimensional in nature (see Matza et al. 2004b). It is generally considered to comprise of physical, psychological and social well-being dimensions, where well-being is regarded as an "end result" measure of health and refers to "subjective perceptions, including reports of unpleasant or pleasant sensations and global evaluations of health" (Topolski et al. 2004, p. 2).

2.1.3 Theories of health-related quality of life
Since the concept emerged in the 1970s, there has been little theory development and a marked under-reporting of the theoretical perspective of HRQoL underpinning published research. For example, a systematic review of theories utilised in children's HRQoL research, found that only 8% of studies made reference to a theory (Davis et al. 2006).

Broad theoretical perspectives
Traditionally, three competing theoretical perspectives have dominated the QoL literature and these have also influenced the study of HRQoL. Researchers either embrace a 'global' view of QoL, a 'multi-dimensional' view (Anderson & Burckhardt 1999, Joyce et al. 2003), or a more 'specific multi-dimensional' perspective of QoL (Revicki 1989, Wilson & Cleary 1995, Ferrans et al. 2005). These competing perspectives differ in how QoL can be compartmentalised and measured and what aspects of life are considered to be most influential therein.
(1) At the broadest level, the global perspective offers a holistic approach to QoL and assumes that QoL is one-dimensional, is affected by all aspects of life, and should be measured as a whole. (2) The multi-dimensional perspective is based on the notion that QoL comprises multiple dimensions of well-being that are affected by all aspects of life which can be measured in part, or in whole (Anderson & Burckhardt 1999, Burckhardt & Anderson 2003). (3) The specific multi-dimensional perspective views QoL as comprising multiple dimensions of well-being that are affected by a specific life aspect (e.g. finance, spirituality and health), and can be measured in part or in whole (Revicki 1989, Anderson & Burckhardt 1999, Ferrans et al. 2005). The specific multi-dimensional perspective has been influential in the establishment of the HRQoL concept. Thus, there is general agreement that HRQoL is a sub-domain of QoL and refers to an individual’s subjective evaluation of their well-being across multiple well-being dimensions that can be affected by, amongst other things, health, illness, treatment and values in health (see Matza et al. 2004b). However, it has been argued that humans do not compartmentalise their QoL into specific research accessible components such as HRQoL, and that it is an ontological error for researchers to do so (Register & Herman 2006). It has also been argued, however, that HRQoL has materialised after forty years of investigation as a ‘real’ phenomenon or a ‘thing’ that we all have, as it has shown repeatedly to express in precise numbers the state of a person’s well-being in relation to a factor such as a health state (Armstrong 2009).

Specific theoretical frameworks

Researchers have generally not adopted a single unifying HRQoL framework. In HRQoL research, generally one of two theoretical frameworks have been adopted in the form of either a ‘deficits-based’ or a ‘generative-based’ framework. The applicability of these to children’s HRQoL is discussed below.

Deficit-based approaches constitute the bulk of HRQoL frameworks and emphasise the degenerative nature of health and the risk factors that diminish HRQoL. Some of these frameworks pertain to specific diseases or conditions (e.g. Archenholtz et al. 1999, Nuamah et al. 1999, White et al. 2004) whereas others consider diseases or conditions more generally (e.g. Revicki 1989, Wilson & Cleary 1995, Joyce et al. 2003, Marden 2005). For example, Wilson and Cleary’s (1995) deficit-based framework of HRQoL refers, not only to processes used by an individual to evaluate their HRQoL, but also to individual and environmental characteristics that can diminish HRQoL; thus, biological and physiological impairments lead to perceptions of abnormal physical, emotional, or cognitive states which, in turn, give rise to general health perceptions that determine overall HRQoL. This model does not discuss potential influential factors, nor does it
make reference to HRQoL in children and how this can be affected. Furthermore, it
does not indicate how HRQoL may be improved or maintained over time. Although
dated, the deficit-based perspective that HRQoL is an inherent condition that
deteriorates when faced with challenges, has provided valuable information about
factors that inhibit HRQoL.

Little research, to date, has adopted the more contemporary generative-based
framework. This embraces a more holistic approach to HRQoL than the deficit-based
models in that they acknowledge the factors that can construct as well as deconstruct
HRQoL over time (Lindström & Eriksson 1993, Sprangers & Schwartz 1999, Ferrans et al. 2005, Register & Herman 2006). This approach has paved the way to a greater
understanding of HRQoL in terms of the contextual factors that influence it. This
emergent framework is founded upon a systems model of health, which recognises that
health is affected by the complex interaction between personal characteristics, life
experiences, and environmental factors that exist in an individual's immediate (e.g.
family and school) and wider (e.g. government policies and social class) environments
(Seeman & McEwen 1996, Yen & Syme 1999). The effect on HRQoL may be no
different. According to this framework, HRQoL is largely determined by the combined
effects of accrued health risks to which a person is exposed (intrapersonally,
interpersonally and contextually), and those protective factors which may circumvent
those risks (Antonovsky 1987, Alvarez-Dardet & Ashton 2005). However, there are
limitations to some of these existing generative-based frameworks of HRQoL including
their applicability to studying HRQoL in children.

For example, Ferrans and colleague's (2005) conceptual model of HRQoL (see Fig.
2.1) builds on an earlier causal model proposed by Wilson et al. (1995). They propose
that HRQoL is a process that involves an objective change in health that is observed by
the individual followed by a subjective reassessment of their HRQoL. This premise is
generally supported by evidence from the literature (Taillefer et al. 2003, Cummins
2005, Solans et al. 2008). Ferrans also draws on the ecological model of health
promotion (McLeroy et al. 1988) which proposes that an individual's evaluation of their
HRQoL can be affected by a complex interaction of individual, environmental and
social factors and that the manipulation of some of these factors can improve HRQoL.
The model also alludes to how HRQoL may change over time by referencing the
response shift theory (Sprangers & Schwartz 1999) (see below) but stops short of
integrating it into the model. Ferrans' model does not, however, refer to the dimensions
of children's HRQoL, the different contexts relevant to children's lives and the factors
that could affect their HRQoL.
Although a theoretical framework of children's HRQoL was not identified in the literature, a HRQoL model was developed to explore the HRQoL of Nordic children (Lindström & Eriksson 1993) and draws on Bronfenbrenner's (1979) ecological model of child development to explain how children's HRQoL is affected by interpersonal, intrapersonal and contextual factors and is affected differently to adults due to the different contexts in which children live (see Fig. 2.2). Lindström's model approaches HRQoL as a phenomenon that is capable of being constructed and deconstructed, but it does not consider how this may occur, nor does it consider some of the core domains of children's HRQoL. The detail on Bronfenbrenner’s theory is also limited in this model (e.g. the parent-child relationship). In addition, it drew upon an earlier version of Bronfenbrenner's theory of child development which, unlike the current bioecological model of child development (Bronfenbrenner 2005, see Figure 2.2), does not emphasise the role of biology in children's health and well-being.

Nonetheless, the integration of Bronfenbrenner's ecological model into a model of children's HRQoL, is a key strength of Lindström's model. Bronfenbrenner's theory has been extensively applied, tested and revised (see Tudge et al. 2009), and is still used as the foundation for other child development theories today (e.g. family systems theory). While a number of existing theories explain how parent-child interactions and parenting, impact children's health (e.g. attachment theory, social learning theory), Bronfenbrenner's ecological model of child development advances these theories by drawing attention to the broader context of child development beyond the confines of the mother-child relationship (Belsky 2005). For example, attachment theory (Bowlby 1969, 1979, Ainsworth 1985) regards caregiver sensitivity as the principal determinant
of whether a child develops a secure or insecure relationship with the caregiver, but ecological theory attains that the psychological attributes of the parent, the relations with their partner, and the degree to which they have access to other social agents are key to the security of the parent-child relationship and the quality of care that a parent provides (Belsky & Pasco Fearon 2008). The ecological theory also draws upon social learning theory (Bandura & McClelland 1977), which reflects the central tenets of traditional behaviourism and advocates that children model behaviour from personally observing others, the environment and the mass media.

![Bronfenbrenner's ecological theory of child development](image)

Fig. 2.2: Bronfenbrenner's ecological theory of child development. Source: Santrock (2007).

Finally, Sprangers et al. (1999) have applied the response shift theory to HRQoL as a means for describing changes in HRQoL over time and the process of adapting to illnesses. Response shift theory has its roots in control theory (Carver & Scheier 1982), and when applied to HRQoL, it proposes that people have the ability to regain homeostasis in HRQoL after experiencing some health-related stress, such that an individual's HRQoL levels would return to normal levels despite no change in their health. A number of studies have tested the response shift theory and support for it is growing (Rapkin & Schwartz 2004 for a review, Ring et al. 2005, Gillison et al. 2008). Recently this process of adaptation in HRQoL has been considered within HRQoL theoretical and conceptual frameworks (e.g. Ferrans et al. 2005, Register & Herman 2006).
Overall, researchers agree that HRQoL is a sub-domain of QoL and refers to an individual's subjective evaluation of their well-being across multiple well-being dimensions that can be affected by health, illness, and treatment and other interpersonal, intrapersonal and environmental factors (see Matza et al. 2004b, Register & Herman 2006). Researchers also agree that a theory of children's HRQoL is needed to understand how children reflect on and give voice to their HRQoL, and how factors relating to the child and their immediate and wider environment, may influence or interact with their HRQoL (Matza et al. 2004b, Davis et al. 2006) (see 2.2 for the conceptual framework for this study).

2.1.4 Measuring health-related quality of life
There is no standard approach to measuring HRQoL mainly because the instruments used tend to reflect researchers' ontological and theoretical biases. In accordance with the deficits-based theoretical framework, most of the HRQoL instruments developed to date (i.e. estimated to be over 1000 QoL and HRQoL instruments, see Armstrong 2009) measure the factors that tend to diminish HRQoL within the context of a condition or disease (see Anderson & Burckhardt 1999, Matza et al. 2004b, Armstrong 2009). Approaches used to measure HRQoL vary by research design (Garratt et al. 2002b), but individualised and quantitative-based approaches are the most popular (Guyatt et al. 1999, Bjornson & McLaughlin 2001, Davis et al. 2006). The individualised approach involves developing a personalised HRQoL instrument specific to a patient's illness by drawing from a battery of items that have varying degrees of relevancy and administering it at at least two time points. Thus, the approach can be time consuming.

Many valid and reliable quantitative HRQoL instruments have been developed to capture the distinct features and contexts of childhood and adolescence (Eiser & Morse 2001, Harding 2001, Matza et al. 2004b, Davis et al. 2006, Solans et al. 2008). Two types of quantitative measures have been employed in HRQoL research; namely, generic and condition-specific measures (Davis et al. 2006). The latter are designed to be applicable to individuals with a specific illness, and are useful in detecting hidden morbidities of the illness and outcomes arising from changes in the individual's condition (Eiser & Morse 2001). These include, for example the Impact of Weight on Quality of Life (IWQOL) and the Paediatric Oncology Quality of Life Scale (POQOLS). In contrast, generic measures are designed to be applicable to all population subgroups and are useful for comparing outcomes between subgroups and for capturing positive well-being in healthy populations (Kane 2008). Some of the more generic-type measures employed within the literature include the Kidscreen 52 and PedsQL. Although condition-specific measures are the most popular quantitative
method of assessing HRQoL in individuals with conditions, research suggests that the HRQoL of these individuals is best studied by using a generic measure with either a condition-specific or individualised measure (Joyce et al. 1999a, Wood-Dauphinee 2000, Tsiros et al. 2009).

Until recently, most research on young people's HRQoL has relied on proxy reports by parents, practitioners or teachers. However, significant discrepancies have been identified between proxy reports and child self-reports (Eiser & Morse 2001, Upton et al. 2008). Given the strong psychosocial component in young people's perception of health, it has been recommended that young people report their HRQoL themselves (WHO 1986, Mechanic & Hansell 1987). By definition, the subjective feelings of children about themselves and their position in life can only be known by them (Edwards et al. 2002, Matza et al. 2004b).

As outlined in this chapter, the HRQoL construct/phenomenon is not without its critics and considerable controversy has surrounded the lack of: a standardised definition, a unified theoretical framework, and standardised measurement approaches. Whilst a number of theoretical frameworks of adult HRQoL have provided a useful foundation upon which young people's HRQoL might be usefully examined, they provide limited or no information on the dimensions of HRQoL pertinent to children, the different contexts in which children live, the factors that could affect their HRQoL, the impact of illness-related factors on HRQoL, and how children may adapt over time. Hence, the following section details a conceptual framework of children's HRQoL that was developed in order to guide and inform this study. The framework makes particular reference to the relationship between children's HRQoL and the three separate but related constructs that are the focus of this study (i.e. depressive symptoms, BMI, and parental mental health status).

2.2 Conceptual framework of the health-related quality of life of children

A conceptual framework of children's HRQoL is proposed for this study that is founded upon a generative-based systems model of health. This considers health to be determined by interactions between people and their environments and to be an ongoing process of construction and deconstruction. This framework draws on aspects of the conceptual model of adult HRQoL (Ferrans et al. 2005), the bioecological model of child development (Bronfenbrenner 1979, 2005), response shift theory (Sprangers & Schwartz 1999) and the health promotion model (McLeroy et al. 1988), all of which were outlined earlier in this chapter.
The fundamental premise of this overarching framework is that children’s HRQoL is a subjective evaluation of their quality of life across multiple well-being dimensions and is a result of a complex interplay between person factors, processes and contexts in which children live, but particularly their health status. The child is viewed as an active participant in a complex system of influences where such influences are not only multiple and interactive, but also reciprocal with the child. Contexts, processes and person factors can have direct and indirect effects on HRQoL. The more proximal person factors are believed to have a greater influence on HRQoL than the more distal processes or contexts. Some factors within this complex system increase the likelihood of poor HRQoL whereas others decrease the likelihood and together they have a cumulative effect. If faced with a severe impairment to their health status, a child may regain homeostasis over time if they shift their HRQoL or evaluation of their standards and values in health. Finally, promotion or improvement of HRQoL can occur by modifying certain person factors, processes and contexts that affect it. Each of these is explored in more detail below.

2.2.1 Dimensions of the health-related quality of life in children

HRQoL is a hidden human phenomenon, but is a universally desired outcome that is essential to human health and well-being (i.e. it is instrumentally valuable). HRQoL is a sub-domain of QoL, such that it comprises a more specific subjective evaluation of a person’s well-being in terms of their health. Children do not perfectly compartmentalise their QoL into convenient entities like health or finance-related QoL, but with standardised measures, HRQoL can be imperfectly and probabilistically assessed and understood (Armstrong 2009). Individuals can give voice to their HRQoL by subjectively evaluating it on a whole and in terms of multiple well-being dimensions. The well-being dimensions of children’s HRQoL consider not only specific stages of physical, psychological and social development, but also the contexts in which children live and distinct features of childhood and adolescence (e.g. physical, psychological, and social well-being, and autonomy, parent relations and school performance) (Bullinger & Ravens-Sieberer 1995, Eiser & Morse 2001). For example, the specific effects of obesity on HRQoL may be different for children than adults because of the different contexts in which they are located; obesity could limit a child’s participation in play and athletics with peers, leading to psychological and social HRQoL consequences that are different from those experienced by adults with the same condition who may instead experience physical dysfunction in the workplace. The factors influencing and being influenced by HRQoL are now discussed.
2.2.2 Factors interacting with the health-related quality of life of children

The child is viewed as an active participant in a complex system of influences where such influences are not only multiple and interactive, but also reciprocal with the child. These influences are broadly categorised in two ways: according to whether they increase or decrease the likelihood of poor HRQoL and according to whether they are internal or external to the child. Within this complex system, there are risk and vulnerability factors that increase the likelihood of poor health, and there are compensatory and protective factors that decrease the likelihood of poor health. Altogether, they have a cumulative effect on health.

Risk factors increase the likelihood whilst compensatory factors decrease the likelihood of poor health; this occurs irrespective of whether an individual is exposed to a stressor (Steinhausen & Metzke 2001). Examples of risk factors are disease, risky health behaviours and detrimental environments, while compensatory factors are the opposite of these. The magnitude of the effect of a risk factor, for example, on a health outcome may be reduced or intensified under different conditions of a third variable. A variable that reduces or intensifies the effect of one factor on another is known as a moderator (Baron & Kenny 1986). When a moderator variable reduces the effect of a risk factor on health, it is considered a protective factor. Protective factors refer to those “traits, conditions, situations and episodes, that appear to alter, or even reverse, predictions of negative outcomes and enable individuals to circumvent life stressors” (Garmezy 1993) An example of such is effective coping. When a moderator variable intensifies the effect of a risk factor on health, it is considered a vulnerability factor. Vulnerability factors are long-standing or enduring conditions or life circumstances that promote poor health (Steinhausen & Metzke 2001) such as socioeconomic deprivation and genetic predisposition to disease. Protective and vulnerability factors generally have no effect on health in the absence of a stressor because they have nothing to protect against or because they remain dormant (Grant 2006). For example, a child’s coping skills might help protect them from the lack of responsiveness from a parent with depression and the effect this might have on their HRQoL. Coping skills may make no difference to a child’s risk of impaired HRQoL, however, when they have a responsive parent. Thus, the presence of a risk factor does not necessarily determine that a negative outcome will occur as protective factors can intervene to make an apparently risky trajectory into a more normal or positive one.

The explanation of risk, vulnerability, compensatory and protective factors is complicated further by the fact that a factor could be compensatory for one group or health outcome, yet protective for another group or health outcome. The same applies
to risk and vulnerability factors. For example, parenting self-efficacy may act as a compensatory factor for mothers regardless of how difficult their child is, but it may act as a protective factor for fathers such that only when parenting a difficult child are fathers with higher parenting self-efficacy protected against experiencing more anxious feelings than those fathers less confident in their parenting abilities (Hastings & Brown 2002). Finally, any of these factors may affect health outcomes directly or indirectly (Matza et al. 2004b, Ferrans et al. 2005).

A mediator is a mechanism by which one factor indirectly affects another factor (Baron & Kenny 1986). For example, a risk factor, such as obesity, may indirectly affect well-being through the experience of arthritis (i.e. the severity of arthritis experienced is the mediating variable). It should be noted that a given variable may function as either a mediator or a moderator, depending on the research question and the theory being tested (Frazier et al. 2004). For example, parent depression could be conceptualised as a mediator of the relation between socioeconomic disadvantage and child health. This would be the case if theory suggested that socioeconomic deprivation affects child health because it increases the chance that a parent will become depressed. Parent depression also could be conceptualised as a moderator of the relation between socioeconomic disadvantage and child health. In this case, theory would suggest that socioeconomic deprivation might differentially affect the health of children whose parents have severe or low levels of depression.

The factors interacting with children's HRQoL can also be described according to whether they are internal or external to the child and include contexts, processes and person factors. These are now discussed in more detail.

2.2.2.1 Contexts
This framework recognises that there are four interrelated systems or contexts (i.e. the micro, meso, exo and macro- system) in which children live that expose them to varying levels of health risks, but also provide different levels of resources (Bronfenbrenner 1979, Belsky & Isabella 1988, Schensul 2009) (Figure 2.4).

The first of these, known as the microsystem, is any environment, such as home, school, or peer group, in which the child spends a good deal of time engaging in activities and interactions. Bringing with them all their personal characteristics, children interact first and foremost with their family. It is proposed that the family home where children spend the majority of their time will have the strongest and most direct influence on their health. As children spend time in more than one microsystem,
interrelations form among them and this context is known as the *mesosystem*. Multiple and interrelated interactions occur across microsystems like parents with schools, schools with the community, and these may influence children's HRQoL. There are also important contexts in terms of their potentially important indirect influence on HRQoL. The next level is the *exosystem* and includes amongst others, parents' social networks and workplace, the conditions in the local community, access to and quality of services, and the media. It is proposed that the exosystem affects children's HRQoL indirectly by influencing the different structures within the microsystem (Bronfenbrenner 1979, 2005). Finally, the *macrosystem* is the wider context encompassing any group, culture or social structure whose members share norms, values, belief systems, resources, hazards, lifestyles, policies, economic conditions and global developments (Bronfenbrenner 1993). The macrosystem encompasses the remaining systems, influencing and being influenced by all of them. Contextual factors of the macrosystem include SES, ethnicity, race, body image and the school culture. It is posited that the macrosystem could affect children's HRQoL if a macrosystem factor is experienced within one or more of the microsystems in which the child spends a lot of time.

![Diagram of four interrelated contexts in which children live](image)

**Fig. 2.3 Four interrelated contexts in which children live (developed for this study based on Bronfenbrenner's (1979) bioecological model of child development)**

The effect of (1) SES and (2) culture (macrosystem) on children's health helps explain how the different contexts may negatively affect their HRQoL. (1) According to the 'family investment model' (Conger & Elder 1994), a low income is associated with adverse health outcomes for children because it hinders parents' ability to purchase the materials, experiences and services that benefit them (Becker & Tomes 1994, Haveman *et al.* 1994, Mayer 1997, Blau 1999) such as healthcare, well resourced schools, nutritional food and physical activity resources. According to the 'family stress
model' (Conger & Elder 1994), a low income can also adversely affect children's health through its negative impact on parental mental health (Gelfand et al. 1996, Deal & Holt 1998, Reading & Reynolds 2001) and this can lead to dysfunctional parenting practices in the microsystem which, in turn, lead to poorer health outcomes for children (Elder & Caspi 1988, Conger et al. 2000, Kiernan & Huerta 2008). (2) Since the 1900's, culture has instilled a set of beliefs, values and norms regarding body image promoting a thin frame with little curves and more muscle as the ideal (Harrison Jr et al. 2000, Rohlinger 2002). Consumer culture (macrosystem) shaped the "ideal body image" through advertisements (exosystem), Hollywood, cosmetics, fashion, Barbie dolls, action figures, and a general negative focus and discourse on weight and shape such as "fat talk", "objectification" and "weight-based teasing" (Featherstone 1982, Pope et al. 1999, Dittmar et al. 2006). Sports became popular pastimes, people started dieting and exercise was soon perceived as a healthy activity to enhance the body. Children's HRQoL may be indirectly affected by this cultural stance through their interaction with these products, services and media, or by modelling the beliefs and behaviours of those significant in their lives (mesosystem and microsystem). Indeed, body dissatisfaction (O'Connell 2012) and unhealthy and extreme body-shaping behaviours, such as eating disorders, cosmetic surgery, and steroid abuse appear to be on the increase (e.g. British Medical Association 2000, Cafri et al. 2005, Hesse-Biber et al. 2006). The psychological factors at play that may lead to poor health and well-being are discussed in Section 2.2.2.3 below.

2.2.2.2 Processes

Reciprocal interactions between the active child and an object or individual with which/whom the child spends time (e.g. food, family, friends, and healthcare providers) are called proximal processes. Proximal processes that occur on a fairly regular basis over extended periods of time may affect children's health (Bronfenbrenner & Morris 1998). For example, binge eating behaviours may lead to obesity, peers may tease children for being overweight which may lead to depression, and parents may seek out healthcare for their children to improve their health. The parenting role has significant consequences for children's health. It is through interactions with parents that children come to make sense of their world, understand their place in it, and acquire key personal resources that may help counteract the effect of certain risks to their HRQoL. Moreover, parents have a strong influence over the promotion of physical activity and nutrition, and when and where healthcare is sought. Any disruptions to parenting or to the security of the parent-child relationship (e.g. parental illness) can affect children's personal resources and negatively affect their health.
Reciprocal interactions that occur within the contexts of which the child is not part (i.e. exosystem and macrosystem) but which can have indirect effects on the child's health, are called *distal processes*. Examples of more distal processes that can indirectly influence children's health include interactions between parents and their friends, peers and their family, and teachers and their partners. It is argued that the ability of parents to perform effectively in their child-rearing roles depends on social supports emanating from other settings (Bronfenbrenner 1979).

### 2.2.2.3 Person factors

The conceptual framework for this study stipulates that there are many *person factors* intrapersonal to the child that can influence their HRQoL. While the health of the child is the main person factor affecting HRQoL, other person factors interact with this process including developmental, biological, psychological and personal resource factors (Bronfenbrenner 1979, 2005).

Health is typically assessed according to four indicators: biological functioning, clinical symptoms, functional status and health status (see Fig. 2.3). The first indicator of health is *biological function*, which focuses on the function of cells, organs, and organ systems. *Symptoms* refer to physical, emotional, and cognitive symptoms perceived by the person or determined by a trained professional (Miller et al. 2000). *Functional status* refers to the ability to perform tasks in multiple domains such as physical, psychological, social, and role functions. *Health status* describes a person's state of health that encapsulates the previous three objective indicators, and thus can have the greatest effect on HRQoL. As the risk of experiencing any of these aspects of health increases and children become more aware of their condition, the risk to HRQoL increases.

![Fig. 2.4: The aspects of health that affect health-related quality of life in children (developed for this study)](attachment://fig24.png)
Developmental factors refer to the age and stage of development of the child. Biological factors include genetics, gender, body fat, skin colour, and to an extent, temperament and personality. Psychological factors refer to temperament, personality, cognitive appraisal, affective response tendencies, adaptation, coping, motivation and persistence (see Sirgy et al. 2006). While personal risk factors can present themselves, other person factors referred to as personal resources, can interact with these health risks and may counteract any negative effects on HRQoL. These include a child’s past experiences, skills, and intelligence, and access to good food, housing, two caring parents, and educational opportunities. Utilisation of these resources is contingent on the child’s awareness of the existence of the resources, the salience or meaning of the resources to the child, and having the ability to access and utilise them (i.e. resilience, Rutter 1979). In accordance with Bronfenbrenner’s (1979) theory, person factors are assumed to have the strongest and most direct effect on children’s HRQoL.

Furthermore, person factors can be proximal or more distal to the child; proximal being the child’s own person factors and distal being person factors relating to other individuals in which the child spends a lot of time. For example, parental mental health and parenting self efficacy are psychological person factors relating to the parent. These distal person factors may affect the personal resources of the child, and thus, indirectly affect the child’s HRQoL. Proximal person factors have a greater impact on the HRQoL of children than more distal person factors.

Lazarus and Folkman (1984) provide a general theory of stress, cognitive appraisal, coping and health status (i.e. transactional model of stress) that may help summarise the way in which person factors can affect children’s HRQoL. If a child is exposed to a stressful encounter, they may initially cognitively appraise or evaluate whether the encounter poses potential harm or benefit to their well-being (i.e. primary appraisal) and, if so, in what way. During the primary appraisal of the encounter, a range of personality characteristics including values, commitments, goals, and beliefs about self and the world helps to define the stakes that the person identifies as having relevance to their well-being. In secondary appraisal the person evaluates what cognitive and behavioural coping options can be used to manage the internal and external demands of the encounter that is appraised as taxing or exceeding the person's resources (e.g. changing the situation, accepting it, seeking more information, or holding back from acting impulsively) in order to optimise their HRQoL. Ineffective coping mechanisms, however, might adversely affect mental or somatic health status through dysfunctional thought processes, constant and intense neuro-chemical responses, excessive use of injurious substances and dieting, engaging in other high risk activities, and avoiding...
adaptive health/illness-related behaviour. As the risk to health status increases and children become more aware of their condition, the risk to HRQoL increases.

The ways in which cultural “body image ideals” (created through a number of mechanisms, see Section 2.2.2.1 above) may impact on children's cognitive appraisal of their body image and, in turn, their affective state and HRQoL may be summarised in a model that draws on (1) value theory (e.g. Rokeach 1973); (2) social comparison theory (Festinger 1954); (3) cognitive dissonance- or self discrepancy- theory (Festinger 1957, Higgins 1987); (4) cognitive theory of depression and reformulated model of learned helplessness (Beck 1967, Abramson et al. 1978); (5) three-time-dimension theory of depression and QoL (De Leval 1995). Overweight children may be particularly affected by stressful “body ideal” stimuli and so will be the focus of the discussion below.

Value theory (e.g. Rokeach 1973) proposes that people hold general, relatively enduring, value orientations that are general beliefs about desirable goals that transcend specific attitudes and behaviours. Children can internalise “body perfect ideals” emanating from a consumer culture so that they form a personal value system (an integral part of their identity) which guides how they construe themselves, what ideals they pursue and how they respond to future body image stressors (Dittmar 1992). Some children internalise this ideal more strongly than others, and thus endorse ideal-body value systems to different degrees. Whether or not children are vulnerable to detrimental consumer culture effects depends on whether they have internalised ideal-body values as their personal goals.

If overweight children value this “bodily ideal” as their personal goal (Collins 1996, Trampe et al. 2007), they may negatively appraise their body image and feel bad about themselves during social comparison with idealised images, given that even the majority of individuals fall far short of the “perfect body” typically portrayed in the media. According to social comparison theory people have a need to evaluate themselves through comparing themselves to others (Festinger 1954).

The discontent that results from overweight children finding themselves lacking when they compare themselves with idealised body images, particularly if they endorse body ideals, can be understood by applying cognitive dissonance- (Festinger 1957) or self discrepancy- (Higgins 1987) theory. These theories postulate that psychological discomfort can occur when individuals experience discrepancies (gaps or contradictions) between thoughts and behaviours, but in this case, between how they...
see themselves (actual body image) and how they would ideally like to be (ideal body image). Thus, for those overweight who have internalised cultural body ideals, exposure to idealised images could make salient actual-ideal identity deficits during primary appraisal.

Ongoing negative appraisals of the self (the world and the future) such as body image concerns can cause and maintain depression in children according to Beck’s (1967) cognitive theory of depression. Moreover, if overweight children perceive their body shape and size to be uncontrollable due to internal, stable and global causes (i.e. distorted causal attributions), this may lead to intense, enduring and generalised depression (see Abramson and colleague’s (1978) reformulated model of learned helplessness).

The effect that depression has on the HRQoL of overweight children with body image concerns can be understood from De Leval’s (1995) “three-time-dimension” theory of depression and QoL, which postulates that depression and QoL are part of a continuum in time rather than independent of each other. The perception of the gap between these children’s healthy past and present ill-being (i.e. depressive symptoms have increased) may affect their HRQoL, if there is a significant difference between their future aspirations for HRQoL and their present standards and values in life (i.e. HRQoL is poorer than expected).

However, not all overweight children will experience this discontent. Cognitive dissonance theory (Festinger 1957) also proposes that humans are to a large extent motivated by efforts to minimise cognitive dissonance. After social comparison and primary appraisal of the discrepancy between actual and ideal body image, overweight children evaluate (i.e. secondary appraisal) what cognitive and behavioural coping options could be used to reduce their cognitive dissonance and optimise HRQoL.

There are a number of modes of dissonance reduction (i.e. appearance fixing, avoidance and positive rational acceptance). One method may be for children to engage in appearance fixing through consumption and weight loss behaviours. Symbolic self-completion theory (Wicklund & Gollwitzer 1982) proposes that children may use material symbols (e.g. buying an attractive outfit) in order to compensate for perceived shortcomings in their identity (Braun & Wicklund 1989). Alternatively, children may pursue a diet or exercise regime to achieve their ideal shape and size. Overweight children may also practice providing themselves with distractions and justifications to ensure that the mental discomfort of being overweight becomes reduced. For example, attitude change is a method of dissonance reduction (Festinger
1957), and overweight children may modify their attitude regarding the importance of conforming to society’s “thin ideal”, thus reducing the discomfort experienced from their awareness of their overweight state and inability to lose weight (Cooper 2007).

2.2.3 Health-related quality of life - response shift

The conceptual framework of this study also adheres to the idea that there is an ongoing transaction between a child’s HRQoL and changing circumstances. Person factors, processes and contexts are in constant interaction with each other and can either increase or decrease the likelihood of a health problem developing and impairing HRQoL. Children confronted with health risks are faced with the struggle to reduce their symptoms, or depending on the severity of the problem, to adapt to their condition. As children attempt to reduce their symptoms, they may re-evaluate their HRQoL to reflect their poor well-being. If children adapt to their condition, they may alter or shift their evaluation of their HRQoL. The process of adapting HRQoL is usefully explained by Schwartz and Sprangers’ (1999) Response Shift theory.

The HRQoL response shift for children involves a complex interaction of: (a) some change in their health status of which they become aware (e.g. obesity); (b) processes or behaviours they engage in to accommodate the changes in their health status (e.g. seeking out social support); (c) their stable or dispositional biological factors (e.g. gender, personality); (d) psychological factors encompassing cognitive and affective mechanisms to accommodate the changes in health status (e.g. reordering goals, coping); and (e) the psychological factor of adaptation, where adaptation involves a re-evaluation of the meaning of the child’s own HRQoL as a result of changes in their internal standards, values and conceptualisation of HRQoL. In accordance with the response shift theory, this framework assumes that there is a dynamic feedback loop aimed at maintaining or improving the perception of HRQoL, which involves the child reinitiating established or new behaviours and psychological mechanisms until their HRQoL reaches more optimal levels (see Figure 2.5). The ease with which a child adapts may reflect how resilient they are (Schwartz & Sprangers 1999).
Response shift integrates other theories such as Festinger’s (1957) theory of cognitive dissonance and Lazarus and Folkman’s (1984) stress management model. Response shift helps explain how patients with a disability or even a life-threatening disease are found to report a stable HRQoL comparable to healthy people (Andrykowski & Hunt 1993, Bach & Tilton 1994). The discrepancy between clinical measures and patient evaluations of their own health indicates how patients may have already lowered their standards of what they consider a good QoL or changed their values of what they now consider important in life. There is mounting evidence for response shifts in QoL evaluations (see Rapkin & Schwartz 2004 for a review, Ring et al. 2005, Gillison et al. 2008) and some authors have also usefully described how this might be operationalised (i.e. by measuring the appraisal process) (Rapkin & Schwartz 2004).

2.2.4 Promotion of health-related quality of life

Another aspect of the conceptual framework described here, proposes that appropriate changes in the social environment may improve children’s HRQoL. Children’s health can be improved by appropriately targeting personal and interpersonal factors (microsystem), organisations and institutions (mesosystem), communities (exosystem), policy and wider social contextual factors (macrosystem) that pose a risk and that protect children from health risks (McLeroy et al. 1988).

Psychological person factors that negatively affect children’s health are modifiable and responsive to interventions. For example, cognitive appraisals (i.e. knowledge, attitude and beliefs) about health behaviours, illness and treatment could be targeted at an individual or group level to reduce risky health behaviours and stigma, and to encourage uptake of effective treatments. In addition, children’s motivation to participate in healthy behaviours could be targeted by promoting intrinsic or extrinsic
rewards. However, affective responses may need to be targeted before attempts are made to modify cognitive appraisals and behaviours. Developmental and physical person factors can affect children's health, but these characteristics are much less open to change. Instead, interventions should take into account the effect of subgroup characteristics (e.g. preadolescents and females) on children's health and provide additional supports to these subgroups. Health interventions should also strive to include those individuals and settings that have the strongest influence over children's health behaviours and access to healthcare (e.g. parents and schools). Changes to the community's infrastructure (e.g. cycle lanes to promote physical activity and bus routes to access healthcare) may also improve the health of children (Ferrans et al. 2005).

Figure 2.6 below presents the overall conceptual framework within which the current study is located.

![Overall conceptual framework of health-related quality of life in children](image)

**Fig. 2.6: Overall conceptual framework of health-related quality of life in children (developed for this study)**

### 2.3 Conclusion

In conclusion, this chapter outlined the historical context of HRQoL and established a need for a framework, conceptual or otherwise, for children's HRQoL. The conceptual framework for the study of HRQoL in children was presented. Chapter Three provides a review of the literature on the nature and extent of the relationship between young people's HRQoL and their depression, obesity and their parents' mental ill-health. The main terms from the conceptual framework that it draws on are risk factors, mediators and moderators, where 'risk factors' refer to factors that are likely to impact negatively on HRQoL, 'mediators' are mechanisms by which a risk factor indirectly affects HRQoL, and 'moderators' are factors that reduce or intensify the effect of a risk on HRQoL.
CHAPTER THREE

Literature review: predictors of health-related quality of life in young people

3.1 Introduction

This chapter provides a critical review and synthesis of the research conducted, to date, on the relationships between young people's HRQoL and the constructs that are the focus of this study (i.e. depression, obesity and parental mental ill-health). The review first looks at a quantitative meta-analytic review and a range of clinical and general population studies of the direct effect of each factor on young people's HRQoL; this includes a discussion of the mechanisms (i.e. mediators) by which these risk factors have their effect. A review of the factors that reduce or intensify the effect (i.e. moderators) of each risk factor on young people's HRQoL is then presented, with a specific focus on key individual and family characteristics (i.e. age and gender of the child and parent's social support).

It is interesting to note at the outset, that the bulk of research in this area has focused on the effect of specific illnesses on young people's HRQoL (Varni et al. 2005). In particular, there have been numerous studies of the effects of obesity. However, only a few studies have examined the effect of depression or parental mental health on young people's HRQoL. Furthermore, very few studies have investigated the factors that reduce or intensify the negative effects of these on young people's HRQoL, and there have been none investigating the mechanisms by which these risks have their effect. Where no research has been carried out, the review relies on indirect evidence mainly from the child development literature.

3.2 Literature search methods

A description of the search methods used to review the literature for this chapter are presented below including the inclusion and exclusion criteria for selecting studies, the search strategies, and the synthesis of information.

3.2.1 Selection of studies

Papers were included if they investigated the following:

1. HRQoL in young people (<18 years) in reference to depression, obesity, and parent mental health. Where studies of HRQoL in reference to these risk factors were not found or were limited, the following terms were searched for: child mood disorder, psychiatric disorder, psychopathology, and then mental health status; child weight status, body mass index and body fat; parent mental health or psychiatric disorder, psychopathology, mood disorder, depression, anxiety and
mental health status. Where studies of HRQoL in reference to these predictors were not found or were limited, studies assessing QoL in a health context were included;

(2) HRQoL in young people in reference to child age, gender and body image perception, parenting self-efficacy, parent social support, and family structure. To explain the interaction between all factors in (1) and (2), papers from the child development literature were also included.

(3) HRQoL in young people from clinical and general populations;
(4) HRQoL in young people from cross-sectional and longitudinal studies;
(5) HRQoL as self-reported by young people, but if limited studies were available, then studies assessing young people's HRQoL via parent proxy-reports and practitioner-reports were included;
(6) HRQoL of young people using generic measures, but if limited studies were available then studies assessing HRQoL in young people using condition/disease specific measures were included.

Non-English papers, narrative reviews, expert opinions, editorials, letters to the editor, theses or abstracts alone were excluded, as were the following studies: studies reporting relationships with HRQoL in people over 18 years and condition-specific HRQoL studies that did not investigate as their main condition, either child depression, child obesity or parent mental health disorders.

3.2.2 Search strategies
An exhaustive list of search statements was used combining concepts referenced above. Searches were made in a number of electronic databases including: Medline (via OVID), CINAHL (via Ebsco-Host), Cochrane Library, EMBASE, PsyclNFO, PubMed and Science Direct. The following journals were also searched: Quality of Life Research, International Journal of Obesity and the Pediatric Obesity journal. World Wide Web search engines Google and Google Scholar were also utilised in the search. 'Saturation point' was reached after searching Google Scholar and only one new article was located from searches of the other databases. All searches involved identifying papers published before 2013.

3.2.3 Synthesis
The research was synthesised and a summary and critique of the literature was provided. The inclusion criteria were broad given the regular misuse of the concept HRQoL, the wide range of HRQoL measures used in studies, the use of instruments that wrongly claim to measure HRQoL (e.g. Short-form 36, Children's Health
Questionnaire, see Michalos 2004), and the lack of research on some relevant topics (e.g. the effect of depression on young people's HRQoL, and indirect and interaction effects of the relationships that are the focus of this study). The descriptive analysis of studies investigating the risks to young people's HRQoL involved: grouping studies according to clinical and general population samples; providing key features such as the author, year, study design, sample size, HRQoL tool, informants, and main findings; and providing a critical summary of the limitations of the studies selected. A total of 67 studies were identified: 9 relating to depression; 30 on obesity; 3 on body image concerns; 9 on parental mental-ill health; 1 on parenting self-efficacy; 4 on parent social support and family structure; 5 on age; and 6 on gender. The earliest study reported here was conducted in 1996, while the most recent was published in 2012.

3.3 The risks to health-related quality of life of young people
The section presents a critical review and synthesis of the research conducted, to date, on the direct effect of depression, obesity (i.e. intrapersonal factors) and exposure to parental mental health problems (i.e. interpersonal factor) on young people's HRQoL. This includes a discussion of the mechanisms by which each of these risk factors is hypothesised to have their effect.

3.3.1 The risk of childhood depression
Depression can have a range of adverse effects on young people including medical (e.g. loss of sleep, change in appetite and weight, and impaired general health), cognitive (e.g. poor concentration and impaired academic performance) and psychosocial (e.g. loss of optimism, problems with interpersonal relationships, suicidal thoughts or acts) (Nolen-Hoeksema et al. 1992, Lewinsohn et al. 1994, Hankin et al. 2001, Angst et al. 2002, Brent & Weersing 2008). HRQoL may also be affected (Bastiaansen 2005, Stevanovic 2012). A critical review of the clinical and general population studies conducted in this area, to date, is provided below.

3.3.1.1 Clinical and general population studies
As already indicated, there is a scarcity of clinical population studies investigating the relationship between depression and HRQoL in young people, but three were identified during the review that assessed the effect of mood disorders and internalising I symptoms (i.e. withdrawn and anxious/depressed behaviours and somatic complaints) more generally. The first of these was based on a cross-sectional design and a sample of young people aged 6-18 years (N = 310) who were referred to psychiatric outpatient care (Bastiaansen et al. 2004). The results showed that participants with mood
disorders obtained significantly lower scores on the emotional well-being dimension of HRQoL than those without any disorder. A self-report generic HRQoL measure called the PedsQL was used. Notably, those children categorised as having no disorder had been referred to mental health services, but had not received any formal (DSM-IV) diagnosis. Thus, they were perhaps not the most suitable control group. The association between internalising symptoms and self-report HRQoL in young people diagnosed with any psychiatric disorder was also investigated by some of the same authors (Bastiaansen et al. 2005), and they reported that internalising symptoms negatively correlated (either weakly or moderately) with total HRQoL as well as physical and emotional well-being. The strongest relationship was with emotional well-being.

Two additional cross-sectional clinical population studies investigating the effect of mental health disorders on the HRQoL of children (6 to 12 years, N = 139) and adolescents (12 to 18 years, N = 540) respectively, and using self-report generic HRQoL measures, support the above finding that mood disorders negatively affect the emotional well-being aspects of HRQoL in particular (Clark & Kirisci 1996, White-Koning et al. 2011). Children with mood disorders reported significantly lower HRQoL on all dimensions than their counterparts without a mood disorder (White-Koning et al. 2011). Adolescents with mood disorders also reported significantly lower psychological well-being and school performance than those without a mood disorder (Clark & Kirisci 1996). However, none of the three clinical studies explored depression specifically within their samples, or indeed, how the spectrum of depressive symptoms across a sample of young people - with and without a formal psychiatric diagnosis - related to HRQoL.

There is also a dearth of general population studies investigating the relationship between youth depression and HRQoL and only one cross-sectional study based on a medium sized sample of young people (aged 8-18 years) was identified (Stevanovic 2012). The author found that depressive symptoms had a strong negative correlation with total HRQoL both before and after controlling for other co-morbidities. However, this study did not explore the relationship between depressive symptoms and the different dimensions of HRQoL. Four general population studies were identified that investigated the effect of young people's mental health status more generally on HRQoL. These revealed that mental health status is positively associated with or predicted some, if not all, dimensions of HRQoL (see Table 3.1 below). Effect sizes were moderate to large and associations were weak to moderate.
<table>
<thead>
<tr>
<th>Author</th>
<th>N</th>
<th>Age</th>
<th>Design</th>
<th>Independent variable</th>
<th>HRQoL measure</th>
<th>Findings</th>
<th>Strengths and limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Stevanovic (2012)</td>
<td>237</td>
<td>8-18</td>
<td>Cross-sectional</td>
<td>depressive symptoms</td>
<td>Generic PedsQL</td>
<td>strong negative correlation with total HRQoL</td>
<td>Controlled for other co-morbidities. Did not explore different dimensions of HRQoL.</td>
</tr>
<tr>
<td>2. Sawyer, Whaites, Rey, Hazell, Graetz &amp; Baghurst (2002)</td>
<td>3597</td>
<td>6-17</td>
<td>Cross-sectional</td>
<td>with and without psychiatric disorders</td>
<td>Children’s Health Questionnaire (CHQ)</td>
<td>large differences between physical and emotional functioning</td>
<td>Large sample size - Used parent proxy report and instrument believed to measure health status not HRQoL (see Michalos, 2004)</td>
</tr>
<tr>
<td>3. Sawatzky, Ratner, Johnson, Kopec &amp; Zumbo (2010)</td>
<td>8225</td>
<td>11-18</td>
<td>Cross-sectional</td>
<td>mental health status</td>
<td>Multidimensional Students Life Satisfaction Scale (MSLSS)</td>
<td>weak to moderate negative correlation with all HRQoL dimensions (i.e. family, school, self, and friends)</td>
<td>Large sample size - Instrument measured life satisfaction not HRQoL</td>
</tr>
<tr>
<td>4. Ravens-Sieberer, Erhart, Wille, Bullinger &amp; the BELLA study group (2008)</td>
<td>2863</td>
<td>7-17</td>
<td>Cross-sectional</td>
<td>with and without mental health problems</td>
<td>Generic KINDL-R</td>
<td>moderate to large differences on all dimensions, but particularly school performance</td>
<td>Large sample size -</td>
</tr>
<tr>
<td>5. Rajmil, Palacio-Vieira, Herdman, Lopez-Aguila, Villalonga-Olives, Valderas, et al., (2009a)</td>
<td>454</td>
<td>8-18</td>
<td>Longitudinal</td>
<td>mental health status of those who deteriorated, stabilised and improved over time</td>
<td>Generic Kidscreen-52</td>
<td>mental health that deteriorated predicted the most severe deterioration in half of the HRQoL dimensions, but particularly psychological well-being</td>
<td>Longitudinal and controlled for baseline HRQoL and socio demographic characteristic -</td>
</tr>
</tbody>
</table>
In summary, the collective findings suggest that depressive symptoms are strongly inversely related to the total HRQoL of young people in the general population. Hence, the risk to HRQoL increases as depressive symptoms increase and not only when within the clinical range. The risk to HRQoL is also greater for those young people with clinical mood disorders whilst mental health symptoms more generally have a weak to strong inverse effect on the HRQoL of young people from the general population, although psychological well-being is the dimension most affected. A need for further research in this area is indicated, both within general and clinical populations.

3.3.1.2 Mediators

Perhaps unsurprisingly, given the general lack of research in this area, there has been little theoretical attention or research undertaken to examine the causal relationship between depression and HRQoL. Of the available research, depressive and mental health symptoms in young people have been found consistently to have a moderate to severe effect on their HRQoL (Ravens-Sieberer et al. 2008, Stevanovic 2012). These findings suggest that the mediators or mechanisms by which depression impacts upon HRQoL in children may not exist, but that a direct relationship may instead occur. There has been some attempt to investigate the direction of causality and to explain the relationship between depression and global QoL. Poor QoL is sometimes seen as a consequence of depression and other times as a precursor to depression (Calman 1984, Frisch 2000), but studies, to date, have been inconclusive.

The moderately strong effect of depression on HRQoL and vice versa, may be explained by the following: a sad affect has the propensity to foster negative, pessimistic, ruminative thought processes about self and environment (Teasdale & Fogarty 1979, Clark & Teasdale 1982, Isen 1984), which may directly affect every facet of HRQoL, which in turn may fuel further depressed ruminative thoughts. De Leval (1995) proposes a "three-time-dimension" theory of depression and global QoL which postulates that depression and QoL may be seen as part of a continuum in time rather than independent of each other. A child’s perception of the gap between their healthy past and present ill-being may affect their QoL, depending on the difference between the child’s future aspirations for QoL and their present standards and values in life. Hence, the negative effect of depression on QoL may reflect an awareness in the child that their level of sadness has increased and the pleasure that they experience in activities has reduced when compared to the past, and that nearly all aspects of their QoL are poorer than what was expected. De Leval’s theory suggests that an individual must be aware of their depression in order for it to have an effect on QoL, which is consistent with theories of HRQoL (Ferrans et al. 2005).
Another explanation for the close relationship between depression and HRQoL could be that depression is a component of the HRQoL construct as it is measured. For example, it has been argued that the items on the emotional subscale of the PedsQL overlap with symptoms of depression (Coghill et al. 2009). Others point out that assessments of depression measure depressive symptoms and how they interfere with functioning, while the concept of HRQoL does not encompass psychiatric symptoms, but instead, addresses the individual’s awareness and experience of having the symptoms and how these might differ from what the individual expected for their HRQoL (e.g. Bastiaansen et al. 2005). This again, reflects the lack of agreement around aspects of the construct as outlined earlier in Chapter Two. See Figure 3.1 below for a summary model of the relationship between depressive symptoms and HRQoL.

Fig. 3.1: Relationship between depressive symptoms and HRQoL in children

3.3.2 The risk of childhood obesity
Childhood obesity can have adverse psychosocial consequences (e.g. poor self-esteem and body dissatisfaction) as well as many negative effects on physical health (e.g. cardiovascular, pulmonary and musculoskeletal problems) (Dietz 1998, Wabitsch 2000, Russell-Mayhew et al. 2012). Poor HRQoL may also be a consequence of obesity in young people. Many clinical and general population studies have investigated the association between obesity and HRQoL in young people (see Tsiros et al. 2009), and an overview of the findings from a quantitative (meta-analytic) review in 2009 and of studies conducted since then, is provided below.

3.3.2.1 Clinical and general population studies
A meta-analysis of studies investigating the HRQoL of overweight and obese children and adolescents before March 2008, identified 28 studies dating back to 2001, the majority of which were cross-sectional (N = 22), involved clinical populations (N = 22) and used the generic HRQoL instrument called the PedsQL (N = 15) (Tsiros et al. 2009). The results of this meta-analysis revealed that young people’s HRQoL is
significantly lower amongst those who were obese than those of normal weight, with moderate to strong effect sizes identified. The risk to HRQoL increases as BMI scores increase and is not just limited to BMI scores in the obese range. Similarly, BMI has a moderate to strong inverse relationship with young people's HRQoL with larger effects for children within clinical settings. While many HRQoL dimensions are affected, physical well-being and social relations appear to be particularly impacted by excess body fat. Psychological well-being can also be as impaired as physical well-being for adolescents when the former dimension consists of physical well-being-related constructs like body esteem and physical appearance (Fallon et al. 2005, Kolotkin et al. 2006). Two general population studies conducted since this meta-analysis support these findings, albeit with smaller effect sizes with regard to the direct effect of obesity or BMI on HRQoL (Haraldstad et al. 2011b, Ottova et al. 2012). Although there is limited longitudinal research in this area, elevated BMI is believed to cause lower HRQoL rather than vice versa (Doll et al. 2000, Swallen et al. 2005).

3.3.2.2 Mediators

Interestingly, HRQoL is found to be impaired in some overweight and obese children but not others (Tsiros et al. 2009), and, consequently, the attention of some theorists has turned to the possible mediators or mechanisms by which obesity can affect young people's HRQoL. Although there has been no research conducted, to date, to investigate the mechanisms through which obesity has its effect on HRQoL, based on indirect evidence it has been proposed that body image concern and weight-related teasing are the mechanisms by which obesity may exert its influence on young people's HRQoL (see Russell-Mayhew et al. 2012). The same authors have also postulated that body dissatisfaction, depression, eating disorder behaviours and self esteem are the mechanisms by which young people's experiences of body image concern and weight-related teasing may impact upon HRQoL. The following section focuses on body image concern and depression as possible mediators because body image concern has reached unprecedented levels in young people (Atkiins & Silber 1993, O'Dea & Caputi 2001, Ricciardelli & McCabe 2001, Davison et al. 2003, O'Connell 2012) and it represents a mediator from the first tier of the proposed theory. Childhood depression is a source of considerable concern, is a construct of particular focus in this study, and it represents a mediator from the second tier of the proposed theory.

Body image concern refers broadly to an individual's negative attitudes and feelings of concern towards their body size and shape (Uys & Wassenaar 1996). There is indirect evidence in the literature to suggest that body image concern may mediate the
association between obesity and youth HRQoL. Research shows that body image concern is common in young people who are overweight and obese (Wardle & Cooke 2005, Jansen et al. 2008), although not all overweight and obese children are aware of, or are concerned about, their condition (Daniels 2005, Edwards et al. 2010). Increasing body image concern has been found to be associated with lower HRQoL (Haraldstad et al. 2011b) whilst body image perception has been found to be a better indicator of HRQoL than BMI (Kurth & Ellert 2008, Haraldstad et al. 2011b, Edwards et al. 2012b).

Obesity may affect HRQoL through an individual's awareness that there is a discrepancy between their perceived and ideal body image. More specifically, socio-cultural pressures to be thin may be unconsciously internalised by young people as 'thin-ideals'. Those who are obese may appraise their feelings and attitudes about their body shape and size thereby bringing their condition into their conscious awareness (Puhl et al. 2007, Schaad 2012). HRQoL research and theory indicate that an individual must be aware of their condition in order for it to affect their HRQoL (Cummins 2005, Ferrans et al. 2005). In turn, those who are obese may identify a discrepancy between their perceived and ideal body image and that they have failed to conform to the thin ideal, which may lead to concerns about their body image (Adams et al. 1993, Stice & Bearman 2001). Deviation from this socially constructed thin ideal is associated with weight-related stigma and may lead to weight-related teasing or discrimination by peers and family members (Neziroglu et al. 2008), which could further provoke negative appraisals of body image (Wardle & Cooke 2005). Whilst body image concern may directly affect young people's HRQoL, more severe and persistent concerns may lead to body dissatisfaction, depression, eating disorder behaviours and/or low self esteem (see Russell-Mayhew et al. 2012), which would serve to compound the already low levels of HRQoL in this vulnerable sub-group.

There is further indirect evidence in the literature to suggest that depression may be one mechanism by which the body image concerns of obese youth affect their HRQoL. Firstly, depression is not as common in young obese people as body image concern, such that the association between BMI and depression is modest at best and sometimes negligible (Wardle & Cooke 2005). However, body image concerns, known to be common in overweight youth, are positively associated with depression (Paxton et al. 2006). In fact, there is some evidence to suggest that body image concern mediates the relationship between childhood obesity and depression (Erickson et al. 2000, Chaiton et al. 2009). See Figure 3.2 below for a summary of the relationship between overweight/obesity and HRQoL in children.
Fig. 3.2: Relationship between overweight/obesity and HRQoL in children

3.3.3 The risk of parental mental ill-health

Poor parental mental health can have numerous adverse consequences for children from infancy to adulthood including low self-esteem, internalising and externalising problems, mood disorders, disrupted academic functioning and an increased risk of injuries (e.g. Goodman & Gotlib 2002, Ensminger et al. 2003, Hammen & Brennan 2003, Cummings et al. 2005, Schwebel & Brezausek 2008, Van Der Bruggen et al. 2008, Ramchandani & Psychogiou 2009). Children's HRQoL may also be affected by their parent's mental health conditions, (Wiegand-Grefe et al. 2012). A critical review of the clinical and general population studies conducted, to date, in this area is provided below.

3.3.3.1 Clinical and general population studies

There are a limited number of clinical population studies investigating the relationship between parent's mental ill-health and their children’s HRQoL. In one cross-sectional clinical population study investigating the impact of psychiatric disorders in a group of parents on the HRQoL of their children (4-18 years, N = 86), Wiegand-Grefe and colleagues (2012) found that the children scored significantly below the general population average on total HRQoL. Earlier associated studies have shown that the dimensions of children's HRQoL that were particularly affected by their parent's psychiatric disorders were emotional well-being, family relations and school performance dimensions (Jeske et al. 2010, Wiegand-Grefe et al. 2010). The authors found only weak negative associations between the level of parental depression and children's total HRQoL as well as the dimensions of psychological well-being, family relations, and school performance. The level of parental anxiety was not, however,
correlated with the HRQoL in children. Notably, this study assessed HRQoL through parent proxy reports as opposed to self reports.

Additional research investigating the relationship between parental mental health status and HRQoL in children with illnesses, supports the above findings. For example, in a cross-sectional study of young people with a chronic illness (7 to 20 years, N = 69) and their parents, Goldbeck and Melches (2005) found a moderate positive correlation between parental emotional stability and the self-reported HRQoL in children, albeit on the psychological well-being dimension only. In a longitudinal clinical population study of young people (0 to 17 years, N = 26) with a chronic illness and their parents, Barrera and colleagues (2000) reported moderate to strong correlations between child HRQoL and parental depression and anxiety, but only with regard to the HRQoL dimensions of emotional distress and physical discomfort. This study relied on parental reports of their children’s HRQoL. However, both studies are based on only very small samples and used disease-specific HRQoL measures (i.e. the LQ-KID and Paediatric Oncology Quality of Life Scale (POQOLS)) which make the generalisability of results difficult. In another longitudinal clinical population study of young people (8 to 18 years, N = 252) with psychiatric disorders, Bastiaansen and colleagues (2005) found weak negative correlations between maternal psychopathology and children’s HRQoL, but when controlling for children’s psychopathology and gender, the two were no longer associated. To add to this, this study found the initial relationships to be significant for practitioner-reported HRQoL in children only, but not parent or self-reports. Neither of the latter studies tested if parental mental health predicted children’s future HRQoL. These findings highlight the importance of conducting studies over time, assessing self-reported HRQoL, and controlling for chronic health conditions in children.

As above, only a limited number of general population studies have examined the relationship between parental mental ill-health and their children’s HRQoL; only three cross-sectional general population studies were identified from a review of the literature. In the first study (5 to 18 years, N = 5340), Waters et al. (2000) found that poor health status and the presence of any illness in parents were strongly related to low levels of HRQoL on all dimensions in their offspring. This study, however, relied on parent reports of their children’s HRQoL, whilst it also used the CHQ which it has been argued, is a measure of children’s health status rather than HRQoL (Michalos 2004). Furthermore, it did not separate the parent’s physical and mental health problems. In the second cross-sectional study of adolescents (11 to 18 years, N = 1194) and their parents, Giannakopoulos and colleagues (2009) found weak positive correlations between parent mental health status and eight of the ten dimensions of adolescent’s
self-reported HRQoL. These included: financial resources; psychological well-being; physical well-being; moods and emotions; school environment; parent-child relationships; self perceptions; and social support and peer relations. Bullying and autonomy dimensions did not correlate significantly with parent mental health status. The third cross-sectional study of children (6 to 13 years, N = 525) and their parents found no relationship between parent mental health status and child self-reported HRQoL (Mansour et al. 2003).

In summary, this review identified that the risk to children’s HRQoL is small regardless of whether parents are drawn from clinical or general populations. Nonetheless, the risk to children’s HRQoL increases as parent mental health symptoms increase and is not limited to scores within the clinical range. There may be a greater risk to children’s HRQoL from parent depression than anxiety. The specific type of mental illness, however, is not a strong predictor of the type of HRQoL problems in children; psychological and emotional well-being dimensions are consistently affected by parental mental ill-health. These findings are supported by the child development literature as well as research investigating the impact of parent mental health on child functioning. Future research should investigate the specific effect of mental health symptoms on the dimensions of self-reported HRQoL in children and adolescents from both clinical and general populations.

For a number of reasons, parental depression rather than parental mental health more generally, is referred to in the remainder of this chapter. First, depression reflects the burden of mental illness in parents. Second, most of the research on the impact of parent’s health on children’s health outcomes has focused on the impact of parent depression. Third, evidence from the child development literature suggests that the type of parental mental health problem is not a strong predictor of the type of problems that manifest themselves in children (Smith 2004). Hence, the effect of parent depressive symptoms on children’s health may also represent the relationship between parental mental health more generally and children’s HRQoL.

3.3.3.2 Mediators
It is noteworthy that parent depression does not inevitably lead to poor outcomes in children: many children do not suffer any adverse effects to their HRQoL (Wiegand-Grefe et al. 2012) or indeed, to other aspects of their health (e.g. psychopathology) (Rutter & Quinton 1984), instead they continue to thrive and experience positive developments. There are many factors that protect children from and compensate for parental depression (Smith 2004). However, this review has established that there is
an increased risk to the HRQoL of children whose parents have depression. Whilst there has been no research conducted, to date, to investigate the mechanisms by which parental depression can affect children's HRQoL, a large body of indirect evidence from the child development literature suggests that it has its effect through the following: genetic transmission; the complex interaction between genetic predispositions in the child and environmental influences; the experience of marital conflict; direct exposure to a parent's depressive symptoms; and disruptions to parenting (see Smith 2004). However, it appears that the quality of parenting may be what mostly mediates the effect (Fergusson et al. 1995, Davies & Windle 1997).

Parenting self-efficacy is a potentially important cognitive construct that has only been established in the last two decades (Ardelt & Eccles 2001) and relates to both parenting competence and parental depression, but research into its function as a mediator of the effect of parental depression on children is only just emerging (see Jones & Prinz 2005). Therefore, the following section focuses on beliefs of parenting inefficacy as a possible mechanism by which parent depression can affect children's HRQoL. Finally, to bring this review full circle, this section will also consider the impact beliefs of parenting inefficacy might have on the development of depression and obesity in children.

Parenting self-efficacy refers to a parent's belief and confidence in his or her parenting role and their ability to positively influence the behaviour and development of their children (Coleman & Karraker 2000). There is indirect evidence in the literature to suggest that parenting self-efficacy may mediate the association between parental depression and children's HRQoL. Research shows that parents with depression are more likely to report feeling less efficacious in their parenting role (e.g. Teti et al. 1990, Teti & Gelfand 1991, Fox & Gelfand 1994), although research is limited in this respect (see Jones & Prinz 2005). The limited research that has been conducted in this area, has shown that parenting self-efficacy during infancy was not associated with adolescent's HRQoL, although parenting satisfaction did appear to be important (Wilkins et al. 2004). It is worth noting there that, again, this study used a measure of health status rather than HRQoL and this may have unduly influenced the results.

It is likely that parenting self-efficacy is a mechanism by which parental depression affects children's HRQoL mainly for reasons relating to the quality of parenting provided (Coleman & Karraker 2000, Coleman et al. 2002). First of all, several characteristics of a parent's depressive state can explain beliefs of parenting inefficacy including; impaired or sad affect which has the propensity to foster negative, pessimistic, ruminative thought processes about self and environment (Teasdale &
Fogarty 1979, Clark & Teasdale 1982, Isen 1984); depressed mood which may also selectively activate memories of failure experiences (Bower et al. 1981); and a history of depression for parents which may have created a history of problematic care-giving with the child. In turn, parenting self-efficacy is closely linked to the behavioural competence of parents with their children. Parents who perceive themselves as efficacious in the parenting role are more likely to engage in positive parenting strategies and to persist in establishing harmonious relationships with their children, flexibly using whatever external and internal resources are available to them (Bugental et al. 1984, Furstenberg et al. 1993, Gross et al. 1995, MacPhee et al. 1996). By contrast, the self-doubts of parents who feel ineffective may lead to parental negativity (e.g. impatience, rigidity, withdrawal, emotionally unavailable, unresponsive and negative attribution style) and less effective parenting practices and strategies (e.g. negative competency-based feedback and harsh or physical punishment of children's behaviour) (Radke-Yarrow & Kuczynski 1983, Gotlib & Hooley 1988, Teti & Gelfand 1991). Children of parents with low levels of parenting self-efficacy are also at a greater risk of a range of developmental problems across cognitive, language, motor, behavioural, and social-emotional domains (e.g. Johnston & Mash 1989, Halpern et al. 1994, Coleman & Karraker 2000, Ardelt & Eccles 2001, Coleman et al. 2002, Coleman & Karraker 2003, McKeown et al. 2003, Tough et al. 2010) and, in turn, may be at a greater risk of poor HRQoL.

There is further indirect evidence in the literature to suggest that children's depression may be a mechanism by which the parenting self-efficacy beliefs of depressed parents impacts children's HRQoL. As indicated in Chapter One, children whose parents are depressed are at a greater risk of depression themselves (e.g. Smith 2004). In addition, research also indicates that children of parents with low levels of parenting self-efficacy are at a greater risk of depression (see Côté et al. 2009). Parenting self-efficacy in depressed parents may also affect their children's HRQoL through the children's experience of depression for reasons relating to the parent's difficulty in displaying warmth and responsivity and employing effective parenting practices as highlighted in the previous section (Du Rocher Schudlich & Cummings 2007, Elgar et al. 2007). More specifically, depressed parents with depressed children engage in parenting styles that tend to be characterised by low nurturance (i.e. cold and unavailable) and high overprotection (i.e. controlling and intrusive) (see Betts et al. 2009). Depressed parents may be less likely to listen to, provide support for, or empower their children to access help. The negative messages emanating from parental negativity and dysfunctional parenting practices may also be internalised or modelled by children (Bondy & Mash 1999) whilst negative self-cognitions (i.e. negative automatic thoughts, cognitive errors

Furthermore, there is indirect evidence in the literature to suggest that obesity in children may be a mechanism by which the parenting self-efficacy beliefs of depressed parents might affect children’s HRQoL. Mentioned earlier in Chapter One was the finding in the literature that children whose parents are depressed are at a greater risk of obesity (e.g. Epstein et al. 1994, Favaro & Santonastaso 1995, Epstein et al. 1996, Zipper et al. 2001, Zeller et al. 2007, Campbell et al. 2010), although this is not always the case (e.g. Gibson et al., 2007). Moreover, research also indicates that children of parents with low levels of parenting self-efficacy are at a greater risk of obesity (Campbell et al. 2010). In addition, depression and beliefs of parenting inefficacy in parents of obese children independently evoke high levels of parenting stress (Moens et al. 2009), and parenting stress has been found to enhance the risk of obesity to children’s HRQoL (Janicke et al. 2007, Guilfoyle et al. 2010). Parenting self-efficacy in depressed parents may also affect their children’s HRQoL through the children’s experience of obesity for reasons explained previously and because depressed parents with overweight children are more likely to engage in a dismissive parenting style that is low on ‘demandingness’ but high on responsiveness (Topham et al. 2010), such that few household rules are set and few responsibilities are assigned to children (Baumrind 1966). With this parenting style, parents are less likely to monitor or guide children’s healthy food choices and exercise than those with authoritative parenting styles (Sleddens et al. 2012). In addition, this parenting style can undermine children’s self-regulation (Baumrind 1989, Cummings et al. 2000) and may leave children with few internal resources to help them regulate their emotions and their own patterns of dietary intake. See Figure 3.3 below for a summary of the relationship between parental mental-ill health and children’s HRQoL.

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**Fig. 3.3: Relationship between parental mental-ill health and children’s HRQoL**
3.4 Moderators of the risks to the health-related quality of life of young people

From a review of the literature, few studies have investigated the specific conditions that moderate (i.e. reduce or intensify) the negative effect of young people's depression, obesity and exposure to parental mental health problems on their HRQoL. Only the moderator effects of age and gender in the relationship between obesity and HRQoL have been investigated. There are indications from the child development and the HRQoL literature, however, that the age and gender of the child (i.e. intrapersonal factors) as well as the parent's level of social support (i.e. an interpersonal factor) may moderate the negative effects of these risks on young people's HRQoL. Social support is often conceptualised according to the kind of support that is available such as emotional support, assistance with a problem, the provision of goods and services, and having people who provide advice (Pierce et al. 1996, Demaray & Malecki 2002, Laakso & Paunonen-Ilmonen 2002).

As previously mentioned, a moderator can be a risk, compensatory, vulnerability or protective factor. The age and gender of the child are regarded as vulnerability factors; that is, when exposed to a stressor, children of a certain age or gender will be more vulnerable to poorer health outcomes. A parent's level of social support is considered a protective factor; thus, when exposed to a stressor, access for parents to strong social support may buffer any potentially negative effect on children's health outcomes. Each of these variables is discussed, in turn, below.

3.4.1 Parent social support

Existing evidence suggests that strong social support for parents may diminish the risk to young people's HRQoL posed by their own depression, obesity and their parent's depression. Children whose parents have strong social support when compared to those who have no such support, have been found to be less likely to have poor HRQoL (Bastiaansen et al. 2005), depression (Kotchick et al. 1997, Feldman et al. 2004, Koverola et al. 2005), to be obese (Gerald et al. 1994, Watt et al. 2012) or to be exposed to parental depression (see Cairney et al. 2003). However, in terms of childhood obesity, research is not consistent (Koch et al. 2008). Furthermore, when parents are depressed, a range of studies show that children's cognitive and behavioural development is less at risk when parents have strong social support than when little or no such support is available (e.g. Melson et al. 1993, Lee et al. 2006, Tough et al. 2010).
Family structure is a crude indicator of social support and refers to the composition of a child's family (Meltzer et al. 2003). A review of the literature found that when compared to other family structures, children from a two-parent family are less likely to have poor HRQoL (Bradley & Corwyn 2004, Swallen et al. 2005, Kvarme et al. 2009), depression (McLanahan & Bumpass 1988, O'Connor et al. 2001, Cuffe et al. 2005, Bramlett & Blumberg 2007) or obesity (Strauss & Knight 1999, Gibson et al. 2007, Hesketh et al. 2007) and to be exposed to parental depression (see Cairney et al. 2003). Furthermore, when parents are depressed, children's health outcomes are likely to be less affected when children are from two-parent families (Conrad & Hammen 1993, Goodman et al. 1993, Carlson & Corcoran 2001, Kahn et al. 2004).

When parents have strong social support, their children's HRQoL may be protected from the risks of their own and their parent's depression as well as from their obesity simply because these parents may have a greater opportunity to relieve their stress, parenting or otherwise, and to employ effective parenting strategies than those with lower levels of social support. As previously documented, depressed parents and parents with depressed or obese children are more likely to report parenting stress and to adhere to dysfunctional parenting styles and practices that may have adverse effects on children's health and well-being. However, strong social support networks can provide much needed emotional support to parents in the form of trust, listening and reassurance, all of which may reduce a parent's level of stress (Litton Fox et al. 2000). In addition, strong social support networks can offer money and time to the family, which may help parents with different aspects of parenting and care-giving activities (McLanahan & Teitler 1999, Cummings et al. 2000, Litton Fox et al. 2000) and assist parents with accessing appropriate healthcare, nutrition, education and physical activity amenities for their children. This kind of support may, in turn, help to alleviate parenting stress and reinforce positive parenting strategies (Sameroff & Seifer 1983, Hops et al. 1987, Tannenbaum & Forehand 1994, Mezulis et al. 2004). Finally, strong social support networks provide a space for parents to share and compare parenting beliefs, experiences, practices and competencies with each other, and are an important source of parenting self-efficacy beliefs that allow parents to perform effectively in their child-rearing roles (Bronfenbrenner 1979, Bandura 1997). Parents who receive ongoing support and are secure in their adult relationships tend to adopt more flexible and adaptive parenting techniques that are more successful at supporting children's health and well-being (e.g. encouraging exercise, monitoring nutrition, and promoting self-regulation) than parents who receive poor support (Durrett et al. 1986, Dubow et al. 1991, Noller & Callan 1991, Brage & Meredith 1994, Kobak & Ferenz-Gillies 1995).
3.4.2 Child age

There is evidence from the literature to suggest that the risk to children’s HRQoL from their own and their parent’s depression and their own obesity may be intensified during adolescence. A number of studies have consistently shown that adolescents are at greater risk of depression (Jorm 1987, Merikangas et al. 2010), obesity (see Wang & Beydoun 2007) and poor HRQoL (Palacio-Vieira et al. 2008, Michel et al. 2009) than their younger counterparts. Furthermore, moderator effects analysis has shown that overweight adolescents are more likely to experience worse HRQoL than overweight children (Pinhas-Hamiel et al. 2005, Swallen et al. 2005, Hughes et al. 2006a). In addition, there are indications that body image concern mediates the relationship between obesity and depression for adolescents more so than for children (Chaiton et al. 2009, Mond et al. 2011). Finally, research has also shown that the impact of parent depression on children’s functioning varies across the different stages of development (reviewed by Gotlib & Goodman 1999), whereby the severity of clinical symptoms tends to increase as children get older. These symptoms include: disorders of attachment affect regulation and socio-emotional development in preschool years (e.g. Field 1992, Cicchetti et al. 1998, Murray et al. 1999); internalising and externalising symptoms in childhood (reviewed by Beck 1998); and mood disorders, particularly depression, in adolescence (Ollendick & King 1994).

Adolescents may be more vulnerable to poorer HRQoL than children due to the psychological and physical changes relating to biological maturation and the changes in social expectations that occur as children move into adolescence. More specifically, adolescence is a time of biological maturation where rapid hormonal changes (i.e. gonadal steroid changes) can occur (Dahl 2004, Patton & Viner 2007). These hormonal changes during puberty can increase the likelihood that a child will be more emotionally responsive to stress if the child’s personality is considered neurotic, and in turn, they are at a greater risk of both anxiety and depression (see Young & Korszun 1998, Parker & Brotchie 2010). Hence, the stress that young people experience from their depression, obesity, and their parent’s depression is more likely to invoke or further invoke depression and, in turn, exert a greater impact on overall HRQoL for adolescents more so than for children. For example, children often show high levels of guilt relating to a parent’s depressed condition (Zahn-Waxler et al. 1990, see Section 3.3.3.2) and this guilt tends to increase with age (Piaget 1965, Thompson & Hoffman 1980, Graham et al. 1984). Perhaps adolescents whose parents are depressed may experience poorer HRQoL than children whose parents are depressed.
Transition into adolescence is also a stressful time where children face multiple challenges and pressures in social domains (e.g., social roles, vocational decisions, peer influences), and social expectations of how to look and behave become more apparent and can become internalised by the child. Furthermore, the rapid changes during adolescence in body size and shape may widen the gap between a child’s real and ideal body image (Malina et al. 2004). This body image discrepancy may act as a stressor and invoke depressive symptoms. Deviation from social expectations is also more likely to be a source of concern for adolescents than for children (Newman & Newman 1976, Jones 2001), and this may act as an additional stressor and invoke depressive symptoms leading to poorer HRQoL. Finally, parent depression may have a greater effect on adolescents’ HRQoL because interruptions to the caregiver-child relationship can interfere with important socio-emotional development milestones in adolescence, such as developing a sense of self-worth and self-esteem (Pierce 1997), leaving adolescents more susceptible to depression. This finding indicates that the effect of parental depression on children’s HRQoL may depend on the history of parental depression and/or at what stage of child development the parent’s distress has emerged.

3.4.3 Child gender

There are further differences by gender which suggest that young females may be more vulnerable to poorer HRQoL in relation to all three constructs of focus in this study. Young females are at greater risk than their male counterparts, of poor HRQoL (Bisegger et al. 2005, Cavallo et al. 2006, Palacio-Vieira et al. 2008, Michel et al. 2009, Haraldstad et al. 2011a) and depression (see Wilhelm et al., Weissman et al. 1996). This is particularly the case from adolescence onwards (Benjet & Hernández-Guzmán 2002, Palacio-Vieira et al. 2008, Michel et al. 2009). Furthermore, studies conducting moderator effects analysis show that HRQoL in overweight children is more impaired in girls than boy (Bisegger et al. 2005, Cavallo et al. 2006, Palacio-Vieira et al. 2008, Michel et al. 2009, Haraldstad et al. 2011a). Similarly, body image concern only mediates the relationship between obesity and depression in girls (Erickson et al. 2000), but this research is sparse and inconclusive (Chaiton et al. 2009, Mond et al. 2011). Although evidence of gender differences in the effect of parental depression on children’s health outcomes has been contradictory (Hammen et al. 1991, Lewinsohn et al. 2005), gender differences are seen across different age groups. More specifically, boy’s health is more affected by parental depression if the latter is evident during the infant years (e.g. Murray et al. 1993), while girl’s health is more affected if their exposure is after infancy (e.g. Hops 1996). A recurring finding is that boys display internalising problems when exposed to parent depression at a young age, but
externalising problems when exposed at an older age (e.g. Carter et al. 2001, Essex et al. 2001).

Girls may be more vulnerable to poorer HRQoL than boys because of the way they respond to stress and the added societal pressures upon them to conform to norms. When responding to stressors, girls tend to internalise the stress and use emotion-focused or social support coping strategies, whereas boys are more likely to externalise the stress and use aggressive antisocial strategies in response (Nolen-Hoeksema 1994, Hilt & Nolen-Hoeksema 2009, Li & Rukavina 2009). Girls are also more likely to respond to stress with cognitive errors and negative self attributions regarding the reason underlying the stressful event (Cummings & Davies 1994). In addition, girls are at a greater risk of depression and anxiety during the hormonal changes of the pubertal years as they are more likely to have characteristics of neuroticism and stress responsiveness than boys (see Parker & Brotchie 2010). Socially constructed gender roles that orient girls and boys toward different roles in life (e.g., "big boys do not cry" and "pink clothes for girls") (Zahn-Waxler 1993, Shields 2002, Brody & Hall 2010) also serve to compound the pressure on girls to take on the caregiver role in the family when the need arises and to internalise their stress. There is also greater pressure on females to conform to society's thin ideal (Presnell et al. 2004, Mond et al. 2007) and girls are more vulnerable to weight-related stigma and teasing (Puhl & Brownell 2003, Puhl & Latner 2007). Hence, the stress young people experience from their depression, obesity, and parent's depression may be more likely to invoke or further invoke anxiety and depression in females than males, and thus have a greater effect on girl's HRQoL.

3.5 Summary of gaps in the health-related quality of life literature

As mentioned in Chapter One, there are major concerns regarding the implications of depression, obesity and the exposure to parental mental health problems on young people's HRQoL. This chapter provided a critical review and synthesis of the literature on the risks to young people's HRQoL from their experience of these, and on the factors that mediate and reduce/intensify the effect of these risks. Overall, there has been little research into the effect of young people's depression and exposure to parental mental ill-health on their HRQoL relative to the many studies that have investigated the effects of obesity. Parent's mental health symptoms tend to have a weak inverse effect on children's HRQoL, while young people's depressive symptoms generally have a strong negative effect on their HRQoL. This appears to be the case regardless of whether parents or young people are from clinical or general population settings. Young people's BMI, however, tends to have an inverse effect on HRQoL,
although weaker effects are associated with young people in the general population and stronger effects with those who have been diagnosed with obesity. Many HRQoL dimensions are affected by these risks, but young people's psychological well-being appears to be the most strongly affected by both their own levels of depression and their parent's mental health problems, while physical well-being and social relations are particularly affected by excess body fat. The research literature is dominated by studies investigating the effect of these conditions on the self-reported HRQoL of adolescents using a single-dimension HRQoL measure, whilst both parents and young people tend to be recruited largely from clinical populations.

In addition, no studies have, as yet, investigated the mechanisms by which these risks affect young people's HRQoL. However, indirect evidence from the child development and HRQoL literature, suggests that depression may have a direct effect on young people's HRQoL and that the relationship is transactional in nature. There is reason to believe that, among other factors, young people's body image concerns and depression mediate the effect of obesity on HRQoL. Furthermore, there is some support that parenting self-efficacy and depression in children (amongst other things) mediate the effect of parental mental health status on their children's HRQoL. Finally, there has been little theoretical or research attention given to understand the factors that reduce or intensify the risk of poor HRQoL based on young people's experience of depression, obesity and parental depression. Only the moderator effects of young people's age and gender in the relationship between obesity and HRQoL have been investigated. However, there are reasonably convincing indications from the child development and HRQoL literature that strong social support for parents, or a two-parent family structure, may reduce the risk to young people's HRQoL from their depression, obesity and parent depression, but that females and adolescents with these conditions may be more vulnerable to poorer HRQoL when compared to males and younger children.

3.6 A model of health-related quality of life of children and the research questions for this study

Using the conceptual framework in Chapter Two, a summary model of the relationships to be tested in this study is presented in Fig. 3.4 below. The model shows that:

a) HRQoL is an important person factor indicating a child's well-being in terms of a number of dimensions that are meaningful to the child;

b) a psychological proximal person factor 'depressive symptoms' may have a direct effect on children's HRQoL;
c) a physical proximal person factor 'body mass index' may indirectly affect children's HRQoL through their 'body image perception' and 'depressive symptoms';

d) a psychological distal person factor 'mental health of parents' may indirectly effect children's HRQoL through 'parenting self efficacy' and children's 'depressive symptoms' (but unlikely through children's 'BMI'); and finally

e) there may be other person factors and processes in the child's microsystem that modify the aforementioned relationships (i.e. age and gender of the child, family structure and parent's social support and mental health).

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**Fig. 3.4: Summary model of potential predictors of health-related quality of life in children**

Realising the gaps in the HRQoL literature and knowing the growing concern for the health of urban disadvantaged families, this study set out to answer the following research questions (see Table 3.2). In a sample of urban disadvantaged children, does BMI, depressive symptoms and parent’s mental health have a direct effect on their self-
reported HRQoL and what dimensions of HRQoL? Do they predict HRQoL a year later? Can being older and female and having a depressed parent intensify the negative effect these have on HRQoL? Can having parents with strong perceived social support reduce their negative effect on HRQoL? Does BMI indirectly affect HRQoL through body image perception and depressive symptoms? Does parental mental health indirectly effect HRQoL through parenting self efficacy and children's depressive symptoms? Does this mediation only occur for older children and females?

Table 3.2: Study research questions

<table>
<thead>
<tr>
<th>Research questions</th>
<th>BMI</th>
<th>Depressive symptoms</th>
<th>Parent's mental health</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do they have a direct effect on HRQoL</td>
<td>?</td>
<td>?</td>
<td>?</td>
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<tr>
<td>Do they predict HRQoL a year later</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Can being older &amp; female &amp; having a depressed parent Intensify their negative effect on HRQoL</td>
<td>?</td>
<td>?</td>
<td>not parent depression</td>
</tr>
<tr>
<td>Can having parents with strong perceived social support reduce their negative effect on HRQoL</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Do they indirectly effect HRQoL through:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body image &amp; depressive symptoms</td>
<td>?</td>
<td></td>
<td>n/a</td>
</tr>
<tr>
<td>Parenting self efficacy &amp; depressive symptoms</td>
<td></td>
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<td>?</td>
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</tbody>
</table>
CHAPTER FOUR
Epistemological approach to the study of health-related quality of life in children

4.1 Introduction
This chapter outlines the epistemological approach adopted within the study. This emphasises the ways in which the phenomenon of HRQoL is viewed and can be studied or analysed by the researcher and the relationship that is assumed to exist between the researcher and participants. Some aspects of the epistemological approach have already been highlighted in the conceptual framework in Chapter Two.

4.2 Post-positivism
Scientific research within the social and health sciences is guided by different philosophical research paradigms including the opposing schools of positivism (i.e. empiricism) and constructivism (i.e. interpretivism), and the paradigm of post positivism (i.e. modern empiricism), which lies somewhere in the middle (Creswell 2008, Blaikie 2009, Bryman 2012). The current study subscribes to the tenets of post-positivism - a 'world view' or paradigm that has been adopted by many social and health science researchers (Creswell 2008, Blaikie 2009, Bryman 2012). Post-positivism and other research paradigms (e.g. positivism, constructivism and pragmatism) have several underlying premises regarding ontology, axiology, epistemology and methodology (Grix 2002). Differences in epistemological approaches are evident between constructivists, positivists and post-positivists. For example, constructivists believe that reality is co-constructed with participants whilst positivists, by contrast, believe that the knower and the known are independent. Post-positivists acknowledge both the above subjective and objective points of view. In addition, constructivists adhere to qualitative methods, while positivists subscribe to quantitative methods (Creswell 2008). Post-positivists, on the other hand, support the use of either quantitative or qualitative methods or both (Routledge 2007). The quantitative tradition emphasises theory verification, confirmatory research questions, numeric data, deductive logic, experimental methods, and statistical analyses. The qualitative tradition, on the other hand, emphasises theory generation, exploratory research questions, narrative data, inductive logic, and ethnographic method (Punch 1998).

Only a limited number of HRQoL researchers report the paradigm that they have adopted in their study of HRQoL, but it appears that most adhere to a post-positivist school of thought (Armstrong 2009). While there are several methods used to assess HRQoL (e.g. individualised, preference-based, successive comparison, design approaches, qualitative and quantitative methods) (Garratt et al. 2002a), most
researchers have used quantitative methods within a post-positivist paradigm (Armstrong, 2009) and a wide range of standardised psychometrically tested quantitative measures have been developed that assess HRQoL (Emery et al. 2005). The majority of studies test a HRQoL theory or model (i.e. testing if certain variables have a predicted effect on HRQoL) which is well suited, therefore, to the use of quantitative methods. Thus, the current study used quantitative methods within a post-positivist paradigm because it was felt that this approach would best address the research objectives.

4.2.1 Advantages and disadvantages of post-positivism

During the 1950s and 1960s, post-positivism emerged as an alternative to the positivist tradition which was considered unsuitable for a comprehensive investigation of human phenomena (Giddings & Grant 2007) and no longer tenable in modern science (Hanson 1958, Popper 1959, Hempel 1966, Kuhn 1970, Lakatos 1970, Laudan 1977). Post positivism was developed to address the problems of positivism (Crossan 2003, Giddings & Grant 2007). The amendments made to positivist assumptions (see i – viii below) highlight the superiority of post-positivism and the advantages of such an approach to research. A critical evaluation of this approach is outlined below.

4.2.1.1 Advantages

i) Predictability: post-positivism acknowledges that because of the complexity of human phenomena, it is unrealistic to expect absolute predictability of an outcome (Weiss 1995). However, it assumes that an outcome such as HRQoL can be probabilistically understood by employing hypothesis testing (Schumacher & Gortner 1992). By contrast, the positivist approach encompasses the belief that absolute predictability is possible (Crossan 2003).

ii) Generalisations: post-positivism assumes that findings from studies can be generalised beyond the study sample, but only to populations with similar characteristics. However, to facilitate generalisations to certain populations, researchers should follow strict research methods (Charney 1996). In contrast, positivism assumes universality (Schumacher & Gortner 1992). Generalisations can have important consequences for healthcare practice (Steckler & McLeroy 2008). For example, it is important to know if the factors that negatively affect the HRQoL of children from certain settings also affect other groups so that interventions can be appropriately targeted, whilst it is also important to know if an effective intervention is likely to be effective in other settings and with other populations.
iii) Observables and unobservables: like positivism, post-positivism asserts that some phenomena are observables that can be measured using valid and reliable instruments (Gortner 1990, Schumacher & Gortner 1992, Weiss 1995), but post-positivists also acknowledge the existence of unobservables that can be estimated using an indicator (an observable variable). Acknowledging unobservables allows for human phenomena such as HRQoL to be identified, measured, and understood (Weiss 1995). Understanding unobservables allows for theoretical explanations of observables (e.g. obesity) and can provide greater predictive ability in the observables.

iv) Reductionism: both the post-positivist and positivist paradigm assert that in some, but not all cases, phenomena can be reduced to measurable entities (Weiss 1995, Giddings & Grant 2007). These measurable entities (e.g. behaviours, thoughts, and feelings) yield empirical data that are then used to test hypotheses and theories and make cause and-effect linkages (Weiss 1995). Reducing QoL into HRQoL, and HRQoL into measurable dimensions allows for the identification of specific relationships between predictors and HRQoL dimensions that otherwise would have remained unknown.

vi) Deductive reasoning: post-positivists and positivists subscribe to the use of deductive reasoning, where hypotheses relating to a phenomenon are deduced from theory and subjected to empirical scrutiny (Routledge 2007). Unlike positivists who attempt to confirm and support theory, post-positivists recognise that a theory of a complex phenomenon such as HRQoL cannot be proven true, but only approximately true through falsification, refutation or disproving of alternative theories (Gortner 1990, Schumacher & Gortner 1992, Weiss 1995). Nonetheless, through repeated investigation of phenomena, post-positivists move closer to the truth by developing successive and ever improving theories (Schumacher & Gortner 1992).

vii) Objectivism: while both positivists and post-positivists attempt to make objective observations about their participants, post-positivists acknowledge that total objectivity is not possible given the interaction between observation and experience (Gortner 1990, Schumacher & Gortner 1992, Weiss 1995). As the researcher observes, analyses, and makes inferences about the study participant, the findings remain contextually bound by the researcher (Gortner 1990, Schumacher & Gortner 1992, Weiss 1995). Objectivity can be maximised by adhering to research protocols, using reliable and validated measures, developing and testing hypotheses in light of existing evidence and theory, testing of more than one prediction, and repeating testing in analogous situations (Gortner 1990, Schumacher & Gortner 1992, Weiss 1995).
viii) **Systematic inquiry**: as complete control over experimental conditions is not possible, post-positivist researchers use systematic inquiry to justify their findings and theoretical claims (see Gortner 1990, Schumacher & Gortner 1992, Weiss 1995). Systematic inquiry involves providing a contextual description of the conditions surrounding the phenomenon (e.g. sample demographics) and identifying influential factors that can be included or controlled for in statistical analysis to determine causal, interactive and confounding effects (Gortner 1990, Schumacher & Gortner 1992, Weiss 1995). Systematic inquiry appropriately limits the generalisability of results and establishes the precise conditions under which the results can be duplicated (Weiss 1995). This increases the reliability of the findings and theoretical claims, which is important for driving policy and for allowing future researchers to develop successive and ever improving theories.

ix) **Scientific method and critical multiplism**: the scientific method is subscribed to by both positivists and post-positivists, but while positivists only permit the use of quantitative approaches, post-positivists assert that there is no one correct scientific method and they support the use of quantitative or qualitative methods or both (Letourneau & Allen 1999). Post-positivists adhere to critical multiplism, which is a research strategy that encourages researchers to approach research goals, questions, methods, analyses and interpretation of results from several perspectives (Letourneau & Allen 1999) in order to obtain more strongly warranted claims than the claims preceding the research (Routledge 2007). With this approach, more accurate ways of improving HRQoL can be established and an array of complementary and successive theories of HRQoL can be developed to guide healthcare practice.

### 4.2.1.2 Disadvantages

There are also a number of disadvantages to a post-positivist research strategy. Critical multiplism has been described as promoting relativism (i.e. denying objective knowledge of realities independent of the knower), accommodating incommensurability (i.e. an inability of theories from different paradigms to be measured against each other point by point), requiring substantial expenditure of resources (i.e. funds, time and energy), and adhering to a methodology that is unable to completely eliminate bias (Letourneau & Allen 1999). However, post-positivists assert that objectivity is retained by subjecting results to public scrutiny, and while they accept that there may be incommensurability of problems and standards across different paradigms, it is argued that there is no incommensurability of the meaning behind the results (Bernstein 1983). In addition, they contend that collaboration among researchers and between disciplines has the following advantages: ensures best use of resources; subjects study results to
further scrutiny; and ensures that patterns and convergences in results are identified, that biases are recognised and minimised, and that assertions are more likely to be warranted (Letourneau & Allen 1999).

In addition, there are notable limitations to employing only a quantitative method of inquiry in a study. Potentially more inaccurate and weaker inferences may be made relying on a single method than if mixed methods were employed. Quantitative research has been criticised for its inability to capture richness of detail (Creswell 2008). The lack of a qualitative insight into HRQoL eliminates the possibility of developing more robust explanations for HRQoL outcomes (Deacon et al. 1998). That said, many studies use a single-method quantitative approach and contribute significantly to research and practice. For example, surveys can describe phenomena (e.g. the prevalence of certain symptoms), identify trends in behaviour or attitudes, and describe the effects of an intervention or service (Bowling 2009). Surveys can also measure the population parameter of interest and a wide range of factors (e.g. causal, interaction and confounding variables) that are important for testing a statistical hypothesis about the population. Surveys allow researchers to demonstrate that a particular variable will have a predicted effect on (or relationship with) another variable, and allow strong statistical inferences to be made in relation to the sample and other similar populations (Bowling 2009). Additional advantages of quantitative methods are that they can be resource and cost-effective, time efficient, easily administered, and they limit the burden of data collection on both participants and researchers (Letourneau & Allen 1999).

As previously mentioned, studies testing HRQoL theory and models commonly use valid and reliable quantitative HRQoL measures. A quantitative methods design within a post-positivist paradigm was hence adopted in this study as this was deemed most appropriate for testing a model of predictors of HRQoL in children and for explaining the study findings. More detailed methodological information is provided in Chapter 5.

4.3 Conclusion
In conclusion, this chapter outlined the epistemological approach underpinning the study of HRQoL in children. Chapter Five provides more detailed methodological information.
CHAPTER FIVE
Research methodology and procedures

5.1. Introduction
The aim of this chapter is to introduce the research methodology used to study, in a sample of urban disadvantaged children, the nature and extent of the relationship between children's Health-Related Quality of Life (HRQoL) and several separate but related physical and mental health constructs including their: (1) depressive symptoms; (2) Body Mass Index (BMI); and (3) the mental health of their parents. This chapter details the study design, setting and participants and provides an overview of ethical issues that were considered throughout the study. The procedure for recruiting participants and collecting data from participants is also presented. A description of the data analysis methods is then provided, covering univariate, bivariate and multivariate analysis of the quantitative data collected and the associated findings from Exploratory Data Analysis (EDA). Finally a summary of the study design is provided.

5.2 Study design, setting and participants
As indicated earlier in Chapter One, this study was undertaken as part of a larger project evaluating the implementation and impact of a Health Promoting School (HPS) initiative in urban disadvantaged primary schools that followed a cohort of children over two years (Comiskey et al. 2012). The study reported here comprised a prospective longitudinal cohort design following children and one of their parents/guardians from year one to year two of the original baseline, year one and year two evaluation. Children (N = 255) and one of their parents/guardian (N = 219) or parent-child dyads (N = 255) were recruited to take part in assessments at year one. The same children were invited to take part in assessments again 12 months later at year two. A battery of quantitative measures was administered to all children and their height and weight was measured in order to assess the relationship between children's HRQoL and each of their depressive symptoms and BMI. A battery of quantitative measures was also administered to the parents/guardians of these children in order to assess the relationship between children’s HRQoL and the mental health of their parents/guardians. A graphical summary of the administration of measures is provided in Figure 5.1 below.
5.2.1 Setting

The research was undertaken in seven primary schools in disadvantaged urban areas of Ireland’s capital Dublin. Five of the schools were chosen by the Childhood Development Initiative (CDI) as intervention schools to implement the HPS initiative, while the other two schools were chosen by the HPS evaluation team from a list of DEIS (Delivering Equality of opportunity In Schools) Band 1 schools to represent the comparison schools not implementing the initiative. The two comparison schools were pragmatically chosen by the HPS evaluation team for their willingness to participate and their similarity with the interventions schools in terms of disadvantage. Recall from Chapter One that because the HPS intervention was found to have no effect on the health outcomes of children, children from both the intervention and comparison

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2 The children that are the focus of this study attend schools that are designated disadvantaged by the Irish Government and they live in urban areas that are socioeconomically disadvantaged according to a national deprivation index (Pobal 2012). Pobal provides a Relative Deprivation Index for each Electoral Division and Small Area in the Republic of Ireland, which is calculated using information from the Irish Census data (1990 to 2006). Small Area indices for the intervention schools in this study range from -13 to -22.05 (disadvantaged to very disadvantaged). While the Small Area indices for the comparison schools range from -12.67 to -15.64 (disadvantaged).

3 The Childhood Development Initiative (CDI) was a project set up in Ireland to test ‘innovative ways of delivering services and early interventions for children and young people, including the wider family and community settings’. It is funded by the Department of Children and Youth Affairs (DCYA) and The Atlantic Philanthropies (AP). CDI used the Health Promoting School (HPS) model to develop a Healthy Schools Manual to help guide the intervention schools in implementing a HPS model (Comiskey et al. 2012).

4 DEIS is a governmental action plan that provides for a standardised system for identifying, and regularly reviewing, levels of educational disadvantage and a new integrated School Support Programme (SSP), which brings together, and builds upon, existing interventions for schools/communities particularly with concentrated levels of educational disadvantage (Department of Education and Science 2003).
schools of the evaluation were considered as a single unit in this current study instead of being separated out. There were two dimensions to the HPS evaluation. The first involved a process evaluation of the implementation of the HPS model into the schools – this adhered to qualitative approaches of investigation. The second aspect of the HPS evaluation involved an impact evaluation of the HPS model or more specifically, a quantitative assessment of children's health outcomes. For the quantitative assessment, children were either recruited to be part of a self-report survey cohort (i.e. children in first to fifth class answered the surveys themselves) or a parent proxy-report survey cohort (i.e. parents of children in junior and senior infants answered the surveys on their behalf). Parents/guardians of the self-report cohort of children were also invited to take part in assessments of their own health and well-being. The study reported here only associated with the impact evaluation of the HPS targeting the self-report cohort of children and their parents/guardians.

5.2.2 Eligibility criteria

All those children who were part of the self-report health outcomes cohort of the HPS impact evaluation and their consenting parents/guardians were eligible for inclusion in this study. However, those children with siblings in the parent proxy-report cohort were excluded as not to overburden parents/guardians. In other words, parents of children in junior and senior infants were already participating in the HPS evaluation answering surveys at three time points on their children's behalf – administering an additional parent survey may have overburdened the parents and jeopardised their participation in the evaluation. Participating parent-child dyads in this current study are described later.

5.2.3 Sample Size Estimation

It was envisaged that in order to fulfil the objectives of this study, data analysis using a range of statistical tests would be necessary. Using statistical power analysis methods (Cohen 1992, Fritz & MacKinnon 2007, Shieh 2009, 2010, Chu & Chen 2012), the sample size was estimated for each statistical test to be used in this study (see Appendix 2). In every sample size calculation, the expected alpha level was 5%, power was 80%, attrition at year one was 2%, attrition at year two was 20%, and effect sizes ranged between small and large. Evidence of whether a small, medium or large effect size would be obtained came from findings in the HRQoL literature. As quoted in Fritz and MacKinnon (2007) "Statistical power refers to the sensitivity of a null-hypothesis test to detect an effect when an effect is present (Neyman & Pearson 1992). Power is equal to 1 minus the Type II error rate (i.e. the probability of failing to reject the null
hypothesis when an effect is present; Cohen 1988). In psychology, power is considered adequate at .8 (Cohen & Wilkinson 1990).

Focusing in on one of the most important tests of this study, mediation, it was estimated that a sample size of between 54 and 399 parent-child dyads would be needed. A sample size of 255 parent-child dyads was achieved. Notably, problems can arise with type I and type II errors when the actual sample size is above or below the estimated sample size needed to identify an effect (Cohen 1992). Caution was therefore taken when interpreting the results.

5.3 Procedure: recruitment

All children in HPS and non-HPS schools and their parents/guardians were invited to participate in the HPS impact evaluation that would assess health outcomes over two years (March 2009 to April 2011). Researchers first met with the children and the purpose and nature of the research and what was involved in taking part was explained to them. Information leaflets were given to all 961 children in first to fifth class (i.e. self-report children) to take home to their parent/guardians and two weeks later invitation letters and consent forms were sent home with these children.

Consecutive sampling was employed as a means of recruiting children and their parents/guardians. It is a non-probability sampling technique that seeks to include all accessible subjects as part of the sample (Yusen & Littenberg 2005). Non probability sampling is sufficient to identify predictors of HRQoL in children from a particular population like those living in socially disadvantaged urban areas. The results of this study can be generalised to families from urban disadvantaged populations.

A total of 38% (365/961) of parent-child dyads met the initial inclusion criteria for this study and were agreeable to taking part. The remaining 596 were not eligible for the following reasons: they did not provide written informed consent (N = 503), parents/guardians consented to participate in parent proxy-report health outcomes surveys for their young children in the HPS impact evaluation (N = 93) and were deemed not eligible as not to overburden them.

All 365 eligible parent-child dyads were contacted at year one to take part in assessments. All but one hundred and ten parent-child dyads took part (70%, 255/365). In terms of the children, thirty two had to be excluded because they had moved to another primary school (N = 29), they were absent from school (N = 2), or they no longer wished to take part (N = 1). In terms of the parents, seventy eight had to
be excluded because they could not be contacted (N = 39), or no longer wished to take part (N = 39). At the end of assessments all children agreed to be contacted again in twelve months time in order to take part in follow-up assessments. It was not feasible to assess parents/guardians again at follow-up. Approximately twelve months later, follow-up assessments were conducted with 199 children (78%). Fifty six had to be excluded because they graduated from school (N = 52), or they moved to another primary school (N = 4) (see Figure 5.2 for recruitment and participation rates).

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**Children**

- 503 did not provide consent
- 93 consented to be a proxy reporter in the HSP evaluation
- 32 excluded

**Parents**

- 596 not eligible
- 78 excluded

**Parent-Child Dyad**

- Researcher sent study consent and information home to parents via children (N = 961)
- 110 excluded
- Parent-child dyads approached at year one (N = 365 or 100%)

**Year one assessment**

- Year one assessment (N = 255 or 70%)

**Year two follow-up assessment**

- (N = 199 or 78%)

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*Fig. 5.2: Recruitment and participation rates: graphical summary*
5.4 Measures

In order to realise the true predictability of children’s HRQoL by their depressive symptoms, BMI and parent’s mental health, measures were selected that were relevant to the study hypotheses; were conceptually sound; quantitative; suitable for the developmental stage of participants; self report; generic and where possible, standardised; brief; and psychometrically robust demonstrating sensitivity to change over time. More specifically, quantitative measures were deemed appropriate for this study because, in accordance with the epistemological approach, human phenomena can be probabilistically understood using indicators that compartmentalise the phenomena into measurable entities. Self-report measures were selected because proxy-report measures, particularly of children’s HRQoL have been criticised for not being as reliable as children’s self-report; for not capturing the subjective feelings that children have about themselves and their health that can, by definition, only be known by them (Mechanic & Hansell 1987, Eiser & Morse 2001, Edwards et al. 2002, Upton et al. 2008). Furthermore, research shows that children can reliably report on their own HRQoL when the instrument is developmentally appropriate (see Matza et al. 2004a).

Generic health status and HRQoL measures were used instead of disease- or condition- specific instruments because they allow for comparison of scores between population subgroups even those groups with low or no risks (Gillison et al. 2008, Kane 2008). Where possible, measures with satisfactory reliability and validity were used as they help identify severe impairments or cases at risk of clinical diagnosis, and ensure high quality data is obtained. Those that are sensitive to change were also selected because of the longitudinal nature of the study.

The range of factors considered central to this study that were assessed included:

1) Children’s Health-Related Quality of Life (HRQoL) using the Kidscreen 27 questionnaire (Kidscreen Group Europe 2006).
2) Children’s demographics using a profile questionnaire.
3) Children’s body image using questions extracted from the Health Related Behaviour Questionnaire (HRBQ, Balding 2002).
4) Children’s depressive symptoms using the Children’s Depression Inventory (CDI) scale (Kovacs 2009).
6) Parent demographics using questions extracted from the Survey of Lifestyles, Attitudes and Nutrition (SLAN) in Ireland (Harrington et al. 2008) and the Quarterly National Household Survey in Ireland (QNHS, in CSO 2010).

8) Parent perceived social support using the Oslo Social Support scale (Meltzer 2003).

9) Parent physical and mental health status using the Short Form 36 (SF 36) (Ware et al. 2000).

10) Parent depressive and anxiety symptoms using the Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith 1983).

Each of the measures used in the study is described in full below. It is worth noting that additional measures were administered to parents for descriptive purposes only. To identify parent’s smoking behaviour, they were asked questions extracted from the US Behavioural Risk Factor Surveillance System Questionnaire (BRFSS, see CDC 2012), Helping Asthma in Real Patients (HARP, see Haughney et al. 2010) and the SLAN. Parent’s problem drinking was assessed using the Alcohol Use Disorders Identification Test–Consumption (AUDIT-C) (Bush et al. 1998), while their drug use was assessed using questions extracted from the Maudsley Addiction Profile (MAP) (Marsden et al. 1998). A description of these instruments is not provided here as these measures were not relevant to the study hypotheses.

(1) Child health-related quality of life - Kidscreen 27

Health-Related Quality of Life (HRQoL) was the primary outcome of this study and was assessed using the Kidscreen 27, a generic 27-item questionnaire for children aged 8 to 18 years (Kidscreen Group Europe 2006). The Kidscreen 27 assesses five well-being dimensions of HRQoL including ‘physical well-being’ (e.g. feeling fit), ‘psychological well-being’ (e.g. enjoying life), ‘autonomy and parent relations’ (e.g. having money), ‘social support and peer relations’ (e.g. receiving help from friends), and ‘school environment’ (happiness in school) (see Appendix 3). The recall period is 1 week and it can be administered in 10 to 15 minutes. Each dimension has a varying number of items ranging from 4 to 6, and each item is scored on a five-point Likert scale. The items in each dimension can be summed to yield a dimension score. Items within the Kidscreen 10 were extracted from the Kidscreen 27 to calculate a total score for HRQoL. Rasch analysis transformed summed scores from each dimension and total into t-scores ranging from 0 to 100, with a mean of 50 and a standard deviation of 10. Higher scores indicate better HRQoL. European reference scores are available for these instruments (Kidscreen Group Europe 2006).
The Kidscreen 27 and 10 are psychometrically robust with Cronbach's α satisfactorily over 0.73 and 0.82, respectively (Kidscreen Group Europe 2006, Ravens-Sieberer et al. 2007b, Robitail et al. 2007). Cronbach's α above 0.70 is an accepted standard for research tools (DeVon et al. 2007). Satisfactory construct validity, responsiveness, external validity, and sensitivity to change have all been identified (Kidscreen Group Europe 2006, Palacio-Vieira et al. 2008, Erhart et al. 2009, Ravens-Sieberer et al. 2010, Gustke et al. 2011). Although Kidscreen has not been psychometrically tested for children under 8 years, research shows that children aged 7 can reliably report on abstract concepts like their HRQoL (see Matza et al. 2004a for a review), and Kidscreen has been used with children aged 7 in recent studies (e.g. Hijmans et al. 2010). Cronbach's alpha in the present study was satisfactory at over .73.

Like other quantitative measures of HRQoL, Kidscreen surveys (i.e. Kidscreen 52, 27 and 10) have been used widely with children and adolescents to assess the effect of interventions on health and the risk to HRQoL due to physical and mental health conditions, socioeconomic status and even the physical and mental health status of their parents. While many of the instruments used in these studies were condition-specific, Kidscreen 27 is a generic measure of HRQoL and is applicable to all population subgroups including healthy individuals (Kidscreen Group Europe 2006, Gillison et al. 2008, Kane 2008). Thus, Kidscreen 27 was appropriate for assessing the HRQoL of children with different levels of depressive symptoms, and BMI and whose parents have different levels of mental health symptoms in this study.

(2) Child demographics - Profile questionnaire
A short profile questionnaire was developed to obtain a demographic background of the children in this study and includes questions on their date of birth, gender, school class, ethnicity, and family structure. Ethnicity was determined by the child's biological parent's country of origin and was categorised as either 'Caucasian' or 'Other'. Family structure refers to the makeup of the family where a child lives (Meltzer et al. 2003), and was recorded as living in a 'one biological parent family', a 'two biological parent family', 'a blended family' (i.e. one biological parent and one step parent) or a 'foster parent family'. For the purposes of analysis, family structure was also categorised into a 'one biological parent family' and a 'two-parent family'.

(3) Child depressive symptoms - Children's Depression Inventory
One of the more popular measures of child depression is the Children's Depression Inventory (28 items), which has been used to identify children at risk of clinical depression and for the purposes of monitoring treatment effectiveness (Twenge &
Children's depressive symptoms was measured in this study using the Children's Depression Inventory short-form (CDI-S, version 2), a ten item measure for children aged 7 to 17 years (Kovacs 2009). While it is not a diagnostic instrument, the CDI-S can effectively screen for cases with clinical depression. The CDI-S items assess the intensity and frequency of several symptoms of depression including 'anhedonia', 'negative mood', 'ineffectiveness' and 'negative self-esteem' (see Appendix 4). The recall period is 2 weeks and the questionnaire could be completed in 5 to 10 minutes. Each item is scored on a three-point Likert scale. The items can be summed to yield a total score which is converted into a T-score with a mean of 50 and a standard deviation (SD) of 10. Higher scores indicate greater levels of depressive symptoms and above 65 is clinically significant for depression. Normative scores are available (Kovacs 2009, p. 31).

CDI-S has strong psychometric properties (Craighead et al. 1998, Meehan et al. 2008, Kovacs 2009) with a Cronbach's α over 0.80 (Kovacs 2009). It is acceptably sensitive to change (Twenge & Nolen-Hoeksema 2002) and it has good construct validity, although there are some inconsistencies on the reports of discriminant validity (Carey et al. 1987, Hodges 1990, Craighead et al. 1998). In the current study Cronbach's α was satisfactory at 0.82.

(4) Child body image perception - Health Related Behaviour Questionnaire

Body image perception is defined as a person's attitudes and feelings towards their body size (i.e. weight and shape) (Uys & Wassenaar 1996). The concept has been approached broadly in terms of body image concern and non concern. It has also been approached more specifically in terms of body image satisfaction and dissatisfaction, and positive and negative body image perceptions, where the latter approach considers the discrepancy between perception and reality (Polivy & Herman 2002). Over the years body image perception's of children and adolescents has been assessed using a variety of questionnaires and figure rating scales (McCrea et al. 1982, Ben-Tovim & Walker 1991, Thompson et al. 1999). The most widely used strategy for measuring body image perception is based on Stunkard and colleague's (1983) figure rating scale (Cohn et al. 1987, Thompson & Altabe 1991, Sherman et al. 1995, Candy & Fee 1998), which captures positive and negative body image perceptions. However, more general questionnaires and even individual questions can address broadly how dissatisfied a person is with their body size (Mendelson & White 1982, Franzoi & Herzog 1987, Kelly et al. 2012).
In the current study, a broad assessment of children's body image perception was measured using a question extracted from the Health Related Behaviour Questionnaire (HRBQ version 4), a 31-item questionnaire that provides descriptives of a range of health beliefs, behaviours and feelings for 8 to 12 year olds (Balding 2008). The HRBQ can be completed in under 20 minutes. In terms of body image perception, the HRBQ asks children which sentence describes them best: 'I would like to put on weight'; 'I would like to lose weight'; or 'I am happy with my weight as it is' (see Appendix 5). The HRBQ has not been psychometrically tested for reliability and validity, but ongoing focus groups with relevant parties (e.g. pupils and health professionals) ensures design of questions are suitable and relevant to the children, while a detailed administration manual maximises validity (Balding 2008). Although designed for children aged 8 to 12 years, the developers of this instrument confirmed that it could be used with children aged 7 to 12 years. There are no standardised reference data to compare scores to, but the developers of the HRBQ provide a databank of all findings on the health-related behaviours of participating schools-aged children across the UK since 1978 that research studies can access to compare their findings to.

(5) Child body fat – Body Mass Index age- and gender-specific z-scores

The Body Mass Index (BMI) is a measure of body fat that has been used extensively in research and practice to screen for weight-related conditions, to identify the risks of these conditions, and for monitoring treatment effectiveness (CDC 2012). Age- and gender-specific BMI z scores are considered a reliable indicator of body fat in children (Pietrobelli et al. 1998). Indeed, other height- and weight-based indices and skinfold measurements do not seem to provide additional information about excess body fat beyond BMI z scores (Garrow & Webster 1985, Pietrobelli et al. 1998, Mei et al. 2002, Mei et al. 2007). Unlike adult BMI, the raw calculation of BMI in children cannot be interpreted reliably because up until adulthood the amount of body fat significantly changes with age and significantly differs by gender, thus z scores must be generated.

In the current study, BMI age- and gender-specific z scores were used as a measure of children's body fat. Children's nurses trained in anthropometric measurement (Hollywood et al. 2012) measured children's weight and height. Children's weight was measured with a digital scales (SECA – model) in their stockings and all heavy outdoor clothing removed. Children's height was obtained using a portable height measurer and outdoor shoes were also removed. Following this protocol ensured inter-rater and intra-rater reliability. BMI was calculated with the formula weight divided by height squared \((\text{weight} / [\text{height}]^2)\). AnthroPlus software (WHO 2009) converted BMIs into standardised z scores ranging between -3 and 3. BMI z scores were grouped into weight categories.
using growth charts detailing BMI age- and sex-specific percentiles and WHO (2007) thresholds for overweight (i.e. +1 standard deviation or 25kg/m²) and obesity (i.e. +2 standard deviations or 30kg/m²) (in Onis et al. 2007). WHO (2007) threshold references were constructed for individuals aged 2 to 19 years using data from children and adults, whereas CDC (2000) references were constructed using adult BMI only (WHO 2009). In addition, WHO references are used to measure the weight of children in a large national longitudinal study of Irish children (Williams et al. 2009). Thus, these references were most relevant to this study.

(6) Parent demographics - Profile questionnaire
A short profile questionnaire on the demographic background of the parents/guardian’s in this study was designed using questions extracted from the Survey of Lifestyles, Attitudes and Nutrition (SLAN) in Ireland (Harrington et al. 2008) and the Quarterly National Household Survey in Ireland (QNHS, in CSO 2010). The profile questionnaire included questions on their age, gender, relationship to the child, marital status, home type, employment status, highest education attained, and presence of a chronic illness. Often studies refer to parent’s education attained as a proxy for family SES (Oakes & Rossi 2003). Parent’s education was coded as categories according to the following education category which they attained: “Some Primary”, “Primary School”, “Junior / Group / Intermediate Certificate or equivalent”, “Leaving Certificate or equivalent”, “Diploma / Certificate”, “Primary Degree”, “Postgraduate / Higher Degree”. For ease of analysis, parent’s education was also categorised as ‘up to Junior Certificate obtained’ and ‘Junior Certificate and more obtained’. In terms of a chronic illness, parents were asked ‘Do you have a long term illness, physical disability or medical condition? and if so please specify’.

The SLAN survey regularly provides reliable data on the demographics and lifestyles of a representative cross-section of the Irish population (Kelleher et al. 2003 p. 5). The QNHS is a large-scale, nationwide survey of households in Ireland. The format of the questions from both are similar to that used by the CSO, a government body responsible for compiling Irish official statistics. By adhering to a standard classification system, direct comparisons can be made between demographics of this study sample and national averages.

(7) Parenting self efficacy - Parenting Sense of Competence scale
Parenting self efficacy has been investigated in many studies in relation to parenting competencies, parental psychological functioning, and child adjustment (see Jones & Prinz 2005). The measures used either assess general, task-related or narrow-domain
parenting self efficacy. General parenting self efficacy measures focus broadly on the extent to which parents feel competent in their parenting role, but do not assess feelings of competency in specific parenting tasks or in particular domains of parenting as the other two measures do.

The Parenting Sense of Competence Scale (PSOC) was first developed by Gibaud-Wallston and Wandersman (1978) and later amended by Johnston and Mash (1989). It is the most frequently used parenting self-efficacy instrument (Jones & Prinz 2005) and was used in this study (see Appendix 6). The PSOC is a 16-item measure of general parenting self efficacy (7 items) and satisfaction (9 items), which has been used with parents as young as 14 (Knoche et al. 2007). Items are answered on a 6-point scale, and scores can be summed and a mean score from 1 to 6 can be calculated. Higher scores indicate greater parenting self efficacy. While no normative data is available for PSOC, average scores are available from a large Australian population study that used the PSOC (Rogers & Matthews 2004). There are mixed reports on the validity of the PSOC (Lovejoy et al. 1997, Ohan et al. 2000, Rogers & Matthews 2004), but studies report good internal consistency with Cronbach’s $\alpha$ over 0.70 (Johnston & Mash 1989). In the current study, $\alpha$ was satisfactory at .99.

(8) Parent perceived social support - Oslo Social Support Scale

Social support is a broad term encompassing a variety of constructs, including support perceptions and receipt of supportive behaviours. Perceived social support refers to an individual’s perception of the general availability of support and satisfaction with support provided, whereas received social support refers to the specific supportive behaviours that are provided by support networks (Sarason et al. 1990).

Measures of perceived social support typically take less time to complete than received social support measures (Sarason et al. 1987). As not to increase unnecessarily the length of an already lengthy questionnaire, parents/guardians perceived social support was assessed in this study using the Oslo Social Support scale, a 3-item questionnaire (Meltzer 2003, Dalgard 2006). The OSLO scale has been used with individuals as young as 8 years (Małkowska et al. 2004) and assesses how many close friends the parents/guardians had, how involved other people were in their lives, and the availability of help from their neighbours (see Appendix 7). Responses provided a cumulative total score (3 to 14 points), which was allocated to one of the following categories: poor (3 to 8), moderate (9 to 11), strong (12 to 14) social support. It has good psychometric properties (Meltzer 2003) with Cronbach’s $\alpha$ over 0.72 (Dalgard 1996). Cronbach’s alpha in this current study was below satisfactory levels at .63, but
closer examination of the results (i.e. Corrected Item-Total Correlation and Cronbach’s Alpha if item deleted) revealed that the items were measuring the same thing as the scale.

(9) Parent overall physical and mental health status - Short Form 36
Parent/guardian health status in this study was measured with the Short Form 36 version 2.0 (SF-36v2), a 36 item generic questionnaire for individuals aged 14 and older (Ware et al. 2000) (see Appendix 8). It measures the following eight concepts commonly represented in health status surveys: physical functioning (10 items); role limitations due to physical health problems (4 items); bodily pain (2 items); general health (5 items); vitality (4 items); social functioning (2 items); role limitations due to emotional problems (3 items); and mental health (5 items). In addition, it produces a Physical Component Summary score (PCS) and a Mental Component Summary score (MCS) that measure overall physical and mental health respectively. The 4 week recall version was used in this study. It can be administered in 5-10 minutes. Using US norm data from 1998, summed scores were transformed into T-scores ranging between 0 and 100 with mean of 50 and standard deviation of 10 (Ware et al., 2000). Normative data from an Irish population (Blake et al. 2000) as well as US population (The SF 36 Community 2006) is available.

The instrument has strong psychometric properties. It has good reliability with a Cronbach’s α over 0.76 (Ware et al. 1993b, McHorney et al. 1994, Tsai et al. 1997, Turner-Bowker et al. 2002). Studies to date have yielded satisfactory content, concurrent, criterion, construct, and predictive evidence of validity (Ware et al. 1993a, Ware et al. 1996a, Ware et al. 1996b). Cronbach’s alpha in the present study was satisfactory over .77.

The SF-36 is one of the most widely used and validated instruments of physical and mental health status (The SF 36 Community 2006). It has been applied extensively in large studies of population health, those comparing relative burden of diseases, and in studies differentiating the health benefits of interventions across groups (Contopoulou-loannidis et al. 2009). One study has investigated the relationship between parent health status and the HRQoL in children using a shorter version of the SF-36 and the Kidscreen instrument. Thus, the SF-36 was an appropriate measure for this study.
(10) Parent depressive and anxiety symptoms - Hospital Anxiety and Depression Scale

While the Structural Clinical Interview (SCID), the Center for Epidemiological Study of Depression Scale, and the Beck Depression Inventory are the most popular measures of depression and anxiety, they were considered too time consuming for an already lengthy parent/guardian questionnaire. The Hospital Anxiety and Depression Scale (HADS), however, is a brief and easy to use a 14-item measure of depressive and anxiety symptoms for adults 16 years and older (Zigmond & Snaith 1983) (see Appendix 9). HADS has been used widely in research (Bjelland et al. 2002) as well as clinical practice (Herrmann 1997). Responses to the HADS items provided a cumulative total score (0 to 21) for both the depression scale and the anxiety scale. Total scores were allocated to one of the following categories: normal symptoms (8 to 10), moderate symptoms (11 to 15) or severe symptoms (16 to 21) (Snaith 1994, Bjelland et al. 2002, Olsson et al. 2005). Normative data from large non-clinical samples have been published (Spinhoven et al. 1997, Crawford et al. 2001). The recall period is one week. It takes less than 10 minutes to complete.

The HADS has good psychometric properties across general and clinical populations (see Herrmann 1997, Bjelland et al. 2002, Michopoulos et al. 2008). It has good reliability with Cronbach’s α satisfactorily over 0.80 (Mykletun et al. 2001) and has demonstrated satisfactory validity (Herrmann 1997, Lisspers et al. 1997, Bjelland et al. 2002). In the present study Cronbach’s α was high at .97 on both the depression and anxiety scale.

5.5 Procedure: data collection

Surveys were administered to children and their height and weight were measured in school by a team of researchers and children’s nurses, respectively. Two large rooms in the school away from teachers were requested from the school Principal, ensured children’s privacy was respected, social desirability was minimised and data quality was maximised (Alderson 1994, Brannen et al. 1994). At the beginning of the assessments, the purpose and nature of the study were again explained to the participants and all were then asked to provide verbally their informed assent. The children were assessed using self report surveys in a classroom setting in small groups (<15). The surveys took approximately 40 minutes. To ensure adequate support for the children throughout the assessment period, the ratio of researchers to children aged 7 and 8 was 1:2 and for children aged 8 to 12 was 1:4. The nursing team, who were trained in anthropometric measurement (Hollywood et al. 2012), lead the assessment of the children’s height and weight. A strict protocol for measuring height and weight
was adhered to (see above). At the end of the assessments, children were appropriately debriefed.

Parents/guardians were contacted by phone shortly after their children completed their self report survey at year one. The purpose and nature of the study were again explained to the participants and all were then asked to provide verbally their informed consent. Either a time and date that suited parents/guardians to take part in the survey was arranged or the survey was administered there and then. Surveys took approximately 20 to 30 minutes to complete. Parents/guardians were appropriately debriefed at the end of the survey.

5.5.1 Addressing non response bias
In order to address the non response bias, a number of steps were taken. Researchers checked surveys for completeness and gently reminded participants of non responses. Where children were absent on the day of assessments researchers returned to the schools to give the children the opportunity to participate. Likewise for parents who were not available to participate in the over-the-phone survey, alternative times were arranged to call back. If parents/guardians were no longer contactable by the number provided, then an effort was made to get a current contact number from the schools. Parents/guardians were only included in the study if their child completed the self report survey at year one. Unfortunately, there was no means for addressing the non-response at year two for children who graduated or left the school.

5.6 Ethical considerations
This study received ethical approval from the Faculty of Health Sciences Ethics Committee in Trinity College Dublin, and was carried out in accordance with the ethical Codes of Conduct of the British Psychological Society and Psychological Society of Ireland.

Respect, beneficence and justice for participants was ensured with the following steps: participants were made aware of the importance of providing informed voluntary consent and assent; they were informed both in writing and verbally of the purpose and nature of the study and how results would be distributed; they were told that they were free to withdraw from the study and/or withdraw their data at any time without prejudice to care or the provision of services in schools; they were offered privacy; and they were reassured that all information would be treated in confidence, but were informed of incidences where confidentiality would have to be breached. Some of these are addressed in more detail below.
5.6.1 The effects on children and parents from taking part in research

The potential effects of this research on participants include the evocation of negative emotions from participating in physical assessments and surveys on mental health, and from any subsequent follow-up or referral if child protection issues arise. The measurement of children's height and weight may be embarrassing for children who are image conscious. Thus, a designated private space was organised to avoid any potential embarrassment. The children's BMI was shared with them, but no reference was made to their weight category. Parents were invited to attend the BMI measurement and were provided with researcher contact details if they wished to know their child's BMI. Many children can find surveys intimidating (as they require a high degree of literacy), boring (because they are no 'fun'), and inappropriate (as they often do not provide any context) (David 1992, Smith & Barker 1999, Barker & Weller 2003). The process of surveying children was made as exciting as possible by the researcher: each question displayed animation and puzzles and colouring pictures were provided at the end of each survey.

Mental health is a potentially sensitive issue for many children and adults and questions about mental health may invoke certain emotions or experiences that may be a source of some distress. It is also possible in a project of this nature that some child protection issues may emerge either directly or indirectly in the course of the study. Both parents and children were given the opportunity to speak about issues that were currently upsetting them. If requested, participants were sensitively informed about their scores on each mental health measure at the end of the survey. A clear protocol was put in place for participants whom the researcher considered might need immediate support. If a child protection issue arose, then this was dealt with sensitively, promptly and in line with established guidelines for the protection of children, and where appropriate, a referral made to the school principal who would, in turn, inform the parent and or a relevant HSE agency (DCYA 2011). If a parent revealed that they or someone else could potentially be harmed, then parents would be reminded that this information would be passed on, they would be provided with telephone numbers for professional support services, a detailed report of the situation would be given to the Research Supervisor, and a decision would be made about who to alert.

While children and parents may not have benefitted directly from participating in this study, the data obtained may inform the development of effective health interventions for improving children's HRQoL. In addition and as a consequence of being part of the HPS evaluation, families in intervention schools benefited from HPS resources, whereas comparison schools benefited from monitory rewards.
5.6.2 Informed consent

Respect for the study participants was safeguarded by obtaining written informed consent. Consent to participate in the HPS evaluation was obtained, in the first instance, from the school's Board of Management (i.e. the schools were gatekeepers to participants in this study). The research team then met with the school staff and children to discuss the project and provided time for questions or concerns to be addressed. Information Leaflets were then sent home to guardians via children and they outlined the following: the nature of the study; that guardians and or their child could withdraw consent and their data at any time without jeopardy to the care with which they received from the schools; and contained assurances that all information would be treated with strictest confidence. Two weeks later, a Letter of Invitation, Information Leaflet, and Consent Form were sent home to parents via the children.

Informed consent was obtained in writing from parents/guardians for their child to participate and for their own participation (i.e. parents were participants and gatekeepers to the children). As parents do not always know what the child needs or understand the consequences for the child participating in research (Assembly 1989), assent was also obtained directly from the child (Rossi et al. 2003). Before all assessments participants were again informed of the purpose of the study, what was involved in participation, and their right to withdraw, and participants were given the opportunity to ask questions or voice concerns. The final stage of the on-going consent process was the debriefing (Holmes 1976, Stewart 1992): participants were given an opportunity to discuss the potential findings of the study and their experience of participating.

5.6.3 Confidentiality

Respecting the participants also involves informing them of, and abiding by, the study's confidentiality policy. The confidentiality policy of this study centred around integrity, identification, collection of personal data, and the safe storing and intended use of data (Sieber 2002). Participants were informed in writing and prior to assessments of the confidentiality policy including: using data for research purposes only; sharing their information with other members of the research team; breaching confidentiality in order to protect the participant or a third party; assigning participants with unique identification (ID) numbers; storing data in locked fireproof cabinets (hard copies) and password protected computers (soft copies); and the period for which data would be retained. A summary of the ethical framework for conducting research with children in this study is provided in Figure 5.3 below.
Confidentiality / Referrals

Levels of competence

Consent / assent

Confidentiality / Referrals

Reciprocity

Notes from fieldworkers / School staff / children

Fieldworker / participant ratios

Questionnaires / Administration environment

Assent preceding parental consent. Right to withdraw. Impact of school setting

Being fully informed of researchers duty of care and clear regarding how information is passed on

Participation

Providing feedback (e.g. last years BMI). Informing how information is used.

Fig. 5.3: Study’s ethical framework for researching children (adapted from Quirke et al. 2010).

5.6.4 Researcher welfare

The impact on the researcher from conducting a large number of potentially distressing interviews is also an important issue. In this study, guidelines were adhered to and supportive structures were put in place to ensure the health and safety of the researcher. Researchers were guided by a standard fieldwork protocol that was developed on the basis of: the literature regarding researchers working in the school setting; Trinity College Health Sciences guidelines for lone researchers; and the study’s ethical guidelines and research design. Supervision was made available to researchers by a nominated staff member within Trinity College Dublin. The researcher also met regularly with her research supervisor.

5.7 Data analysis methods

A database was set up in SPSS (version 18) to conform to the specifications of a coding book that had been developed for this study. Data from the child and parent/guardian surveys and the height and weight measurements of children were entered into the database. The statistical packages SPSS version 18.0 (SPSS 2011), Mplus version 7 (Muthén & Muthén (1998-2012)) and Microsoft Excel were used to analyse the data. The aims of this study were fulfilled by conducting univariate,
bivariate and multivariate analysis of the quantitative data collected. A seven stage approach was taken to the analysis:

(1) Univariate data analysis was conducted to provide descriptives of the study participants at year one and two.
(2) Within-subjects analysis was employed to determine if there were any changes in study variables between year one and two.
(3) Bivariate analysis was conducted between all study variables at year one to identify correlates of HRQoL, and confounders and potential mediators of the three relationships of focus in this study.
(4) Multivariate analysis was employed to test the relationship between key study variables and HRQoL in children at year one after controlling for potential confounders, and where applicable, the same analysis was conducted for data at year two.
(5) Bivariate analysis was also conducted between key study variables at year one and HRQoL at year two to identify predictors of HRQoL, and between the change in key study variables and the change in HRQoL to determine if improvement in key study variables predicted improvement in HRQoL over time.
(6) Multivariate analysis was used to test the moderator effects within the relationships between key study variables and HRQoL in children at year one.
(7) Multivariate analysis was used to test the simple-, multiple- and moderated-mediator effects in the relationship between key study variables and HRQoL in children at year one (i.e. cross-sectional mediation). Mediator effects were also tested using two waves of data (i.e. half-longitudinal mediation).

These data analytical methods are described in more detail below, and where appropriate, the associated findings from Exploratory Data Analysis (EDA) are also discussed and are presented in full in Appendix 10. It is noteworthy that an alpha level of .05 was used as a significance criterion for all statistical tests.

5.7.1 Univariate analysis of study variables at year one and two
Univariate data analysis was conducted to provide descriptives of the study participants at year one and two as a preliminary to all other analyses. These statistics included: demographics (e.g. gender, age, family structure); physical aspects of participants (e.g. body mass index, physical health status); and psychosocial aspects of participants (e.g. HRQoL, depressive symptoms, perceived social support). The purpose of this analysis was to provide a context for the results of subsequent analysis. Univariate
analysis provided absolute participant numbers, relative frequencies, measures of central tendency (mean/medians), and dispersion (standard deviations and ranges) of the study variables at year one and two. As missing data were not imputed, results tables reported actual response rates and valid percentages.

**Exploratory Data Analysis**

The distribution of data for each study variable was assessed for outliers, skewness, kurtosis and overall normality (see Appendix 10 Section A for EDA findings). In general, few outliers were identified, some distributions of IVs and DVs had significant skewness and kurtosis, the majority of distributions violated the assumption of normality. However, removal of outliers and transformation of IV and DV data was not deemed necessary for the following reasons:

a) the percentage of outliers identified was either less than the expected 1% or they belonged to the sample population and did not affect the distribution mean;
b) the negative effects of significant skewness and kurtosis, found in half of the DV and the majority of the IV distributions, are limited in large samples such as this one (Tabachnick & Fidell 2001) and some skewness simply reflected the underlying nature of the construct being measured (Pallant 2003, p. 52);
c) violation of the assumption of normality in the social sciences and in large samples is not unusual (Pallant 2003, p. 57);
d) transformation can sometimes affect the interpretation of models in undesirable ways, but even when square root transformations were conducted (Box & Cox 1964), they did not alter the normality of the distributions in any way. Non transformation of data is not uncommon in the HRQoL literature;
e) non parametric alternatives were used in order to confirm that type 1 or 2 errors were not made with parametric tests; and finally,
f) failing to satisfy the main assumptions does not mean that the study findings are incorrect, instead the analysis is valid but weakened (see Pallant 2003, Tabachnick & Fidell 2012).

**5.7.2 Within-subjects analysis of study variables between year one and two**

The second stage of the analysis involved within-subjects analysis of all study variables between year one and two to determine if any significant changes in study variables occurred over time. The purpose of this analysis was to provide a context for the results obtained in other analyses of longitudinal data. Parametric paired-samples t-tests were conducted to determine if there were any changes in continuous variables over time (e.g. HRQoL, anxiety symptoms). The remaining tests used were non-
parametric. Wilcoxin Signed Rank tests were conducted to determine if there were any changes in ranking variables (e.g. weight categories), while McNemar tests were employed to determine if there were any changes in discrete variables with more than two groups (e.g. body image perception).

**Exploratory data analysis**

As noted earlier, some of the HRQoL distributions and other study variables were not normally distributed. Although the parametric paired samples t test assumes normality within the distributions, it is a reasonably robust test and violation of the assumption of normality when using this test should not affect results if the sample size is greater than thirty (Pallant 2003) as it was in this study.

5.7.3 *Bivariate analyses between all study variables at year one*

The third stage of the analysis involved bivariate analysis between all study variables at year one in order to identify correlates of HRQoL and to see what variables might be important for the later modelling (i.e. identify confounders and potential mediators). Independent samples t-tests were used to compare the mean score of children's HRQoL for two different groups (e.g. children concerned and not concerned about body image). Similarly, one-way between-groups Analysis of Variance (ANOVA) was used to compare the mean score of children's HRQoL according to three different groups (e.g. children of normal weight, overweight and obese status). Post analytic pairwise comparisons (i.e. Tukey HSD) determined which group means were significantly different from each other. Finally, Pearson's r product-moment correlation test was used to assess association or linear independence between two continuous study variables (e.g. child HRQoL and parent mental health status). The Mann-Whitney U test, Kruskal-Wallis test, and Spearman's rho are the non parametric equivalents to the independent t test, ANOVA and Pearson's r correlation and were conducted to ensure that type I or type II errors were not made (see Appendix 10 Section B for results).

**Exploratory data analysis**

The assumption of linearity and homoscedasticity were assessed for each correlation but no violations were identified (see Appendix 10 Section B for EDA findings). Any violation of homoscedasticity is compensated for when using t tests and ANOVAs. Although the HRQoL distributions were non normal, t tests and ANOVAs are not greatly influenced by this as long as scores are symmetrically distributed, sample sizes are equal and greater than 12, and variances do not differ by more than a factor of four (Keppel & Wickens 2007, Howell 2012). Similarly, violation of normality should not be
an issue for correlations when sample size is sufficiently large (Kowalski 1972) as it is in this study.

5.7.4 Multivariate analysis of key relationships when controlling for confounders
The fourth stage involved multivariate analysis to test the relationship between key study variables (e.g. depressive symptoms, BMI and mental health status of parents) and HRQoL in children when controlling for confounders at both time points where appropriate. The purpose of this analysis is to estimate the direct effects. There are three main criteria for identifying confounders: (1) the factor must have an effect on the outcome; (2) the factor must correlate with the risk factor; and (3) the factor must not be a mediator. If these criteria were met then a two-step parametric Hierarchical Multiple Regression (HMR) model was employed. The following equation is an example of a HMR with one confounder: \( Y = a + b_1X_1 + b_2X_2 + eY \), where \( Y \) is HRQoL, \( X_1 \) is the confounder, \( X_2 \) is the predictor of HRQoL, \( b \) is the associated path coefficient, and \( eY \) is the error in \( Y \). \( R^2 \) change describes how much of the variance in HRQoL is explained by the predictor after controlling for potential confounders.

Exploratory data analysis
EDA investigated multivariate outliers, linearity and homoscedasticity. Multivariate outliers did not have any undue influence on the models and were therefore not removed. There were no problems with multi collinearity between the IVs and the assumption of linearity and homoscedasticity were not violated (see Appendix 10 Section C).

5.7.5 Bivariate analyses between key study variables at year one and health-related quality of life at year two
Bivariate analysis was also conducted between key study variables at year one and HRQoL at year two to identify predictors of HRQoL, and between the change in key study variables and the change in HRQoL to determine if improvement in key study variables predicted improvement in HRQoL over time. Again Pearson's r correlations were employed.

Exploratory data analysis
Same findings as 5.7.3 (see Appendix 10 Section D).
5.7.6 Moderator effects in the relationship between key study variables and health-related quality of life in children at year one

The sixth stage of analysis involved multivariate analysis to test the moderator effects in the relationship between key study variables and HRQoL in children at year one. The purpose of this analysis is to establish under what conditions (e.g. male or female, poor parent perceived social support or strong social support) the magnitude of the effect between children's HRQoL and the three variables of focus in this study increases or decreases in order to identify the true predictability of HRQoL by these key study variables. Moderation is said to have occurred when the strength of the relationship between a predictor (X) and an outcome (Y) is dependent on a third variable (W) (Preacher et al. 2007). The interaction model is represented by the following regression equation: \( Y = b_1X + b_2W + b_3XW + eY \). The direct effects and interaction (or moderator) effect are illustrated in Figure below and described as follows: path \( b_1 \) represents the direct effect of X on Y; path \( b_2 \) represents the direct effect of W on Y controlling for X; path \( b_3 \) represents the direct effect of the interaction term XW on Y controlling for X and W (i.e. the moderator effect).

![Fig. 5.4: Path coefficients in a moderation model](image)

The magnitude of the effect of a predictor (X) on an outcome (Y) varies as a function of a third variable (W), if path \( b_3 \) in the third step of a three-step Hierarchical Multiple Regression (HMR) significantly added to the prediction of Y over and above the main effects of X and W, independently (i.e. \( p < 0.05 \) for \( R^2 \) Change). If \( b_3 \) was significant, the interaction effect was probed using t tests to calculate simple slopes and to determine whether the simple slope of Y on X was statistically significant for chosen conditional values of W (typically the mean and \( \pm 1 \) SD from the mean for continuous W, and coded values for dichotomous W) (Aiken & West 1991).
Exploratory data analysis
EDA investigated multivariate outliers, linearity and homoscedasticity. Multivariate outliers did not have any undue influence on the models and were therefore not removed. There were no problems with multi collinearity between the IVs and the assumption of linearity and homoscedasticity were violated in some analysis (see Appendix 10 Section E). Some research has demonstrated that HMR can be robust to modest violations of assumptions of linearity, normality and homoscedasticity (Osborne 2010). Failing to satisfy the multiple regression assumptions does not mean that the findings are incorrect, the analysis is still valid but weakened as the solutions may under-report the strength of the relationship, and caution was therefore taken in interpreting the findings.

5.7.7 Mediator effects in the relationship between key study variables and health-related quality of life in children
Multivariate analysis was used to test the simple-, multiple- and moderated- mediator effects in the relationship between key study variables and HRQoL in children at year one (i.e. cross-sectional mediation). Further tests of mediator effects analyses were conducted on the same relationships but this time between year one and two (i.e. half-longitudinal mediation). The purpose of this analysis was to identify factors that may explain the effect that child BMI and parent mental health has on child HRQoL and if such factors lie within the causal path. Cross-sectional formulations for mediation act as an important guide for researchers before investigating longitudinal formulations for mediation. A mediator or indirect effect is said to occur when 'the causal effect of an independent variable (X) on a dependent variable (Y) is transmitted by a mediator (M)' (Preacher et al. 2007, p.186). Every mediation model was constructed using multivariate regressions run simultaneously and cross product multiplication of certain regression paths. Each mediation model has regression coefficients of direct effects, indirect effect(s) and a total effect.

In this study, the non-parametric bootstrapping method was used to calculate the standardised betas (β) of the direct effects, indirect effect and total effect (Preacher & Hayes 2004). Bootstrapping involves taking cases from the original dataset and randomly re-sampling these before replacing them, and repeating this process a number of times in order to re-estimate the sampling distribution and obtain a more normal distribution. In this study a bootstrapped sample of n = 5000 was used. From this new sampling distribution, bias corrected (BC) confidence intervals (CI 95%) were constructed. Bootstrapping produces the most accurate confidence intervals compared to other methods (MacKinnon et al. 2004) and detects a significant mediator effect 10%
to 20% more frequently than the parametric Sobel test approach when the sample size and effect size is small (Cheung & Lau 2008). In general, a factor X is said to indirectly effect Y through M when the indirect path coefficient is significantly different from zero or likewise when zero is not contained within the bootstrap Bias Corrected 95% Confidence Interval (BC CI) for the indirect effect coefficient. It is argued by some that all study variables within the path analysis should correlate significantly with each other as a prerequisite to mediation analysis (Judd & Kenny 1981, Baron & Kenny 1986), but others argue that an indirect effect can exist even if some study variables do not significantly correlate (Preacher et al. 2007).

5.7.7.1 Simple mediator effects analysis

Simple mediation is a causal chain involving two related regression equations at one time point: \( M = a_1X + eM \) and \( Y = b_1M + c_1X + eY \) (\( M = \) mediator; \( X = \) predictor; \( Y = \) outcome; \( a_1, b_1, \) and \( c_1 \) are the path coefficients of direct effects; and \( e \) is the residual or unexplained variance). The direct effects, indirect effect and total effect of the simple mediation model are illustrated in Figure below and described as follows: path \( a_1 \) represents the direct effect of \( X \) on \( M \); path \( b_1 \) represents the direct effect of \( M \) on \( Y \), controlling for \( X \); path \( c_1 \) represents the direct effect of \( X \) on \( Y \) controlling for \( M \); path \( a_1b_1 \) represents the indirect effect of \( X \) on \( Y \) through \( M \) or the product of the associated paths; path \( c \) represents the raw correlation between or the total effect of \( X \) on \( Y \), which is the sum of the direct effect plus the indirect effect (\( c_1 + a_1b_1 \)). The subscript _1 indicates that there is only one path due to the cross-sectional design.

If a significant indirect effect was found, the extent to which the indirect effect explained the total effect \( c \) between \( X \) and \( Y \) (i.e. partial or complete mediation) was investigated. If \( M \) completely mediated the \( X \) to \( Y \) relationship, then the direct effect of \( X \) on \( Y \) (controlling for \( M \)) approached zero (i.e. \( c_1 \rightarrow 0 \)). If \( M \) only partially mediated the relationship, then \( c_1 \) did not approach zero. In the social sciences, \( c_1 \) never completely
disappears or equals zero. The proportion of the total effect that is explained by the significant indirect effect was computed by dividing the indirect effect by the total effect \((a_i b_1/(c_1+ a_i b_1))\) (MacKinnon & Dwyer 1993). A proportion greater than 50% indicated complete mediation.

**5.7.7.2 Multiple-step multiple-mediator effects analysis**

Compared to a simple mediation model, a multiple mediator model is a much more realistic model of a process as effects often function through multiple mediators. A simple mediation model can produce estimates of indirect effects that are statistically biased by failing to include all the mediators that might be involved in producing an effect. Multiple-step multiple-mediation is a causal chain involving three related regression equations at one time point: \(M^1 = a_1X + eM^1; M^2 = a_2X + a_3M^1 + eM^2; \) and \(Y = b_1M^1 + b_2M^2 + c_1X + eY\) (\(M^1\) = the first mediator and \(M^2\) = the second mediator). The direct effects, indirect effect, and total effect are illustrated in Figure below and described as follows: path \(a_1\) represents the direct effect of \(X\) on \(M^1\); path \(a_2\) represents the direct effect of \(X\) on \(M^2\) controlling for \(M^1\); path \(b_1\) represents the direct effect of \(M^1\) on \(Y\), controlling for \(X\) and \(M^2\); path \(b_2\) represents the direct effect of \(M^2\) on \(Y\), controlling for \(X\) and \(M^1\); path \(a_3\) represents the direct effect of \(M^1\) on \(M^2\) controlling for \(X\); path \(c_1\) represents the direct effect of \(X\) on \(Y\) controlling for \(M^1\) and \(M^2\); path \(a_1b_1\) represents the indirect effect of \(X\) on \(Y\) through \(M^1\) or the product of the associated paths; path \(a_2b_2\) represents the indirect effect of \(X\) on \(Y\) through \(M^2\) or the product of the associated paths; path \(a_1a_3b_2\) represents the indirect effect of \(X\) on \(Y\) through \(M^1\) then \(M^2\) or the product of the associated paths; and path \(c\) represents the raw correlation between \(X\) and \(Y\) or the total effect of \(X\) on \(Y\), which is the sum of the direct effect plus the indirect effects \((c_1 + a_1b_1 + a_2b_2 + a_1 a_3b_2)\). If a significant indirect effect was found along the path \(a_1a_3b_2\), the extent to which the indirect effect explained the total effect \(c\) between \(X\) and \(Y\) was investigated (see method in simple mediation).

![Fig. 5.6: Path coefficients in a multiple-step multiple-mediation model](image-url)
5.7.7.3 Half-longitudinal mediator effects analysis

Half-longitudinal mediation models with two waves of data (i.e. year one and two) were tested in this study to support the results obtained in cross-sectional mediation (see Cole & Maxwell 2003 for advantages of these models over cross-sectional models). To understand half-longitudinal mediation, longitudinal mediation, which involves at least three waves of data, must first be explained. Longitudinal mediation is a causal chain involving two related regression equations: \( M_t = mM_{t-1} + aX_{t-1} + eM_t \) and \( Y_t = yY_{t-1} + bM_{t-1} + eY_t \) (i.e. the last data collection time point). A three wave longitudinal mediation model (i.e. \( t = 3 \)) consists of direct effects, an indirect (or mediator) effect, and a total effect, which are illustrated in Figure 5.7 below and described as follows: path \( a_{t-1} \) represents the direct effect of \( X_{t-1} \) on \( M_t \), controlling for \( M_{t-1} \); path \( b_t \) represents the direct effect of \( M_t \) on \( Y_t \), controlling for \( Y_{t-1} \); path \( c_t \) represents the direct effect of \( X_{t-2} \) on \( Y_t \), controlling for \( Y_{t-1} \), \( M_{t-1} \), and \( M_{t-2} \); path \( a_{t-2}b_t \) represents the indirect effect of \( X_{t-2} \) on \( Y_t \) through \( M_t \) or the product of the associated paths; and path \( c_t \) represents the raw correlation between or the total effect of \( X_{t-2} \) on \( Y_t \), which is the sum of the direct effect plus the indirect effect \( (c_t + a_{t-2}b_t) \).

Fig. 5.7: Path coefficients in a three wave longitudinal mediation model (wave one and two are in dark blue and third wave is in light blue)

Unlike a three-wave longitudinal model, a two-wave half-longitudinal mediation model assumes stationarity such that the relationship between mediator at time 1 and outcome at time 2 is assumed to remain constant a year later (i.e. it assumes that path \( b_2 \) equals path \( b_3 \) and subsequently that the indirect path \( a_2b_2 \) is equivalent to the indirect path \( a_2b_3 \)). If a significant indirect effect \( a_2b_2 \) was found, the extent to which the indirect effect explained the total effect \( c \) between \( X_1 \) and \( Y_2 \) was
investigated. If $M_2$ completely mediated the $X_1$ to $Y_2$ relationship, then the direct effect of $X_1$ on $Y_2$ (controlling for $M_2$) approached zero (i.e. $c_2 \rightarrow 0$). If $M_2$ only partially mediated the relationship, then $c_2$ did not approach zero. It was not possible, however, to determine the proportion of the total effect explained by the significant indirect effect.

5.7.7.4 Moderated mediator effects analysis

Moderated mediator effects are said to occur when mediation is contingent on the level of a moderator or, in other words, when a predictor ($X$) only exerts its effect indirectly through a mediator ($M$) on some outcome ($Y$) depending on the level of another variable or moderator ($W$) (e.g. the age and gender of the child) (Preacher et al. 2007). A moderated mediation model is a much more realistic than a simple mediation model: a simple mediation model may fail to identify an indirect effect or only identify partial mediation if it fails to test for moderated mediation. There are several forms in which a moderated mediation can occur (Preacher et al. 2007). This study tested only one of those: a fourth variable $W$ affects the path between $X$ and $M$ (i.e. the $a_1$ path of an otherwise simple mediation model is moderated by $W$). This moderated mediation is a causal chain involving two related regression equations at one time point: $M = a_1X + a_2W + a_3MW + eM$ and $Y = b_1M + c_1X + c_2W + c_3XW + eY$ ($W =$ moderator, $MW =$ interaction term for the mediator and moderator). The direct effects, indirect effect, and total effect are illustrated in Figure below and described as follows: path $a_1$ represents the direct effect of $X$ on $M$ controlling for $W$ and $XxW$; path $b_1$ represents the direct effect of $M$ on $Y$, controlling for $X$, $W$ and $XxW$; path $c_1$ represents the direct effect of $X$ on $Y$ controlling for $M$, $W$ and $XxW$; path $a_1b_1$ represents the indirect effect of $X$ on $Y$ through $M$ or the product of the associated paths; path $(a_1 + a_3 \times W \ level) \times b_1$ represents the conditional indirect effect of $X$ on $Y$ through $M$ when there is an interaction between $X$ and another variable $W$ along the $a_1$ path; and path $c$ represents the raw correlation between or the total effect of $X$ on $Y$, which is the sum of the direct effect plus the indirect effect ($c_1 + a_1b_1$).

![Diagram of moderated mediation model](image-url)

**Fig. 5.8: Path coefficients in moderated mediation model**
A factor X indirectly effects Y through M only for one level of the moderator W when two conditions are met: (1) when the interaction XW significantly predicts M over and above the main effects of X and W, independently; and (2) when the indirect path $a_1b_1$ for one of levels of the moderator (i.e. $(a_1 + a_3 \times W$ level) $\times b_1$) is significantly different from zero or likewise when zero is not contained within the bootstrap Bias Corrected 95% Confidence Interval (BC CI) for the indirect effect coefficient of $(a_1 + a_3 \times W$ level) $\times b_1$. If a significant indirect effect for one of the levels of the moderator was found in this study, the extent to which the indirect effect explained the total effect $c$ between X and Y (i.e. partial or complete mediation) was investigated (see method in simple mediation).

Exploratory data analysis

While some distributions of the study IVs and DVs were non normal and skewed, the non-parametric bootstrapping method for calculating the standardised betas of the direct effects, indirect effect (i.e. mediator effect) and total effect in mediation models does not require the assumption of a normal distribution to be met (MacKinnon et al., 2004). Thus, exploratory data analysis was deemed not necessary.

5.8 Data audit and quality control of results

Prior to any analysis, a comprehensive audit of the quality of the data entry was conducted. The database was audited for data entry accuracy and quality. A printout of a random sample of 16 cases of children and 12 cases of parents entered on to the computer were checked against the original paper files. The child audit revealed 4 errors in total. Of these, 2 were real errors among the 4032 data points (i.e. true error rate was 0.10%). The parent audit had a total of 6 errors, with 2 of these being coding errors and 4 real errors among the 2760 data points (i.e. true error rate was 0.14%). These coding errors were rectified and where there were systemic problems in the way a question was entered into the database the problem was corrected for the entire database. Errors encountered during the audit process were subsequently cleaned / corrected.

5.9 Summary of study design

As indicated earlier in Chapter One, this study was undertaken as part of a larger project evaluating the implementation and impact of a Health Promoting School (HPS) initiative in urban disadvantaged primary schools that followed a cohort of children over two years (Comiskey et al. 2012). The study reported here comprised a prospective longitudinal cohort design following children and one of their parents/guardians from year one to year two of the original baseline, year one and year two evaluation.
Determined by the literature, research aims and available resources, a quantitative approach with a quantitative strategy of inquiry dominated this design. The methods chosen included: face-to-face administration of surveys to children; direct measurement of children's height and weight; and over-the-phone administration of surveys to parents/guardians. The data obtained described the demographics, physical and psychosocial aspects of the parent-child dyad sample including children's HRQoL. This data helped determine the predictability of children's HRQoL according to their (1) depressive symptoms; (2) BMI; and (3) the mental health of their parents. All child assessments were carried out at year one and again at year two of the HPS evaluation. The parent survey was cross-sectional and was carried out at year one. An overview of the study execution process is given in Figure 5.9 below.

Guided by a conceptual framework, this study employed a quantitative prospective longitudinal cohort design to investigate predictors of HRQoL in children at year one and year two.

Data collection

Year one

Assessment of HRQoL in children

Assessment of child predictors of HRQoL

Assessment of parent predictors of HRQoL

Year two

Assessment of HRQoL in children

Assessment of child predictors of HRQoL

Check missing data and assumptions of normality. Produce descriptive statistics: absolute participant numbers, relative frequencies, central tendency and dispersion. Produce inferential statistics: direct, indirect and interaction effects, and changes over time and association between changes over time.

Interpretation

Discussion, implications, limitations, and future research

Fig. 5.9: Study execution process
In conclusion, this chapter introduced the study design and highlighted some important ethical considerations that had to be addressed when conducting mental health research with a vulnerable population. Further to this, the methods used to collect the data, ensure data quality, and analyse the data were discussed. Details of the results of these analyses are provided in Chapters Six to Nine.
CHAPTER SIX
Pre-modelling analysis and discussion

6.1 Introduction
The purpose of this chapter is to contextualise and inform the multivariate modelling and findings described in Chapters Seven to Nine. Chapters Seven to Nine investigate the nature and extent of the relationship between HRQoL and the three distinct but related aspects of mental and physical health that are the focus of this study. This chapter first describes the sample of children and parents/guardians at year one, including demographics and physical and psychosocial aspects of the sample. Secondly, a summary of changes in the study variables over a one year period is provided, including changes in the outcome variable - HRQoL. Thirdly, the results from bivariate analysis between all study variables at year one are presented. Within this analysis, confounders of the three main relationships that are the focus of this study are identified, potential mediators of these relationships are highlighted, and the effects of potential moderators on children's HRQoL, depressive symptoms and BMI, and parental mental health are described. All findings of this chapter are discussed within the context of the literature. Finally, a discussion of the implications of these findings for the modelling in Chapters Seven to Nine is presented and areas in need of further research are highlighted. As mentioned previously in Chapter One, parental mental health refers to parent's/guardian's overall mental health status and includes depressive and anxiety symptoms.

It is worth noting first that the disadvantage within the urban disadvantaged setting from which the families were recruited is evident from the children's lack of personally owned schoolbooks, parent's marital status (see below), the school's physical structure and the availability of resources within (e.g. dated buildings and communal playgrounds shared with other schools), and the poorer infrastructure and inadequate services within the community compared to more affluent settings.

6.2 Description of the samples
This section provides a description of the sample of children and parents/guardians at year one of the study.

(a) Description of the sample of children
Table 6.2(a) presents a description of demographics, and physical and psychosocial aspects of the children at year one. Demographic details of the children whose parents/guardians declined participation were largely similar to the recruited sample. Of
the 255 children recruited to the study, half were female, and aged between 7 and 12 years inclusive. Approximately three-quarters (74%, 189/255) were attending schools working toward implementing a Health Promoting School (HPS) model; the remainder (N = 66) were attending the two comparison schools.

Table 6.2(a): Description of the child sample

<table>
<thead>
<tr>
<th>Variables</th>
<th>N (%)</th>
<th>M (SD) range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>255 (100)</td>
<td>9.73 (1.46) 7-12</td>
</tr>
<tr>
<td>Sex</td>
<td>255 (100)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>128 (50)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>127 (50)</td>
<td></td>
</tr>
<tr>
<td>Ethnicity</td>
<td>249 (98)</td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>236 (95)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>13 (5)</td>
<td></td>
</tr>
<tr>
<td>School type</td>
<td>255 (100)</td>
<td></td>
</tr>
<tr>
<td>HPS model</td>
<td>189 (74)</td>
<td></td>
</tr>
<tr>
<td>Non-HPS model</td>
<td>66 (26)</td>
<td></td>
</tr>
<tr>
<td>BMI z-scores</td>
<td>253 (99)</td>
<td>0.84 (1.10) -2.21-4.41</td>
</tr>
<tr>
<td>Underweight</td>
<td>1 (.4)</td>
<td></td>
</tr>
<tr>
<td>Normal weight</td>
<td>156 (61.6)</td>
<td></td>
</tr>
<tr>
<td>Overweight</td>
<td>41 (16)</td>
<td></td>
</tr>
<tr>
<td>Obese</td>
<td>55 (22)</td>
<td></td>
</tr>
<tr>
<td>Body image perception</td>
<td>252 (99)</td>
<td></td>
</tr>
<tr>
<td>Happy with weight</td>
<td>154 (61)</td>
<td></td>
</tr>
<tr>
<td>Would like to lose weight</td>
<td>85 (34)</td>
<td></td>
</tr>
<tr>
<td>Would like to gain weight</td>
<td>13 (5)</td>
<td></td>
</tr>
<tr>
<td>Depressive Symptoms</td>
<td>252 (99)</td>
<td>47.17 (9.9) 40.00-94.00</td>
</tr>
<tr>
<td>Non-cases</td>
<td>235 (92)</td>
<td></td>
</tr>
<tr>
<td>Cases</td>
<td>17 (7)</td>
<td></td>
</tr>
<tr>
<td>Physical Well-being</td>
<td>253 (99)</td>
<td>53.57 (11.1) 20.70-73.20</td>
</tr>
<tr>
<td>Psychological Well-being</td>
<td>252 (99)</td>
<td>53.56 (10.9) 20.55-75.53</td>
</tr>
<tr>
<td>Autonomy and Parent Relations</td>
<td>252 (99)</td>
<td>52.07 (12.9) 13.96-74.39</td>
</tr>
<tr>
<td>Social support and Peer Relations</td>
<td>251 (99)</td>
<td>53.26 (13.3) 11.24-66.34</td>
</tr>
<tr>
<td>School Environment</td>
<td>251 (99)</td>
<td>55.47 (11.9) 16.28-71.00</td>
</tr>
<tr>
<td>Total HRQoL</td>
<td>245 (96)</td>
<td>53.86 (12.0) 26.64-83.81</td>
</tr>
<tr>
<td>Below average total HRQoL</td>
<td>43 (18)</td>
<td></td>
</tr>
<tr>
<td>Average total HRQoL</td>
<td>162 (66)</td>
<td></td>
</tr>
<tr>
<td>Above average total HRQoL</td>
<td>40 (16)</td>
<td></td>
</tr>
</tbody>
</table>

*Mean is a t, z or average score depending on the instrument.*

Table 6.2(a) also describes the HRQoL of children in this study in terms of five dimensions of well-being and one total score as obtained from the Kidscreen 27 measure of HRQoL. The mean score on the HRQoL dimensions and total score at year one were within the average range for the general population of Irish and European children (Kidscreen Group Europe 2006), which was unexpected as children from low SES populations tend to have poorer HRQoL. While nearly a fifth of children (17%, 43/245) fell below the general population average for total HRQoL, the majority of children have a positive HRQoL. The highest mean HRQoL score was in the 'school
environment’ dimension, which is in contrast to the general population of Irish children and children living in socioeconomic disadvantage across Europe where school environment was ranked as the lowest and second lowest mean HRQoL score, respectively (Von Rueden et al. 2006, Keenaghan & Kilroe 2008). This may be explained by the fact that the schools in this study are classed as some of the most disadvantaged in the country (i.e. DEIS band one) and receive additional resources as part of a Government scheme that may be unavailable to other schools. Alternatively, the difference may be explained by social desirability response bias as children in this study completed surveys during class time. That said, a strict fieldwork protocol was followed in order to limit social desirability. The lowest mean HRQoL score in the current study was in the ‘autonomy and parent relations’ dimension. However, for all SES populations this dimension usually ranks somewhere in the middle (Kidscreen Group Europe 2006).

In addition, Table 6.2(a) shows that the mean level of depressive symptoms for children \(M = 47.17, \ SD = 9.86\) was within the average range by international standards (Kovacs 2009), whilst the proportion of children who reached clinically significant levels of depression \(7\%, 17/252\) was at the lower end of the range (i.e. 5% to 20%) of children in the general population who are found to be experiencing depressive symptoms at any given point in time (Edelsohn et al. 1992). The finding that the majority of these children have positive mental health was unexpected given that children from low SES populations are twice as likely to become depressed as those from high SES populations (see Melchior et al. 2007). This is discussed in more detail in Chapter Ten.

Furthermore, over a third of children \(38\%, 96/253\) were considered either overweight \(16\%, 41/253\) or obese \(22\%, 55/253\), which is greater than the rate of 25% observed in a nationally representative sample of Irish children \(N = 19,617\) (Whelton et al. 2007) whilst it is also marginally above the 33% rate in a sample of socioeconomically disadvantaged Irish children in the GUI study (Layte & McCrory 2011). It is noteworthy that for the remainder of the results chapters, children who are underweight are grouped with those of normal weight in accordance with WHO BMI references for the following reasons: WHO BMI references categorise underweight and normal weight children together because they were developed upon data from children and adults (unlike CDC references which are constructed on adult data), they acknowledge that children are rapidly growing and that it is difficult to distinguish between children who are lean and underweight; this study adheres to the same methodology as the national GUI study in using the WHO references; and less than 1%
of children in this study were identified as underweight according to CDC references which is too small a group to conduct analysis on. It is acknowledged, however, that if a larger proportion of children were identified as underweight then these may have to be separated from normal weight children for the purposes of testing if BMI predicts HRQoL because underweight children may score as poor on HRQoL as obese children.

In terms of children’s body image perception, while 62% of children \((N = 154)\) were happy with their weight, nearly two fifths \((39\%, \; 98/252)\) were concerned about their body image, which is slightly more than the third of adolescents in Ireland who have been found in recent work to be dissatisfied with their body image \((O'Connell \; 2012)\). More specifically, just over a third of children in this study would like to lose weight \((34\%, \; 85/252)\), which is nearly double the proportion of 11 to 12-year-old children in Ireland who perceive themselves to be “a bit” or “much too” fat \((18.6\%, \; Kelly \; et \; al. \; 2012)\). These findings were unexpected given that negative perceptions of body image are less likely amongst children from lower social classes \((Walters \; & \; Kendler \; 1995, \; Wardle \; & \; Cooke \; 2005)\).

When considering the weight and body image perception of children (see Fig. 6.1(a) to 6.1(c) below), this study found that just over two thirds of obese children were happy with their weight \((35\%, \; 19/55)\), while just over a quarter of normal weight children had concerns in this respect \((26\%, \; 40/155)\). Indeed, the literature shows that not all overweight and obese children are concerned about their body shape and size and not all normal weight children are happy with their body image \((Brener \; et \; al. \; 2005, \; Daniels \; 2005)\). The percentage of obese children in this study happy with their weight \((35\%)\) is substantially higher than the percentage of obese children from a nationally representative German sample who felt their weight was “just right” \((1\%, \; Kurth \; & \; Ellert \; 2008)\), which is consistent with the literature that finds obese children from low SES populations to be less likely to perceive themselves as obese than those from high SES populations \((O'Dea \; & \; Caputi \; 2001)\). In addition, the percentage of normal weight children in this study happy with their weight \((74\%)\) is substantially higher than the percentage of normal weight children from a nationally representative German sample who felt their weight was just right \((49\%, \; Kurth \; & \; Ellert \; 2008)\), which is consistent with the literature that finds normal weight children with a low SES to be less likely to perceive themselves as overweight than those with a high SES \((O'Dea \; & \; Caputi \; 2001)\).
(b) Description of the parent/guardian sample

Table 6.2(b) provides a description of demographics, and physical and psychosocial aspects of the parents/guardians at year one. The vast majority of the 219 parents/guardians recruited to this study were female (92%, N = 201), biological parents (98%, N = 214) and typically mothers; 2.4% were step or foster parents (N = 5). They were aged between 25 and 61 years with a mean age of 37 (SD = 7.3). A significant proportion were lone parents, whilst most (N = 153) lived with their partner (i.e. another biological parent, step parent or foster parent) (Table 6.2(b)). The ratio of two- to one- parent households in this study (60:40) was, as expected, lower than the ratio in Ireland more generally (80:20), but unexpectedly higher than the ratio in other disadvantaged areas in the country (40:60) (McKeown et al. 2003).

As shown in Table 6.2(b), parents/guardians had a mean social support score of 11.73 (SD 2.34), which is indicative of strong social support (Meltzer 2003). This score is higher than the average social support score (i.e. 10.70 or moderate social support) found in a randomised controlled study in Ireland, albeit one that did not include a
nationally representative sample (Dalgard 2006). While this was unexpected given that socioeconomically disadvantaged persons are at a greater risk of poor social support (Turner & Marino 1994, Krause & Borawski-Clark 1995, Weyers et al. 2010), parent’s high level of perceived social support may be explained by the majority living with their partner, and many of their family and friends living in close proximity to them, as would be expected in such densely populated urban communities. Indeed, additional results show that these parents had contact with their own parents, siblings and friends on average 20 days in a month for each group (SD = 12.4, 11.7 and 11.0 respectively). These communities may also be quite tight-knit.

Table 6.2(b): Description of the parent/guardian sample

<table>
<thead>
<tr>
<th>Variables</th>
<th>N (%)</th>
<th>M (SD) range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children’s family structure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One-parent family</td>
<td>102 (40)</td>
<td></td>
</tr>
<tr>
<td>Two-parent family</td>
<td>153 (60)</td>
<td></td>
</tr>
<tr>
<td>Relationship to child</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td>196 (90)</td>
<td></td>
</tr>
<tr>
<td>Father</td>
<td>18 (8)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>5 (2)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>219 (100)</td>
<td>37.35 (7.29) 25-61</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>93 (42)</td>
<td></td>
</tr>
<tr>
<td>Cohabiting</td>
<td>50 (23)</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>76 (35)</td>
<td></td>
</tr>
<tr>
<td>Education completed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up to junior certificate obtained</td>
<td>102 (47)</td>
<td></td>
</tr>
<tr>
<td>Junior certificate and more obtained</td>
<td>117 (53)</td>
<td></td>
</tr>
<tr>
<td>Employment status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>114 (52)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>105 (48)</td>
<td></td>
</tr>
<tr>
<td>Home</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Owned outright</td>
<td>6 (3)</td>
<td></td>
</tr>
<tr>
<td>Owned with a mortgage</td>
<td>46 (21)</td>
<td></td>
</tr>
<tr>
<td>Rented local authority</td>
<td>153 (70)</td>
<td></td>
</tr>
<tr>
<td>Rented privately</td>
<td>14 (6)</td>
<td></td>
</tr>
<tr>
<td>Perceived social support</td>
<td>219 (100)</td>
<td>11.73 (2.34) 4-14</td>
</tr>
<tr>
<td>Poor</td>
<td>23 (11)</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>55 (25)</td>
<td></td>
</tr>
<tr>
<td>Strong</td>
<td>141 (64)</td>
<td></td>
</tr>
<tr>
<td>Chronic illness</td>
<td>219 (100)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>91 (42)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>128 (58)</td>
<td></td>
</tr>
<tr>
<td>Depressive symptoms</td>
<td></td>
<td>3.93 (4.14) 0-21</td>
</tr>
<tr>
<td>Non-cases</td>
<td>182 (83)</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>19 (9)</td>
<td></td>
</tr>
<tr>
<td>Severe</td>
<td>17 (8)</td>
<td></td>
</tr>
<tr>
<td>Anxiety symptoms</td>
<td></td>
<td>6.70 (4.56) 0-21</td>
</tr>
<tr>
<td>Non-cases</td>
<td>132 (60)</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>47 (22)</td>
<td></td>
</tr>
<tr>
<td>Severe</td>
<td>39 (18)</td>
<td></td>
</tr>
</tbody>
</table>

96
Parents had mean levels of depressive symptoms ($M = 3.93, SD = 4.14$) that fell within the normal range for general populations in the United Kingdom and the Netherlands (Spinhoven et al. 1997, Crawford et al. 2001), and almost one in ten had severe symptoms (8%, $N = 17$), albeit this is at the lower end of the range (i.e. 10% to 16%) of mothers who are estimated to have depressive symptoms in the general population (Reis 1988, O'Hara & Swain 1996). This was unexpected given that there is an increased risk of depression for parents living in socioeconomically deprived areas (Gerald et al. 1994, Deal & Holt 1998, Reading & Reynolds 2001, Kiernan & Huerta 2008). For example Olfson and colleagues (2000) found that 19% of adults living in urban disadvantage are depressed. However, the 17% ($N = 36$) with moderate to severe depressive symptoms in the current study is in line with the latter. The mean level of anxiety symptoms for parents ($M = 6.70, SD = 4.56$) falls within the normal range for a British general population, but above that for a Dutch general population (Spinhoven et al. 1997, Crawford et al. 2001), and nearly one fifth had severe symptoms (18%, 39/218), which is similar to the proportion found in urban disadvantaged populations (e.g. generalized anxiety (14.8%) and panic (8.3%), Olfson et al. 2000). The larger proportion of parents presenting with severe anxiety symptoms over depressive symptoms is consistent with the literature on the prevalence of mental
health disorders in the general population (Wittchen & Jacobi 2005). As for their overall mental health, the mean score \( \mu = 47.22, \sigma = 11.30 \) falls within the average range according to American norms (Ware et al. 2000), but nearly a third of parents had below average scores (30%, 66/219) (i.e. where below average indicates poor mental health). In summary, the majority of these urban disadvantaged parents have a positive mental health, but for those who have poor mental health, anxiety symptoms may be a particular issue.

Table 6.2(b) also shows that parents/guardians had an above average mean parenting self-efficacy score \( \mu = 4.86, \sigma = 0.67 \) when compared to Canadian norms (Johnston & Mash 1989) and an Australian general population (Rogers & Matthews 2004), and only a small percentage scored below the average (5%, 7/159). This indicates that the majority of parents felt that they were successful in their parenting role. This was, to some extent, unexpected given that economic hardship is associated with poorer parenting self-efficacy (Jackson & Scheines 2005, Jackson et al. 2009) and can negatively affect parenting (Gross et al. 1994, Elder Jr et al. 1995, Jackson 2000, Jackson & Huang 2000, Ardelt & Eccles 2001). Although, a likely explanation is that some parents may have inflated their reported beliefs of competency in parenting consciously or perhaps because they are in denial (Conrad et al. 1992).

### 6.3 Changes over time

This section provides a description of changes in study variables over one year using matched pairs based on results from paired-samples t-test, Wilcoxon Signed Rank tests, McNemar tests and binomial tests. Table 6.3 presents changes over time in some but not all study variables: no data were available on the parents/guardians at year two and there were some variables relating to the child (e.g. age and sex) where testing for changes over time was not appropriate. Missing data at either year one or two was excluded pairwise, thus the description of the samples at year two refers only to valid frequencies and means (see Appendix 11 for a full description of absolute and relative frequencies and means at year one and two).

From an initial scan of the means and frequencies in Table 6.3, it appears that some children of normal weight became overweight between year one and two. However, the numbers dissatisfied with their body image decreased, the average score on depressive symptoms improved, whilst the HRQoL dimensions and total score also improved over time, with the exception of physical well-being. Analysis revealed, however, that only the average score on depressive symptoms and the autonomy and parent relations dimension of HRQoL significantly improved over time; the effect sizes
in both cases were small. Notably, the literature indicates that scores on autonomy tend to improve as children get older (Palacio-Vieira et al. 2008, Michel et al. 2009). It is worth noting, however, that the same studies found parent relations to deteriorate as children get older. As children get older they begin to display more individualisation, become more independent from their parents, spend more time with their peers and develop socially (Paikoff & Brooks-Gunn 1991, Bisegger et al. 2005). This more autonomic behaviour may also include the uptake of temporary work in their spare time, thus improving their financial means and financial well-being. The improvement in depressive symptoms over time was not to be expected as the risk of depression tends to increase with age (Parker & Brotchie 2010). However, as HRQoL appeared to improve or improved with time, it is understandable that depressive symptoms might also improve.

As detailed in Chapter One, an impact evaluation of the health outcomes in children over three years was carried out to determine if there were any short term improvements in the health of children as a result of the HPS initiative. This evaluation revealed that the significant improvements in children’s depressive symptoms and autonomy and parent relations scores, or indeed any other significant changes over time, were not attributed to the HPS initiative (Comiskey et al. 2012). During the course of the evaluation, however, a school context or environment effect on children’s health outcomes was identified that pre-dated the implementation of the HPS model, such that children from HPS schools, on average, reported better scores on some health outcomes (e.g. HRQoL) than children from non HPS schools (Comiskey et al. 2012). These results occurred despite the careful matching of schools in terms of disadvantage. Given this finding, the effect of the school context was assessed to determine if it confounded any of the relationships under investigation in this study.
<table>
<thead>
<tr>
<th>Variables</th>
<th>Year one</th>
<th>Year two</th>
<th>Analysis of change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N (%)</td>
<td>M (SD)</td>
<td>N (%)</td>
</tr>
<tr>
<td><strong>BMI z-scores</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underweight/Normal</td>
<td>121 (62)</td>
<td>.91 (1.13)</td>
<td>116 (59)</td>
</tr>
<tr>
<td>Overweight</td>
<td>29 (15)</td>
<td>.91 (1.13)</td>
<td>34 (17)</td>
</tr>
<tr>
<td>Obese</td>
<td>46 (23)</td>
<td>.91 (1.13)</td>
<td>46 (24)</td>
</tr>
<tr>
<td><strong>Body image perception</strong></td>
<td></td>
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<tr>
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<td>.91 (1.13)</td>
<td>133 (68)</td>
</tr>
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<td>Would like to lose weight</td>
<td>65 (33)</td>
<td>.91 (1.13)</td>
<td>55 (28)</td>
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<tr>
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<td>8 (4)</td>
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<tr>
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<td>107 (55)</td>
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<td>128 (67)</td>
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<tr>
<td>Average</td>
<td>55 (29)</td>
<td>.91 (1.13)</td>
<td>38 (20)</td>
</tr>
<tr>
<td>Above average</td>
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<td>.91 (1.13)</td>
<td>26 (13)</td>
</tr>
<tr>
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<td>Psychological well-being</td>
<td>198 (100)</td>
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<td>192 (100)</td>
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<td><strong>Total HRQoL</strong></td>
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<td></td>
<td></td>
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<tr>
<td>Below average</td>
<td>122 (65)</td>
<td>.91 (1.13)</td>
<td>127 (68)</td>
</tr>
<tr>
<td>Average</td>
<td>35 (19)</td>
<td>.91 (1.13)</td>
<td>26 (14)</td>
</tr>
<tr>
<td>Above average</td>
<td>122 (65)</td>
<td>.91 (1.13)</td>
<td>127 (68)</td>
</tr>
</tbody>
</table>

df, T or Z, ES and P is degrees of freedom, t or z test score, effect size and p value. An ES of .01, .06 and .14 are small, medium and large (Cohen 1988).

* significant change over time at p < .05

** significant change over time at p < .01
6.4 Bivariate analysis between all study variables at year one

This section presents the results from bivariate analysis between all study variables at year one, which was central to guiding the analysis of direct, indirect and interaction effects in the three main relationships of focus in this study (see Chapters Seven to Nine). This section highlights the direct effect of child depressive symptoms, child BMI and parent/guardian mental health on the HRQoL of children before controlling for confounders. Subsequently, the confounders of the three main relationships of focus are described. Following this, the potential mediators of these relationships are highlighted and the effects of potential moderators on children’s HRQoL, depressive symptoms and BMI, and parent/guardian mental health are described.

6.4.1 Direct effect of key study variables on the health-related quality of life of children at year one

This section presents results from the bivariate analysis of HRQoL in children at year one with each of the following: child depressive symptoms and BMI, and parent/guardian mental health (see Table 6.4.1). Analysis of associations between continuous independent variables and HRQoL involved Pearson’s r correlations, while analysis of categorical independent variable differences in HRQoL relied on independent t-tests and, where appropriate, one-way between-groups analysis of variance (ANOVA) and post hoc comparisons using the Tukey HSD test.

As shown in Table 6.4.1 and as hypothesised, there was a strong negative correlation between children’s depressive symptoms and their total HRQoL, psychological well-being, and social support and peer relations, while there was a moderate negative correlation between children’s depressive symptoms and physical well-being, autonomy and peer relations, and school environment scores. As expected, the strongest association was with psychological well-being. These findings are in line with other studies in the literature involving general and clinical populations (Bastiaansen et al. 2005, Stevanovic 2012). Differences in the HRQoL scores between clinically and non-clinically depressed groups of children were not tested due to the small number deemed to be clinically depressed.
Table 6.4.1: Relationship between physical and psychological aspects and HRQoL at year one (Correlation and ANOVAs)

Dimensions of and total HRQoL in children

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Physical Well-being M (SD) ES</th>
<th>Psychological Well-being M (SD) ES</th>
<th>Autonomy and Parent Relations M (SD) ES</th>
<th>Social Support and Peer Relations M (SD) ES</th>
<th>School Environment M (SD) ES</th>
<th>Total HRQoL M (SD) ES</th>
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</thead>
<tbody>
<tr>
<td>Child depressive symptoms§</td>
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<td>-.63**</td>
<td>-.44**</td>
<td>-.54**</td>
<td>-.45**</td>
<td>-.55**</td>
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<tr>
<td>Child BMI z-scores§</td>
<td>-.17**</td>
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<td>-.13*</td>
<td>-.12</td>
<td>-.08</td>
<td>-.15*</td>
</tr>
<tr>
<td>Normal/Underweight (ref)</td>
<td>55.07 (11.28)</td>
<td>54.98 (11.04)</td>
<td>52.93 (12.63)</td>
<td>54.16 (12.90)</td>
<td>56.11 (11.91)</td>
<td>55.29 (12.59)</td>
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<tr>
<td>Overweight</td>
<td>52.08 (11.50)</td>
<td>51.37 (10.96)</td>
<td>52.11 (13.93)</td>
<td>52.29 (12.74)</td>
<td>54.57 (11.11)</td>
<td>52.08 (11.79)</td>
</tr>
<tr>
<td>Obese</td>
<td>50.51 (9.48) .03*</td>
<td>51.20 (10.45) .03*</td>
<td>48.92 (12.30)</td>
<td>50.94 (14.51)</td>
<td>54.30 (12.25)</td>
<td>50.78 (9.99) .03*</td>
</tr>
<tr>
<td>Parent depressive symptoms§</td>
<td>.07</td>
<td>.02</td>
<td>.04</td>
<td>.04</td>
<td>-.03</td>
<td>.02</td>
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<td>.09</td>
<td>.10</td>
<td>.06</td>
<td>.13*</td>
<td>.17**</td>
<td>.14*</td>
</tr>
</tbody>
</table>

ES is effect size. ANOVA effect sizes are small at 0.01, medium at 0.06, and large at 0.14 (Cohen 1988).

§ Pearson correlation coefficients are given. Effect size is small when r = ±.10 to ±.29; medium when r = ±.30 to ±.49; and large when r = ±.50 to ±1.0 (Cohen 1988).

b Spearman's rho coefficients are given.

* p<.05
** p <.01
p = .054

ANOVA found a small significant difference between groups but post-hoc test did not identify any.
As hypothesised, children's BMI was also negatively correlated with HRQoL scores. More specifically, there was a weak negative correlation between children's BMI and total HRQoL, and both the physical well-being and autonomy and peer relations dimensions, and a marginally significant negative correlation between children's BMI and psychological well-being. Children were also divided into three groups according to their BMI (Group 1: normal/underweight; Group 2: overweight; Group 3: obese). Similar to the HRQoL dimensions affected by BMI (i.e. interval data), there was a statistically significantly, albeit only small difference in total HRQoL and physical well-being scores between the three weight categories and there was a marginally significant difference in psychological well-being scores between the three weight categories. More specifically, post-hoc comparisons found, as hypothesised, that normal weight children reported significantly higher HRQoL (total, physical and psychological well-being) than children in the obese group. Unexpectedly, there was no difference in the autonomy and parent relations dimension between those obese and of normal weight, and there were no differences in HRQoL scores between normal weight and overweight children. It is important to note here, however, that neither weight group fell below the average European HRQoL range.

Unexpectedly, there were no significant correlations found between children's HRQoL and parent/guardian mental health status, depressive symptoms or anxiety symptoms using parametric tests. However, non-parametric tests revealed that parent/guardian mental health status weakly positively correlated with children's total HRQoL, social support and peer relations and the school environment dimension (see Table 6.4.1 above).

6.4.2 Confounders of the relationship between key study variables and health-related quality of life in children at year one

To determine the true effect of child depressive symptoms, child BMI, and parent/guardian mental health on the HRQoL of children, confounders of the relationship must be identified. This was carried out by investigating Pearson's r correlations between all study variables at year one (see Table 6.4.2 below) and determining if potential confounders met the following criteria: (1) the factor must correlate with the outcome; (2) the factor must correlate with the risk factor; and (3) the factor must not be a mediator. Based on these criteria, only body image perception was found to confound the relationship between depressive symptoms and HRQoL. No variables were found to confound the relationship between BMI and HRQoL or between parental mental health and HRQoL.
Table 6.4.2: Pearson's r correlations between all study variables

<table>
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<th>Variables</th>
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<td>.18*</td>
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<td>.52**</td>
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<tr>
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<td>-.09</td>
<td>.03</td>
<td>-.13*</td>
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<td>.55**</td>
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<td>-.08</td>
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<td>-.05</td>
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<td>.09</td>
<td>.68**</td>
<td>.75**</td>
<td>.72**</td>
<td>.65**</td>
</tr>
</tbody>
</table>

Effect size is small when $r = \pm 10$ to $\pm 29$; medium when $r = \pm 30$ to $\pm 49$; and large when $r = \pm 50$ to $\pm 1.0$ (Cohen 1988).

Although not presented here, the following did not reach criteria as confounders: child ethnicity, asthma, absenteeism rate, or parent's relationship to the child, education, marital status, ownership of home, work status, smoking, alcohol consumption, physical status or parenting satisfaction.

*p < .05

**p < .01
It is worth noting that, while children attending HPS intervention schools reported significantly higher physical well-being than children in comparison schools (small effect size), the school context did not confound any of the main relationships of focus in this study. The next two sections discuss potential mediators and moderators of the three relationships of focus in this study (with reference to Table 6.4.2).

6.4.3 Potential mediators of the relationship between key study variables and health-related quality of life in children at year one

Prior to investigating the indirect effects in the relationship between children's HRQoL and both their BMI and their parent's/guardian's mental health, an investigation of the direct effects of all variables in the mediating path on each other, was carried out to identify potential mediators (i.e. pre-mediation analysis). There are some who argue that significant bivariate associations should be identified between each of the variables in a mediation model prior to testing mediator effects (Kenny 1979). Conversely however, others argue that significant bivariate associations between path variables is not a pre-requirement to mediation analysis and that mediation is said to occur simply when a significant indirect effect is found (Preacher et al. 2007). The literature indicates that (a) body image perception and depressive symptoms may mediate the relationship between BMI and HRQoL in children, while (b) parenting self-efficacy and child depressive symptoms may mediate the relationship between parent/guardian mental health and child HRQoL. The following sections describe the bivariate associations between variables in the mediation paths (a) and (b).

(a) Potential mediation by depressive symptoms and body image perception in the relationship between body mass index and health-related quality of life in children at year one

This section describes the bivariate associations in the path BMI->body image perception->depressive symptoms->HRQoL. Table 6.4.2 above revealed that, at year one, depressive symptoms were inversely related to all HRQoL dimensions and total score (r = -.55, p < .01). Table 6.4.3 below describes the relationship between body image perception and HRQoL. Children were divided into three groups according to their body image perception (Group 1: happy with their weight; Group 2: would like to lose weight; Group 3: would like to put on weight). Initially, an ANOVA revealed that there was a statistically significant difference between the three body image perceptions with regard to total HRQoL (F(2, 240)=12.747, eta^2=.10, p<.01) and on all five dimensions. The magnitude of the differences in the means was moderately large for physical well-being, small for social support and peer relations, and moderate for all others. Post-hoc comparisons then found that, as expected, children who were happy
with their weight (Group 1) reported significantly higher HRQoL than children who wanted to lose weight (Group 2) in terms of total HRQoL (eta^2=.10, p<.01) and all dimensions except for social support and peer relations. Furthermore, children who were happy with their weight reported significantly higher HRQoL than children who wanted to gain weight (Group 3), but only on the psychological well-being dimension (eta^2=.08, p<.05).

Children's body image perception was subsequently divided into two groups (Group 1: happy with body image; Group 2: concerned about body image) so that the mediation analysis presented in Chapter Eight would be easier to interpret (see Table 6.4.3 below). With similar effect sizes as in the previous findings, independent t-tests showed that children who were happy with their body image reported significantly higher HRQoL (in terms of overall score (t(241)=3.822, eta^2=.10, p<.001) and on individual dimensions) than those who were concerned about their body image. These results are comparable to other studies that have focused on total HRQoL (Haraldstad et al. 2011a, Edwards et al. 2012a). For example, Haraldstad and colleagues (2011) found that body image perception was a strong predictor of young people's HRQoL (8 - 18 years, N = 1066).

Table 6.4.3 also presents the differences in HRQoL at year one for obese children who were happy with their body image and normal weight children who were concerned about their body image (using independent t-tests). Expectedly, obese children who were happy with their body image had a higher HRQoL than normal weight children who were concerned about their body image, but only with regard to the physical well-being (t(58)=-2.059, eta^2=.07, p<.05) and school environment (t(57)=-2.027, eta^2=.07, p<.05) dimensions. This compares favourably to a study that investigated the HRQoL of a nationally representative German sample of young people (11 to 17 years, N = 6669), which found that obese youths have a higher HRQoL than those normal weight who only perceive themselves as being overweight (Kurth & Ellert 2008). This finding suggests that body image perception may mediate the relationship between BMI and HRQoL.
### Table 6.4.3: Relationship between body image perception and HRQoL at year one

Dimensions of and total HRQoL in children

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Physical Well-being</th>
<th>Psychological Well-being</th>
<th>Autonomy &amp; Parent Relations</th>
<th>Social Support &amp; Peer Relations</th>
<th>School Environment</th>
<th>Total HRQoL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>M (SD) ES</td>
<td>M (SD) ES</td>
<td>M (SD) ES</td>
<td>M (SD) ES</td>
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<tr>
<td><strong>Body image perception</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Happy with body image (ref)</td>
<td>56.76 (10.48)</td>
<td>56.16 (9.83)</td>
<td>54.77 (12.02)</td>
<td>54.91 (12.10)</td>
<td>57.83 (10.70)</td>
<td>56.88 (11.48)</td>
</tr>
<tr>
<td>Concerned about body image</td>
<td>48.47 (10.11) .13**</td>
<td>49.74 (11.60) .08**</td>
<td>48.04 (13.04) .07**</td>
<td>50.75 (14.69) .02*</td>
<td>51.86 (12.72) .06**</td>
<td>49.27 (11.42) .10**</td>
</tr>
<tr>
<td>Or Happy with weight (ref)</td>
<td>56.76 (10.48)</td>
<td>56.16 (9.83)</td>
<td>54.77 (12.02)</td>
<td>54.91 (12.10)</td>
<td>57.83 (10.70)</td>
<td>56.88 (11.48)</td>
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<tr>
<td>Would like to lose weight</td>
<td>48.26 (10.24) .13**</td>
<td>49.99 (11.71) .08**</td>
<td>48.11 (12.81) .07**</td>
<td>51.34 (14.89) *</td>
<td>51.70 (12.76) .06**</td>
<td>49.06 (11.29) .10**</td>
</tr>
<tr>
<td>Would like to gain weight</td>
<td>49.80 (9.50)</td>
<td>48.10 (11.17) .08*</td>
<td>47.59 (15.05)</td>
<td>47.01 (13.24)</td>
<td>52.88 (12.96)</td>
<td>50.60 (12.61)</td>
</tr>
<tr>
<td><strong>Body image perception &amp; weight</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal weight &amp; concerned (ref)</td>
<td>49.29 (1.19)</td>
<td>50.75 (12.94)</td>
<td>46.55 (12.33)</td>
<td>49.76 (15.31)</td>
<td>52.21 (13.33)</td>
<td>49.77 (13.48)</td>
</tr>
<tr>
<td>Obese &amp; not concerned</td>
<td>55.34 (9.69) .07*</td>
<td>56.69 (11.24)</td>
<td>51.69 (11.24)</td>
<td>53.44 (14.09)</td>
<td>58.30 (9.48) .07*</td>
<td>55.06 (9.96)</td>
</tr>
</tbody>
</table>

ES is effect size. T test and ANOVA effect sizes are small at 0.01, medium at 0.06, and large at 0.14 (Cohen 1988).

\* p < .05
\** p < .01
\* ANOVA found a small significant difference between groups but post-hoc test did not identify any.
Finally, this section presents a summary of the common significant associations between variables in the path 'BMI->body image perception->depressive symptoms->HRQoL' (refer to Table 6.4.2 above and Figure 6.2 below):

- BMI was inversely related to total HRQoL ($r = -0.15$, $p < 0.05$), physical well-being and autonomy and parent relations;
- body image perception was also positively associated with total HRQoL ($r = 0.31$, $p < 0.01$), physical well-being, and autonomy and parent relations;
- depressive symptoms was inversely related to total HRQoL ($r = -0.55$, $p < 0.01$), physical well-being and autonomy and parent relations;
- body image perception was inversely related to depressive symptoms ($r = -0.29$, $p < 0.01$);
- BMI was inversely related to body image perception ($r = -0.34$, $p < 0.01$);
- but notably, there was no significant correlation between BMI and depressive symptoms;
- body image perception and depressive symptoms correlated with other HRQoL dimensions, but because BMI did not, the results are not shown in Figure 6.2.

Overall, these findings suggest that body image perception and depressive symptoms may be the mechanisms by which BMI impacts total HRQoL, physical well-being, and autonomy and parent relations.

Fig. 6.2: Pearson correlations between variables in the path between BMI and HRQoL: potential mediators include body image perception and depressive symptoms
Potential mediation by parenting self-efficacy in the relationship between parent/guardian mental health and health-related quality of life in children at year one

This section summarises the common significant associations at year one between variables in the path ‘parent/guardian mental health status->parenting self-efficacy->HRQoL’ (refer to Table 6.4.2 above and Figure 6.3 below):

- parental mental health status was positively associated with parenting self-efficacy ($r=.16$, $p<.05$);
- there was a weak positive correlation between parenting self-efficacy and children's school well-being ($r=.17$, $p<.05$) suggesting that the more efficient parents feel in their parenting role, the higher the school well-being scores for children; and finally
- parental mental health status weakly positively correlated with children's school well-being ($r=.16$, $p<.05$) as well as their total HRQoL, social support and peer relations.

Hence, these results suggest that parenting self-efficacy may mediate the relationship between parental mental health status and children's school well-being. While it was hypothesised that child depressive symptoms mediate the relationship between parental mental health/parenting self-efficacy and children’s HRQoL, child depressive symptoms were not associated with the former.

Fig. 6.3: Pearson correlations between variables in the path between parent/guardian mental health status and HRQoL in children: potential mediators include parenting self-efficacy
6.4.4 Potential moderators of the relationship between key study variables and health-related quality of life in children at year one

The primary aim of the analysis described in Chapters Seven to Nine was to determine if certain factors (i.e. child age, child gender, family structure, parent/guardian perceived social support and parent/guardian depressive symptoms) moderate the relationship between HRQoL and the three constructs of focus in this study. In order to contextualise and inform the analysis and findings within these chapters, a summary of the significant bivariate relationships in terms of each potential moderator is provided below (results extracted from Table 6.4.2).

Child age

A negative correlation was identified between age and the school environment dimension, which is consistent with the HRQoL literature that children report poorer school well-being as they get older (Palacio-Vieira et al. 2008, Michel et al. 2009). In addition, a positive correlation was found between age and the autonomy and parent relations dimension. The finding that children become more autonomous with age is indicated in the HRQoL literature, but the quality of relations with parents, on the other hand, tends to deteriorate slightly with age (Benjet & Hernández-Guzmán 2002, Palacio-Vieira et al. 2008). That said, the effect sizes were weak. Unexpectedly, the age of the child was not related to their depressive symptoms, despite evidence that children are more likely to experience depression during puberty (Jorm 1987, Merikangas et al. 2010, Parker & Brotchie 2010). However, the onset of puberty varies between 10 and 13 years of age and the children in this study are aged 7 to 12 years inclusive. Understandably children’s age alone was not associated with their BMI or their parent’s mental health.

Child gender

As expected from the HRQoL literature (Bisegger et al. 2005, Michel et al. 2009), boys scored significantly higher than girls on the social support and peer relations dimension and the school environment dimension, but the magnitude of the differences in the means was small. However, significant differences usually are not seen until children reach the age of twelve (Benjet & Hernández-Guzmán 2002, Palacio-Vieira et al. 2008). Even though females are more vulnerable to depression (Parker & Brotchie 2010), child gender was not related to depressive symptoms in this study. That said, differences may only be seen between genders from puberty onwards (Parker & Brotchie 2010). It is understandable, however, that the gender of the child alone was not associated with their BMI or their parent’s mental health.
Parent/guardian perceived social support

Parent/guardian perceived social support was not associated with HRQoL or depressive symptoms in children, but significant findings in the literature that children whose parents have strong social support are less likely to experience poor HRQoL (Bastiaanssen 2005, Bastiaanssen et al. 2005) and depression (Kotchick et al. 1997, Feldman et al. 2004, Koverola et al. 2005) are rare, possibly because social support can be a protective factor that mostly serves to protect children when they are faced with a threat to their health. However, overall parental mental health status was positively correlated with parental perceived social support in this study, and more specifically, their depressive and anxiety symptoms were inversely correlated with it (small, moderate and small effect sizes, respectively). Indeed, the finding that strong social support was related to positive parental mental health is common in the literature (see Cairney et al. 2003). Parental perceived social support was also weakly positively associated with parenting self efficacy in this study, which is also common in the literature (e.g. Stoneman & Crapps 1988, Gowen et al. 1989, Haldy & Hanzlik 1990). Unexpectedly, parent’s perceived social support was positively associated with children’s BMI, meaning that as parent’s social support becomes stronger, children’s BMI increases towards obesity. While this finding is difficult to explain, it is important to note that the effect size was only small and while the literature finds that children whose parents have strong social support are less likely to be obese (Gerald et al. 1994, Watt et al. 2012), this is not always the case (Koch et al. 2008). The inconsistent findings in the literature and knowledge that social support mostly serves as a protective factor suggests that there may be other factors that explain why parental social support positively correlated with children’s BMI.

Family structure

Family structure is considered a crude indicator of social support. For example, it is assumed that children in a two-parent family have greater social support than children in a one-parent family. Although the literature documents that children from a two-parent family are less likely to have poorer HRQoL (Bradley & Corwyn 2004, Swallen et al. 2005, Kvarme et al. 2009), to experience depression (McLanahan & Bumpass 1988, O’Connor et al. 2001, Cuffe et al. 2005, Bramlett & Blumberg 2007, Côté et al. 2009) and obesity (Strauss & Knight 1999, Gibson et al. 2007, Hesketh et al. 2007, Ohlseyer et al. 2007, Guilfoyle et al. 2010) than children from one-parent families, family structure was not related to children’s HRQoL, depressive symptoms or BMI in this study. However, this may be because on average the children in this study have parents (even single parents) with strong social support who have a lot of contact per month with relatives outside the family home (see Table 6.2(b) above), and hence,
children's health outcomes may not differ between one and two parent families. Consistent with the literature (see Cairney et al. 2003), parental mental health status was significantly better in two-parent than one-parent families, albeit the magnitude of difference was only small.

**Parent/guardian depressive symptoms**

Results from bivariate analysis with parent/guardian depressive symptoms were unexpected. As already documented, parental depressive symptoms did not correlate with children's HRQoL or their depressive symptoms, despite evidence in the literature that parent depression increases the risk of poor HRQoL (Jeske et al. 2010, Wiegand-Grefe et al. 2010) and depression (e.g. Oyserman et al. 2000) in children. Although in terms of children's HRQoL, research is limited to those two studies and only weak correlations were identified within. A lack of correlation may be because parents were recruited from a non-clinical population and only a small proportion had clinical levels of depression or because parents with high depressive symptoms continue to parent effectively. Finally, the finding that as parental depressive symptoms increased children's BMI decreased (weak correlation) is in contrast to the literature that finds children with depressed parents to be at a greater risk of obesity (e.g. Epstein et al. 1994, Epstein et al. 1996, Zipper et al. 2001, Zeller et al. 2007). However, that association is not consistently found in the literature (e.g. Gibson et al. 2007) and there may be factors that are confounding the relationship between parent depression and offspring obesity which were not measured in this study and thus could not be controlled for (e.g. parent's weight or experience of prenatal depression).

**6.5 Implications for modelling and directions for future research**

This chapter provided a description of the study sample between year one and two and identified bivariate associations between study variables, which together, help to provide a context for, and guide, the modelling described in Chapters Seven to Nine. A summary of the findings and their implications for the modelling in these chapters is now presented. This chapter also identified several unexpected findings, and in light of these, some directions for future research are proposed here, some of which are discussed in more detail in Chapter Ten.

**Description of the study sample**

In summary, there were equal numbers of male and female children recruited. The finding that children's mean HRQoL scores were better than, and the proportion with clinical depressive symptoms was lower than, what would be expected for such disadvantaged populations and that their depressive symptoms significantly improved
over time, even though the risk of such tends to increase with age, suggests that there may be intrapersonal resources or contextual factors protecting this cohort’s mental health and well-being from the negative effects of poverty and maturation. The health promoting processes occurring within the school context that potentially circumvent the risks of developing depression and poor HRQoL should be the focus of future research given the finding that children’s school well-being ranked highest and higher than national and international norms and that differences in children’s physical well-being were found across schools. In addition, a comparison of the prevalence of depressive symptoms and poor HRQoL in children attending schools that are designated disadvantaged at the different DEIS band levels may shed more light on the positive mental health and well-being observed on average in this sample. A discussion of the mental health promotion initiatives for children that are proving to be effective is provided in Chapter Ten. It is worth noting that, as expected, 'autonomy and parent relations' also improved over time. In terms of the implications for modelling, the small proportion of children with clinical depressive symptoms in this sample may make it difficult to identify significant effects in modelling in Chapter Seven (this is discussed further in Chapter Ten). In addition, the identified improvements in mental health and well-being over time should be taken into consideration when interpreting the results from modelling the extent to which one factor predicts HRQoL over time and from investigating mediator effects in a half-longitudinal design in Chapters Seven to Nine.

Furthermore, the finding that rates of body image concern and overweight states were higher than international and national averages and worse than outcomes expected from low SES populations indicates that internalisation of “thin ideals” and subsequent dissatisfaction with body image, and sedentary behaviour and/or intake of foods with high fat content, may be occurring to a greater extent in highly disadvantaged urban communities. The implications for policy and practice in terms of the need for greater attention to be given to body image concerns and preventing the development of such, and the effectiveness of obesity prevention initiatives, are explored in the discussion in Chapter Ten. As expected from low SES populations, however, the proportion of obese children happy with their body image was greater than the general population. That said, this finding has implications for the general assumption by health care providers that all overweight children need an intervention and is discussed in Chapter Ten. These findings should not affect the modelling presented in Chapter Eight.

The fact that the majority of parents/guardians were mothers is an important consideration when interpreting HRQoL models in relation to parental mental health in Chapter Seven to Nine as the literature suggests that maternal mental ill-health has a
greater impact on the health outcomes of children than paternal mental ill-health. This demographic is discussed further under limitations and direction for future research in Chapter Ten. Furthermore, the finding that parents have a strong perceived social support on average and a score higher than a national mean even though poorer social support is expected in populations that are highly disadvantaged, suggests that the majority of children may be protected from the risk of poverty and parental mental ill-health etc. This should be considered when interpreting modelling findings. The possibility that parent's perceived social support is strong because the majority live with a partner and have regular contact with friends and family, suggests that future research should investigate how tight-knit highly populated urban communities are and whether proximity to family and friends in these densely populated areas is responsible for the strong social support. Tangible or instrumental support available to parents in such communities should also be considered alongside informal supports.

In terms of parent's mental health, the finding that the mean score of parental anxiety symptoms was slightly above international norms and similar to other urban disadvantaged populations highlights the critical need for primary care practices serving poor urban populations to provide access to mental health services. This is discussed in more detail in Chapter Ten. However, the finding that the mean scores of parental depressive symptoms and overall mental health status have fallen within international norms and that the proportion with clinical depressive symptoms was smaller than what was expected from adults living in high disadvantage, brings into question how representative of disadvantaged populations are these parents/guardians. This may have consequences for identifying significant effects in modelling. The latter description is discussed in more detail under limitations of this study and directions for future research in Chapter Ten.

The additional finding that the average parenting self-efficacy score was above international norms despite evidence from the literature that socioeconomic hardship is associated with lower confidence in parenting ability, suggests that inflated responses may have been provided and may, in turn, bias the modelling results. Caution should be taken when interpreting the findings. Future research should study potential bias in self-report of parenting self-efficacy and this study could be replicated using a proxy reported measure of parental competence (e.g. child report).

**Bivariate associations**

As hypothesised, significant bivariate associations were identified between children's HRQoL and the three constructs of focus in this study and these relationships are
explored in greater detail in Chapters Seven to Nine. While a significant bivariate association was found between parent’s overall mental health and children’s HRQoL, unexpectedly there were no statistically significant associations identified between parental depressive or anxiety symptoms and children’s HRQoL. This finding limits the analysis of Chapter Nine. Body image perception was the only confounder identified in the relationship between depressive symptoms and HRQoL in children and is controlled for in Chapter Seven. In addition, the results suggest that body image perception and depressive symptoms may mediate the relationship between BMI and each of total HRQoL, autonomy and parent relations, and physical and psychological well-being. However, the marginally significant association between BMI and psychological well-being may reduce the chances of identifying an indirect effect. These potential indirect effects are investigated further in Chapter Eight. The finding within this chapter that obese children happy with their weight have a more positive HRQoL than normal weight children concerned about their weight is further evidence of the potential mediating effect of body image perception. The latter finding has implications for screening for and targeting interventions at children who are overweight and is discussed in more detail in Chapter Ten. Furthermore, results indicate that parenting self-efficacy may mediate the relationship between parental mental health status and the school environment dimension of children’s HRQoL. Results from the mediation analysis investigating this causal path are presented in Chapter Nine.

Finally, some main effects were identified between potential moderators and HRQoL and between potential moderators and the three constructs of focus in this study, which also provide a context for the modelling detailed in Chapters Seven to Nine. The majority of these findings were consistent with the literature, but the finding that greater levels of parental depressive symptoms and lower levels of parental social support are associated with low BMI in children and not high BMI is in contrast to existing research and suggests that other factors (that were not measured) may be confounding these relationships. These findings should be considered when interpreting the modelling in Chapter Eight. Future research should replicate this study but include measures of parent’s weight and their experience of prenatal depression.
The relationship between depressive symptoms and health-related quality of life in children

7.1 Introduction
This chapter presents results from a series of analyses investigating the nature and extent of the relationship between depressive symptoms and HRQoL in children. This includes, first of all, the direct effect of depressive symptoms on HRQoL after controlling for confounders at both year one and two. Second, the ability for depressive symptoms to predict HRQoL a year later and the association between changes in depressive symptoms and HRQoL over time, is described. Third, the results of moderator effects of the relationship between depressive symptoms and HRQoL at year one is presented.

7.2 Direct effect of depressive symptoms on health-related quality of life in children when controlling for confounders
This section describes, at both year one and two, the effect of depressive symptoms on HRQoL after controlling for one confounder (i.e. body image perception) using a two step Hierarchical Multiple Regression (HMR) model (Table 7.2 below). Recall from Chapter Six Section 6.4.2 that body image perception was identified as a confounder of the relationship between depressive symptoms and HRQoL (i.e. an extraneous variable that could bias the effect), and thus it is controlled for here. It is also worth recalling here, that this study tested if depressive symptoms mediate the effect of body image perception on HRQoL and tested if body image perception mediated the effect of BMI on HRQoL through depressive symptoms (see Chapter Eight for results).

As hypothesised, the results revealed that, at year one and two, children’s depressive symptoms had a moderate inverse relationship with physical well-being and a strong inverse relationship with both total HRQoL and all other dimensions after, as well as before, controlling for the confounder. At year two, however, depressive symptoms appear to explain more of the variance in psychological well-being and school environment scores, but less of the variance in physical well-being scores than at year one. More specifically in terms of year one, every point increase in children’s depressive symptoms was associated with a 0.26 to a 0.60 point decrease in total HRQoL and dimensions. Psychological well-being had the largest point decrease, while physical well-being had the smallest point decrease with increasing depression. Depressive symptoms explained a large proportion of the variance in HRQoL dimensions and total score (i.e. $R^2$ change ranges from 6% to 33%).
Table 7.2: Standardised coefficients in the relationship between depressive symptoms and HRQoL in children at year one and two when controlling for a confounder

<table>
<thead>
<tr>
<th>Dimensions of and total HRQoL in children</th>
<th>Physical Well-being</th>
<th>Psychological Well-being</th>
<th>Autonomy and Parent Relations</th>
<th>Social Support and Peer Relations</th>
<th>School Environment</th>
<th>Total HRQoL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year one</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$R^2$</td>
<td>.13**</td>
<td>.08**</td>
<td>.07**</td>
<td>.02*</td>
<td>.06**</td>
<td>.10**</td>
</tr>
<tr>
<td>$R^2$ change</td>
<td>.06**</td>
<td>.33**</td>
<td>.15**</td>
<td>.26**</td>
<td>.15**</td>
<td>.23**</td>
</tr>
<tr>
<td>$R^2$-adjusted</td>
<td>.19**</td>
<td>.41**</td>
<td>.21**</td>
<td>.29**</td>
<td>.21**</td>
<td>.33**</td>
</tr>
<tr>
<td>$F$ (df)</td>
<td>29.96** (2, 246)</td>
<td>86.62** (2, 246)</td>
<td>33.21** (2, 246)</td>
<td>49.20** (2, 245)</td>
<td>33.04** (2, 245)</td>
<td>57.93** (2, 239)</td>
</tr>
<tr>
<td>Body image perception $\beta_1$</td>
<td>.29**</td>
<td>.11*</td>
<td>.14*</td>
<td>-.01</td>
<td>.13*</td>
<td>.16**</td>
</tr>
<tr>
<td>Depressive symptoms $\beta_2$</td>
<td>-.26**</td>
<td>-.60**</td>
<td>-.40**</td>
<td>-.54**</td>
<td>-.41**</td>
<td>-.50**</td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$R^2$</td>
<td>.07**</td>
<td>.09**</td>
<td>.04**</td>
<td>.07**</td>
<td>.06**</td>
<td>.08**</td>
</tr>
<tr>
<td>$R^2$ change</td>
<td>.02**</td>
<td>.40**</td>
<td>.14**</td>
<td>.27**</td>
<td>.19**</td>
<td>.23**</td>
</tr>
<tr>
<td>$R^2$-adjusted</td>
<td>.09*</td>
<td>.49**</td>
<td>.18**</td>
<td>.34**</td>
<td>.25**</td>
<td>.31**</td>
</tr>
<tr>
<td>$F$ (df)</td>
<td>9.525** (2, 190)</td>
<td>92.369** (2, 190)</td>
<td>21.06** (2, 190)</td>
<td>47.74** (2, 187)</td>
<td>31.87** (2, 187)</td>
<td>41.93** (2, 186)</td>
</tr>
<tr>
<td>Body image perception $\beta_1$</td>
<td>.23**</td>
<td>.13*</td>
<td>.09</td>
<td>.12</td>
<td>.13</td>
<td>.16**</td>
</tr>
<tr>
<td>Depressive symptoms $\beta_2$</td>
<td>-.15*</td>
<td>-.66**</td>
<td>-.40**</td>
<td>-.54**</td>
<td>-.45**</td>
<td>-.50**</td>
</tr>
</tbody>
</table>

$\beta$ is standardised beta from the final models only. Effect size of 0.02, 0.15, and 0.35 are termed small, medium, and large, respectively (Cohen, 1988).

* $p < .05$

** $p < .01$
7.3 Depressive symptoms and the prediction of health-related quality of life in children a year later

This section describes the extent to which depressive symptoms predicted HRQoL a year later and the association between changes in this construct and HRQoL over time using Pearson’s r correlations (Table 7.3(a) and (b)). The results showed that depressive symptoms predicted HRQoL a year later (both on all dimensions and with regard to the total overall score), and vice versa. As expected, depressive symptoms had the largest effect on psychological well-being and the smallest effect on physical well-being (Table 7.3(a)). Secondary analysis revealed that the improvement in depressive symptoms over time moderately predicted improvement in school environment and autonomy and parent relations scores and strongly predicted improved scores on total HRQoL, psychological well-being and social support and peer relations, and vice versa (Table 7.3(b)). However, the change in depressive symptoms did not predict any change in physical well-being or vice versa. Notably, as indicated in the previous chapter, ‘autonomy and parent relations’ was the only dimension to show significant improvement over time (Table 6.3). As for the mean score of the other HRQoL distributions, all showed slight improvements over time except for physical well-being, which showed a slight decline.
Table 7.3(a): Pearson's $r$ correlation between depressive symptoms at year one and HRQoL in children at year two

<table>
<thead>
<tr>
<th>Dimensions of and total HRQoL in children at year two</th>
<th>Physical Well-being</th>
<th>Psychological Well-being</th>
<th>Autonomy &amp; Parent Relations</th>
<th>Social Support &amp; Peer Relations</th>
<th>School Environment</th>
<th>Total HRQoL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depressive symptoms at year one</td>
<td>$-0.20^{**}$</td>
<td>$-0.47^{**}$</td>
<td>$-0.28^{**}$</td>
<td>$-0.30^{**}$</td>
<td>$-0.37^{**}$</td>
<td>$-0.40^{**}$</td>
</tr>
</tbody>
</table>

Effect size is small when $r = 0.10$ to $0.29$; medium when $r = 0.30$ to $0.49$; and large when $r = 0.50$ to $1.0$ (Cohen, 1988).

** $p < 0.01$

Table 7.3(b): Pearson's $r$ correlation between the change in depressive symptoms and in HRQoL in children over time

<table>
<thead>
<tr>
<th>Change in dimensions of and total HRQoL in children</th>
<th>Physical Well-being</th>
<th>Psychological Well-being</th>
<th>Autonomy &amp; Parent Relations</th>
<th>Social Support &amp; Peer Relations</th>
<th>School Environment</th>
<th>Total HRQoL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in depressive symptoms</td>
<td>$-0.13$</td>
<td>$-0.43^{**}$</td>
<td>$-0.24^{**}$</td>
<td>$-0.40^{**}$</td>
<td>$-0.23^{**}$</td>
<td>$-0.30^{**}$</td>
</tr>
</tbody>
</table>

Effect size is small when $r = 0.10$ to $0.29$; medium when $r = 0.30$ to $0.49$; and large when $r = 0.50$ to $1.0$ (Cohen, 1988).

** $p < 0.01$
7.4 Moderator effects in the relationship between depressive symptoms and health-related quality of life in children at year one

This section describes the moderator effects of the relationship between depressive symptoms and HRQoL in children at year one using a three-step HMR model in order to establish under what conditions the magnitude of the effect of depressive symptoms on HRQoL increased or decreased. The age and gender of the child, family structure, and parent/guardian social perceived support and depressive symptoms were considered potential moderators of the relationship. Only age significantly moderated the relationship between depressive symptoms and the school environment dimension of HRQoL, and is presented here (see Fig. 7.1). Although age and depressive symptoms were continuous variables in the HMR, they were categorised in order to graphically illustrate the interaction: low (1 SD below mean), medium (mean), and high (1 SD above mean). Notably, high, medium and low depressive symptoms represents above average, average and below average depressive symptoms according to CDI T Score Interpretive Guidelines (Kovacs 2009). See Figure. 7.1 for the categorisation of age.

Model 1: Moderator effect of child age

An interaction between depressive symptoms and age made an independent contribution to children's 'school environment' dimension \( \Delta R^2 = .012, F_{inc}(1, 244) = 3.87, p < .05 \). Under conditions of low or normal depressive symptoms, children aged between 7 and 11 years reported significantly higher school environment scores than children aged 12 years (see Fig. 7.1). This is consistent with the finding from Chapter Six that age only inversely correlates with the school environment dimension of HRQoL. When children reported above average depressive symptoms, however, school environment did not differ between ages.
Fig. 7.1: The relation between depressive symptoms and the school well-being of children aged 7, 8 to 11, and 12 years (T value indicates how slope differs from zero (**p < .01)).

7.5 Conclusion
This short chapter provided results from an investigation into the nature and extent of the relationship between depressive symptoms and HRQoL. In summary, the results showed that depressive symptoms were moderately to strongly positively associated with HRQoL even when controlling for confounders. Depressive symptoms predicted HRQoL a year later (all dimensions and total), and vice versa. In addition, improvement in depressive symptoms was associated with improvement in all HRQoL dimensions and total HRQoL over time except for physical well-being. The strongest relationship was found between depressive symptoms and psychological well-being. While none of the potential moderators reduced or intensified the effect of depressive symptoms on HRQoL, moderator effects analysis showed that school well-being decreases with age for children considered as non-cases for depression, but not children who are potential cases. Similarly, Chapter Six found that school well-being tends to decrease with age.
CHAPTER EIGHT
The relationship between body mass index and health-related quality of life in children

8.1 Introduction
Building on the findings from Chapter Six, this chapter presents results from a series of analyses investigating the nature and extent of the relationship between BMI z-scores and HRQoL in children. This chapter first presents the direct effect of BMI on HRQoL at both year one and two. Second, its prediction of HRQoL a year later and the association between changes in BMI and HRQoL over time, is described. Third, the moderator effects of the relationship between BMI and HRQoL at year one is presented. Finally, the results from a series of mediation analysis is provided and includes simple-, moderated-, multiple- and half-longitudinal- mediator effects in the relationship between BMI and HRQoL. Half-longitudinal mediator effects analysis refers to mediation models with two waves of data.

8.2 Direct effect of body mass index on health-related quality of life in children when controlling for confounders
This section describes, at both year one and two, the direct effect of BMI on HRQoL. Section 6.4.2 revealed that none of the study variables met the criteria for confounders of the relationship between BMI and HRQoL. Hence, the bivariate associations between HRQoL and both BMI and weight categories identified in Chapter Six are again presented here.

Table 8.2 below shows that, at year one, there was a weak negative correlation between children’s BMI and total HRQoL, and both the physical well-being and autonomy and peer relations dimensions, and a marginally significant negative correlation between children’s BMI and psychological well-being. Physical well-being had the largest point decrease with increasing BMI. BMI only explained a small proportion of the variance in HRQoL dimensions and total score (i.e. $R^2$ ranges from 2% to 3%). As hypothesised, significant differences in HRQoL were observed between those who were obese and normal weight, where HRQoL means total HRQoL, physical and psychological well-being. However, no differences in HRQoL were seen between overweight and normal weight children. Furthermore, neither weight group fell below the average European HRQoL range. In contrast to the results at year one, Table 8.2 below shows that, at year two, children’s BMI only had a weak inverse relationship with physical well-being and there were no differences in HRQoL scores across the weight categories. Again, BMI only explained 3% of the variation in physical well-being.
Table 8.2: Relationship between children’s HRQoL and both BMI and weight categories at year one and two

Dimensions of and total HRQoL in children

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Physical Well-being</th>
<th>Psychological Well-being</th>
<th>Autonomy and Parent Relations</th>
<th>Social Support and Peer Relations</th>
<th>School Environment</th>
<th>Total HRQoL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD) ES</td>
<td>M (SD) ES</td>
<td>M (SD) ES</td>
<td>M (SD) ES</td>
<td>M (SD) ES</td>
<td>M (SD) ES</td>
</tr>
<tr>
<td>Year one</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI z-scores</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal/Underweight</td>
<td>-.17**</td>
<td>-.12'</td>
<td>-.13*</td>
<td>-.12</td>
<td>-.08</td>
<td>-.15*</td>
</tr>
<tr>
<td>(ref)</td>
<td>55.07 (11.28)</td>
<td>54.98 (11.04)</td>
<td>52.93 (12.63)</td>
<td>54.16 (12.90)</td>
<td>56.11 (11.91)</td>
<td>55.29 (12.59)</td>
</tr>
<tr>
<td>Overweight</td>
<td>52.08 (11.50)</td>
<td>51.37 (10.96)</td>
<td>52.11 (13.93)</td>
<td>52.29 (12.74)</td>
<td>54.57 (11.11)</td>
<td>52.08 (11.79)</td>
</tr>
<tr>
<td>Obese</td>
<td>50.51 (9.48)</td>
<td>.03*</td>
<td>51.20 (10.45)</td>
<td>.03*</td>
<td>48.92 (12.30)</td>
<td>50.94 (14.51)</td>
</tr>
<tr>
<td>Year two</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI z-scores</td>
<td>-.16*</td>
<td>-.07</td>
<td>-.05</td>
<td>-.11</td>
<td>.07</td>
<td>-.11</td>
</tr>
<tr>
<td>Normal/Underweight</td>
<td>54.70 (11.51)</td>
<td>54.59 (11.83)</td>
<td>54.42 (13.27)</td>
<td>55.07 (11.58)</td>
<td>54.76 (11.42)</td>
<td>55.77 (12.61)</td>
</tr>
<tr>
<td>(ref)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overweight</td>
<td>53.63 (12.04)</td>
<td>55.02 (11.57)</td>
<td>56.17 (14.09)</td>
<td>55.43 (10.55)</td>
<td>57.50 (12.40)</td>
<td>56.50 (13.92)</td>
</tr>
<tr>
<td>Obese</td>
<td>50.71 (11.85)</td>
<td>53.82 (13.25)</td>
<td>55.00 (12.57)</td>
<td>51.88 (15.58)</td>
<td>58.48 (11.50)</td>
<td>53.67 (11.63)</td>
</tr>
</tbody>
</table>

ES is effect size. ANOVA effect sizes are small at 0.01, medium at 0.06, and large at 0.14 (Cohen, 1988).

Pearson correlation coefficients are given. Effect size is small when r = ±.10 to ±.29; medium when r = ±.30 to ±.49; and large when r = ±.50 to ±.70 (Cohen, 1988).

*p < .05
**p < .01
*p = .054
8.3 Body mass index and the prediction of health-related quality of life in children a year later

This section describes the extent to which BMI predicted HRQoL a year later and the association between changes in BMI and HRQoL over time using Pearson’s r correlations (Table 8.3(a) and (b), respectively). Results showed that BMI predicted physical well-being a year later and vice versa. However, autonomy and parent relations also predicted BMI a year later (results not shown here). Furthermore, deterioration in BMI marginally predicted deterioration in psychological well-being. Notably, as indicated in the previous chapter, BMI, physical and psychological well-being did not significantly change over time, but there did appear to be a slight deterioration in BMI and physical well-being, and a slight improvement in psychological well-being (Table 6.3). Thus, no conclusion can be drawn from the latter finding.
Table 8.3(a): Pearson’s r correlation between BMI at year one and HRQoL in children at year two

<table>
<thead>
<tr>
<th>Dimensions of and total HRQoL in children at year two</th>
<th>Physical Well-being</th>
<th>Psychological Well-being</th>
<th>Autonomy &amp; Parent Relations</th>
<th>Social Support &amp; Peer Relations</th>
<th>School Environment</th>
<th>Total HRQoL</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI z-scores at year one</td>
<td>-.14*</td>
<td>-.04</td>
<td>-.04</td>
<td>-.10</td>
<td>.08</td>
<td>-.10</td>
</tr>
</tbody>
</table>

Effect size is small when $r = \pm .10$ to $\pm .29$; medium when $r = \pm .30$ to $\pm .49$; and large when $r = \pm .50$ to $\pm 1.0$ (Cohen, 1988).

* $p < .05$

Table 8.3(b): Pearson’s r correlation between the change in BMI and in HRQoL in children over time

<table>
<thead>
<tr>
<th>Change in dimensions of and total HRQoL in children</th>
<th>Physical Well-being</th>
<th>Psychological Well-being</th>
<th>Autonomy &amp; Parent Relations</th>
<th>Social Support &amp; Peer Relations</th>
<th>School Environment</th>
<th>Total HRQoL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in BMI z-scores</td>
<td>-.03</td>
<td>-.14*</td>
<td>.08</td>
<td>.11</td>
<td>.03</td>
<td>.03</td>
</tr>
</tbody>
</table>

Effect size is small when $r = \pm .10$ to $\pm .29$; medium when $r = \pm .30$ to $\pm .49$; and large when $r = \pm .50$ to $\pm 1.0$ (Cohen, 1988).

Both variables have positive scores. Higher scores for change in HRQoL suggest more improvement, but higher scores for change in BMI suggest increased weight.

* $p = .054$
8.4 Moderator effects in the relationship between body mass index and HRQoL in children at year one

To determine if the negative effect of overweight BMI on HRQoL is intensified by being female, approaching adolescence and having a guardian with high depressive symptoms or reduced by being from a two-parent family or by having a guardian with strong social support, moderator effects analysis was conducted using a three-step HMR model. Only the models testing the moderator effects of age, family structure and parent/guardian depressive symptoms in the relationship between BMI and HRQoL reached statistical significance and are presented here (see Figures 8.1 to 8.3). Although continuous variables, BMI z-scores, age and parent/guardian depressive symptoms were categorised into low (1 SD below mean), medium (mean), and high (1 SD above mean) in order to illustrate the interaction. Low and medium BMI represents BMI at the lower and higher levels of the normal range, respectively. High BMI represents overweight (i.e. overweight and obese). See Figures 8.1 and 8.3 for a description of child age and parent/guardian depressive symptoms categories.

Model 1: Moderator effect of child age

The interaction between BMI and age made an independent contribution to physical well-being in children \(\Delta R^2 = .019, F_{inc}(1, 245) = 5.09, p = .025\). Under conditions of overweight status, children approaching adolescence reported significantly lower physical well-being than children aged between 7 and 11 years as expected (Fig. 8.1(a)). Physical well-being did not differ by age when children were of normal weight.

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![Fig. 8.1(a): The relation between BMI z-scores and physical well-being for children aged 7, 8 to 11, and 12 years (T-value indicates how slope differs from zero (**p < .01, *p < .05)).](image)
The interaction between BMI and age also made a significant contribution to children's 'school environment' dimension \( [\Delta R^2 = .038, F_{inc}(3, 245) = 10.09, p = .002] \). Under conditions of overweight status, children aged 7 years reported significantly higher school environment scores than children aged between 8 and 12 years as expected (Fig. 8.1(b)). However, school related well-being did not differ between ages when children were of normal weight. Notably, BMI did not have a direct effect on school environment scores, but only through the interaction with age does BMI affect school environment scores. However, Chapter Six showed that age by itself had a direct effect on school environment scores.

Fig. 8.1(b): The relation between BMI z-scores and school environment for children aged 7, 8 to 11, and 12 years (T-value indicates how slope differs from zero (**p < .01)).
In addition, the interaction between BMI and age made a marginal significant contribution to total HRQoL in children \( \Delta R^2 = .016, F_{inc}(1, 239) = 3.857, p = .054 \). Under conditions of overweight status, children approaching adolescence reported marginally significantly lower total HRQoL than children aged 7 to 11 years as expected (Fig. 8.1(c)). When children were of normal weight, total HRQoL did not differ between ages.

Fig. 8.1(c): The relation between BMI z-scores and total HRQoL for children aged 7, 8 to 11, and 12 years (T-value indicates how slope differs from zero (**p < .01)).

Unexpectedly, age was not found to moderate the relationship between BMI and any of the following dimensions: psychological well-being, autonomy and parent relations, or social support and peer relations.
Model 2: Moderator effect of family structure

The interaction between BMI and family structure made an independent contribution to physical well-being in children ($\Delta R^2 = .015$, $F_{inc}(1, 247) = 3.89, p = .05$). Under conditions of overweight status, children from one-parent families unexpectedly reported significantly higher levels of physical well-being than children from two-parent families (Fig. 8.2(a)). However, when BMI was at the lower levels of the normal range, children from two-parent families expectedly reported significantly higher levels of physical well-being than children of one-parent families. Physical well-being did not differ between the two types of family structures when children had a BMI at the higher levels of the normal range.

![Fig. 8.2(a): The relation between BMI z-scores and physical well-being for children from one-parent and two-parent families (T value indicates how slope differs from zero (**p < .01)).](image-url)

129
The interaction between BMI and family structure also made a significant contribution to social support and peer relations in children $[\Delta R^2 = .035, F_{inc}(1, 245) = 9.02, p < .003]$. Under conditions of overweight status, children from one-parent families unexpectedly reported significantly higher levels of social support and peer relations than children of two-parent families (Fig. 8.2(b)). When BMI was at the lower levels of the normal range, children from two-parent families expectedly reported significantly higher levels of social support and peer relations than children of one-parent families. Social support and peer relations did not differ between the two types of family structures when children had a BMI at the higher levels of the normal range. Although BMI did not have a direct effect on social support and peer relations scores, social support and peer relations scores are affected when the interaction between BMI and age is considered.

![Fig. 8.2(b): The relation between BMI z-scores and social support and peer relations for children from one-parent and two-parent families (T-value indicates how slope differs from zero (**p < .01)).](image)

Unexpectedly, family structure was not found to moderate the relationship between BMI and total HRQoL or any of the following dimensions: psychological well-being, autonomy and parent relations or school environment.
**Model 3: Moderator effect of parent/guardian depressive symptoms**

The interaction between child BMI and parent/guardian depressive symptoms made a significant contribution to children's 'school environment' well-being \(\Delta R^2 = .020, F_{inc}(3, 244) = 4.95, p = .027\). Under conditions of overweight status, children whose parents/guardians had moderate to severe depressive symptoms reported significantly lower 'school environment' scores than children whose parents/guardians had normal levels of depressive symptoms as expected (Fig. 8.3). When children were of normal weight, school environment scores did not differ between the different levels of parent/guardian depressive symptoms. Although BMI did not have a direct effect on school environment scores, school environment scores are affected when the interaction between BMI and parent/guardian depressive symptoms is considered.

![Graph showing the relation between BMI z-scores and school environment](image)

Fig. 8.3: The relation between BMI z-scores and school environment in children whose parent/guardian has normal and moderate to severe depressive symptoms (T-value indicates how slope differs from zero (*p<.05)).

Unexpectedly, parent/guardian depressive symptoms were not found to moderate the relationship between BMI and total HRQoL or any of the other dimensions.
8.5 Mediator effects in the relationship between body mass index and health-related quality of life in children

Although main effects between BMI and HRQoL were identified, this does not imply causality. Given the small amount of variance in HRQoL explained by BMI and that deterioration in BMI was not associated with a deterioration in HRQoL, it is likely that there are other factors mediating the effect. The effect may be mediated by body image perception and depressive symptoms. This section presents the results from six mediation model analyses including simple-, multiple-, moderated- and half-longitudinal- mediator effects in the relationship between BMI and HRQoL (see Fig. 8.4 to 8.9). Mediation exists when the indirect effect or mediating path is significantly different from zero and if zero is not contained within the upper and lower Bias Corrected Confidence Intervals (BC CIs). A description of the indirect effect path is presented for each of the six models below.

8.5.1 Model 1: Simple mediator effect of body image perception

Model 1 hypothesised that body image perception (i.e. happy with body image or concerned about body image) would mediate the relationship between BMI z-scores and HRQoL at year one. The indirect effect is equal to the product $a_i b_i$ from two equations: $M = a_i X + eM$ and $Y = b_i M + c_i X + eY$. Table 8.5.1 below reveals that zero was not contained within the lower and upper BC limits of the significant indirect effect found between BMI and total HRQoL. In addition, the direct effect of BMI on total HRQoL (path $c$) became non significant when controlling for body image perception (path $c_i$). Thus, body image perception fully mediated the relationship between BMI and total HRQoL (see Fig. 8.4). More specifically, children's concern about their body image was the real cause of the negative effect that BMI had on total HRQoL. The proportion explained by the mediated effect was 100%. It is noteworthy that the model fit statistics were satisfactory for this model (i.e. RMSEA and WRMSR were good at <.05, while $X^2$ was unexpectedly significant, CFI was satisfactorily greater than .90).
Perception

Total HRQoL

Fig. 8.4: Standardised coefficients for the simple mediator effect of body image perception in the relationship between BMI z-scores and total HRQoL (The total effect coefficient is located parenthetically in the figure (**p<.01)).

Table 8.5.1: Path coefficients and the indirect effect confidence interval for Model 1: Simple mediator effect of body image perception in the relationship between BMI and HRQoL in children at year one

<table>
<thead>
<tr>
<th>Model 1</th>
<th>Total HRQoL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( \beta )</td>
</tr>
<tr>
<td>BMI to Body Image Perception (path ( a_i ))</td>
<td>(-.413)</td>
</tr>
<tr>
<td>BIP to HRQoL (control for BMI, path ( b_i ))</td>
<td>(4.528)</td>
</tr>
<tr>
<td>BMI to HRQoL (path ( c ))</td>
<td>(-.152)</td>
</tr>
<tr>
<td>BMI to HRQoL (control for BIP, path ( c_i ))</td>
<td>(.017)</td>
</tr>
<tr>
<td>Indirect effect {BC CI} (path ( a_i b_i ))</td>
<td>(-1.779)</td>
</tr>
</tbody>
</table>

| Proportion explained by indirect effect (\( a_i b_i / (c_i + a_i b_i) \)) | \(1.00\) |

**Model Fit Statistics**

| R\(^2\) BIP | \(.171\) |
| R\(^2\) HRQoL | \(.165\) |
| \(X^2\) | \(.000\) | \(.000\) |
| CFI | \(1.000\) |
| RMSEA | \(.000\) | \(.000\) |
| WRMSR | \(.002\) |

BC CI is the bias corrected 95% confidence interval for the beta coefficient of the indirect effect.

CFI, RMSEA and WRMSR are Comparative Fit Index, Root Mean Square Error Of Approximation and Weighted Root Mean Square Residual.

* BC CI does not contain zero, which indicates a significant indirect effect.

Furthermore, similar results were found across the five dimensions of HRQoL (see Table 8.5.1 continued below). It is worth noting that, in terms of the social support and peer relations, the indirect effect was only marginally significant. However, zero was not contained within the BC CI, which indicates that a significant indirect effect exists.
Table 8.5.1 continued: Path coefficients and indirect effect confidence interval for Model 1: Simple mediator effect of body image perception in the relationship between BMI and HRQoL in children at year one

<table>
<thead>
<tr>
<th>Model 1</th>
<th>Physical well-being</th>
<th>Psychological well-being</th>
<th>Autonomy and parent relations</th>
<th>Social support and peer relations</th>
<th>School environment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( \beta )</td>
<td>SE</td>
<td>( P )</td>
<td>( \beta )</td>
<td>SE</td>
</tr>
<tr>
<td>BMI to BIP (path ( a_i ))</td>
<td>-.413</td>
<td>.000</td>
<td>.000</td>
<td>-.413</td>
<td>.000</td>
</tr>
<tr>
<td>BIP to HRQoL (path ( b_{i} ))</td>
<td>4.654</td>
<td>.846</td>
<td>.000</td>
<td>3.679</td>
<td>.917</td>
</tr>
<tr>
<td>BMI to HRQoL (path ( c_i ))</td>
<td>-.168</td>
<td>.007</td>
<td>.000</td>
<td>-.122</td>
<td>.054</td>
</tr>
<tr>
<td>Indirect effect BC CI (path ( a_i b_{i} ))</td>
<td>-1.829</td>
<td>-2.621</td>
<td>.000</td>
<td>-1.445</td>
<td>-2.192</td>
</tr>
<tr>
<td>Proportion explained by indirect effect ( (a_i b_{i}/(c_i + a_i b_{i})) )</td>
<td>1.00</td>
<td>1.00</td>
<td>.000</td>
<td>1.00</td>
<td>-.96</td>
</tr>
</tbody>
</table>

* BC CI does not contain zero, which indicates a significant indirect effect.
8.5.2 Model 2: Multiple mediator effect of body image perception and depressive symptoms

Model 2 posited that depressive symptoms would mediate the relationship between BMI z-scores and HRQoL through body image perception at year one. The indirect effect of depressive symptoms through body image perception is equal to the product $a_1b_2b_3$ from three equations: $M^1 = a_1X + eM^1$; $M^2 = a_2X + a_3M^1 + eM^2$; and $Y = b_1M^1 + b_2M^2 + c_1X + eY$. Table 8.5.2 below shows that zero was not contained within the lower and upper BC limits of the significant indirect effect found between BMI and total HRQoL. Similar to the simple mediation model, the effect of BMI on total HRQoL (path c) became non significant when controlling for body image perception and depressive symptoms (path $c_1$). Thus, depressive symptoms fully mediated the relationship between BMI and total HRQoL through body image perception (Fig. 8.5). In other words, the negative effect of BMI on HRQoL can be explained by the high levels of depressive symptoms of those children with body image concerns. The proportion explained by the mediated effect was 42%, which suggests that there are other mediators of the effect of body image perception on total HRQoL.

Fig. 8.5: Standardised coefficients for the multiple mediator effects of body image perception and depressive symptoms in the relationship between BMI z-scores and total HRQoL (*p<.05, **p<.01).
Table 8.5.2: Path coefficients and the indirect effect confidence interval for Model 2: Multiple mediator effect of body image perception and depressive symptoms in the relationship between BMI and HRQoL in children at year one

<table>
<thead>
<tr>
<th>Model 2</th>
<th>Total HRQoL</th>
<th>$\beta$</th>
<th>SE</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI to Body Image Perception (path $a_1$)</td>
<td>- .413</td>
<td>.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI to Depressive symptoms (control for BIP, path $a_2$)</td>
<td>- .106</td>
<td>.173</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIP to Dep (control for BMI, path $b_1$)</td>
<td>-3.705</td>
<td>.941</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>BIP to HRQoL (control for BMI &amp; Dep, path $b_1$)</td>
<td>2.449</td>
<td>1.058</td>
<td>.021</td>
<td></td>
</tr>
<tr>
<td>Dep to HRQoL (control for BMI &amp; BIP, path $b_2$)</td>
<td>- .460</td>
<td>.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI to HRQoL (path c)</td>
<td>- .152</td>
<td>.014</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI to HRQoL (control for BIP &amp; Dep, path $c_1$)</td>
<td>- .031</td>
<td>.620</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indirect effect BC CI (path $a_1a_2b_2$)</td>
<td>- .818</td>
<td>{-1.237, - .400} *</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Proportion explained by indirect effect

\[
(a_1a_2b_2/(c_1 + a_1b_1 + a_2b_2 + a_1a_2b_2))
\]

.42

Model Fit Statistics

| $R^2$ BIP | .170 |
| $R^2$ Dep | .146 |
| $R^2$ HRQoL | .346 |
| $X^2$ | .000 | .000 |
| CFI | 1.000 |
| RMSEA | .000 | .000 |
| WRMSR | .000 |

* BC CI does not contain zero, which indicates a significant indirect effect.

Although not reported in the table above, it is worth noting that zero was not contained within the simple mediator effect ($a_2b_2$) BC CI of depressive symptoms in the relationship between BMI and total HRQoL. In other words, depressive symptoms by itself did not mediate the relationship between BMI and total HRQoL. This result is consistent with the literature that finds a modest to nonexistent effect between BMI and depression (Hesketh *et al.* 2004, Wardle & Cooke 2005) and that overweight states tend to lead to depression through other experiences children have such as body image concerns.

Moreover, similar results were found across the five dimensions of HRQoL (see Table 8.5.2 continued below). The proportion explained by the mediated effect was largest for social support and peer relations and smallest for physical well-being. Thus, if children’s body image concerns develop into depression, their physical well-being suffers less than the other dimensions of their HRQoL.
<table>
<thead>
<tr>
<th>Model 2</th>
<th>Physical well-being</th>
<th>Psychological well-being</th>
<th>Autonomy and parent relations</th>
<th>Social support and peer relations</th>
<th>School environment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>SE</td>
<td>P</td>
<td>β</td>
<td>SE</td>
</tr>
<tr>
<td>BMI to BIP (path (a_1))</td>
<td>-.413</td>
<td>.000</td>
<td>-.413</td>
<td>.000</td>
<td>-.413</td>
</tr>
<tr>
<td>BMI to Dep (path (a_2))</td>
<td>-.106</td>
<td>.173</td>
<td>-.106</td>
<td>.173</td>
<td>-.106</td>
</tr>
<tr>
<td>BIP to Dep (path (a_3))</td>
<td>-3.705</td>
<td>.941</td>
<td>0.000</td>
<td>-3.705</td>
<td>.941</td>
</tr>
<tr>
<td>BIP to HRQoL (path (b_1))</td>
<td>3.786</td>
<td>.907</td>
<td>0.000</td>
<td>1.283</td>
<td>.839</td>
</tr>
<tr>
<td>Dep to HRQoL (path (b_2))</td>
<td>-.209</td>
<td>.003</td>
<td>-.585</td>
<td>.000</td>
<td>-.359</td>
</tr>
<tr>
<td>BMI to HRQoL (path (c))</td>
<td>-.168</td>
<td>.007</td>
<td>-.122</td>
<td>.054</td>
<td>-.130</td>
</tr>
<tr>
<td>BMI to HRQoL (path (c_1))</td>
<td>0.000</td>
<td>1.000</td>
<td>-.032</td>
<td>.588</td>
<td>-.020</td>
</tr>
<tr>
<td>Indirect effect BC CI ((a_1a_2a_3b_2))</td>
<td>-.342</td>
<td>{.574}</td>
<td>.016</td>
<td>-.949</td>
<td>{.1.472}</td>
</tr>
</tbody>
</table>

Proportion explained by indirect effect \((a_1a_2a_3b_2/(c_1 + a_1b_1 + a_2b_2 + a_3a_3b_3))\) .17 .65 .35 1.00 .44

*BC CI does not contain zero, which indicates a significant indirect effect.*
8.5.3 Model 3: Moderated mediator effect of body image perception by age

The third model proposed that the mediational influence of body image perception in the relationship between BMI z-scores and HRQoL would be moderated by age (moderation within the path from BMI z-scores to body image perception of Model 1). More specifically, it was hypothesised that the magnitude of the mediator effect of body image perception in the relationship between BMI and HRQoL is stronger for children aged 10 to 12 years than children aged 7 to 9 years. Significant moderated mediation occurs when the interaction term or path $a_3$ significantly contributes to the prediction of body image perception and when a significant mediator effect is identified for one age group (i.e. zero is not contained within the BC CI), but not for the other. The indirect effect is the product of $(a_1 + a_3xW)$ level$(b_1)$ and is obtained from two equations: $M = a_1X + a_2W + a_3MW + eM$ and $Y = b_1M + c_1X + c_2W + c_3XW + eY$.

Unexpectedly, initial regression analysis indicated that the interaction of BMI and age did not significantly predict body image perception over and above the main effects of BMI and age, independently (see Table 8.5.3). Hence, body image perception serves as a mediator in the relationship between BMI and HRQoL (total and dimensions), but the strength of the effect does not differ by age (see Fig. 8.6 below).

Fig. 8.6: Standardised coefficients for body image perception as a mediator in the relationship between BMI z-scores and total HRQoL moderated by age (**p < .01).
Table 8.5.3: Path coefficients and indirect effect confidence interval for Model 3: Moderated mediator effect of body image perception in the relationship between BMI and HRQoL in children at year one by age

Model 3

<table>
<thead>
<tr>
<th>Path Coefficient Description</th>
<th>Total HRQoL</th>
<th>β</th>
<th>SE</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI to BIP (control for Age &amp; BMI x Age, path a₁)</td>
<td>.139</td>
<td>.632</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI x Age to BIP (control for BMI &amp; Age, path a₂)</td>
<td>-.602</td>
<td>.071</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIP to HRQoL (control for BMI, Age &amp; BMI x Age, path b₁)</td>
<td>4.399</td>
<td>1.605</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>BMI to HRQoL (path c)</td>
<td>-.152</td>
<td>.014</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIP to HRQoL (control for BIP, Age &amp; BMI x Age, path c₁)</td>
<td>.067</td>
<td>.724</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conditional indirect effect for Age (older) a BC CI</td>
<td>-3.132</td>
<td>{-5.555, .011}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conditional indirect effect for Age (younger) a BC CI</td>
<td>-1.267</td>
<td>{-2.231, .011}</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Model Fit Statistics

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>R² BIP</td>
<td>.222</td>
</tr>
<tr>
<td>R² HRQoL</td>
<td>.169</td>
</tr>
<tr>
<td>χ²</td>
<td>.000</td>
</tr>
<tr>
<td>CFI</td>
<td>1.000</td>
</tr>
<tr>
<td>RMSEA</td>
<td>.000</td>
</tr>
<tr>
<td>WRMSR</td>
<td>.001</td>
</tr>
</tbody>
</table>

* BC CI does not contain zero, which indicates a significant indirect effect.

† Age did not significantly moderate the relationship between BMI and BIP. Hence, conditional mediation did not occur.

8.5.4 Model 4: Moderated mediator effect of body image perception by gender

The fourth model hypothesised that the mediational influence of body image perception on the relationship between BMI z-scores and HRQoL would be moderated by gender (moderation within the path from BMI z-scores to body image perception of Model 1). More specifically, it was hypothesised that the magnitude of the mediator effect of body image perception in the relationship between BMI and HRQoL is stronger for females than males. See model 3 above for a description of significant moderated mediation.

Unexpectedly, initial regression analysis indicated that the interaction of BMI and gender did not significantly predict body image perception over and above the main effects of BMI and gender, independently (Table 8.5.4). Hence, body image perception serves as a mediator in the relationship between BMI and HRQoL (total and dimensions), but the strength of the effect does not differ by gender (Fig 8.7).
Fig. 8.7: Standardised coefficients for body image perception as a mediator in the relationship between BMI z-scores and total HRQoL moderated by gender (**p < .01, *p < .05).

Table 8.5.4: Path coefficients and indirect effect confidence interval for Model 4: Moderated mediator effect of body image perception in the relationship between BMI and HRQoL in children at year one by gender

<table>
<thead>
<tr>
<th>Model 4</th>
<th>Total HRQoL</th>
<th>( \beta )</th>
<th>SE</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI to BIP (control for Sex &amp; BMI x Sex, path ( a_1 ))</td>
<td>-.603</td>
<td>.025</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI x Sex to BIP (control for BMI &amp; Sex, path ( a_2 ))</td>
<td>.207</td>
<td>.025</td>
<td></td>
<td>.000</td>
</tr>
<tr>
<td>BIP to HRQoL (control for BMI, Sex &amp; BMI x Sex, path ( b_1 ))</td>
<td>4.535</td>
<td>1.012</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>BMI to HRQoL (path ( c ))</td>
<td>-.152</td>
<td>.014</td>
<td></td>
<td>.000</td>
</tr>
<tr>
<td>BMI to HRQoL (control for BIP, Sex &amp; BMI x Sex, path ( c_1 ))</td>
<td>.128</td>
<td>.015</td>
<td></td>
<td>.000</td>
</tr>
<tr>
<td>Conditional indirect effect for Sex (female)(^a) BC CI</td>
<td>-1.474</td>
<td>{}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conditional indirect effect for cSex (male)(^a) BC CI</td>
<td>-2.048</td>
<td>{}</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Model Fit Statistics

\[ R^2 \text{ BIP} \] .183
\[ R^2 \text{ HRQoL} \] .166
\[ \chi^2 \] .000
CFI .000
RMSEA .000
WRMSR .000

\(^a\) BC CI does not contain zero, which indicates a significant indirect effect.

\(^b\) Sex did not significantly moderate the relationship between BMI and BIP. Hence, conditional mediation did not occur.
8.5.5 Model 5: Half-longitudinal mediator effect of body image perception

While significant mediator effects were identified in Model 1 and 2 above, these results are based on cross-sectional path analysis. It is argued that time must lapse between variables in the path in order to prove causality. Model 5 hypothesised that body image perception would mediate the relationship between BMI z-scores and HRQoL over time. The indirect effect is equal to the product $a_2b_2$ of the following two equations: $M_{t2} = m_{M1} + a_2X_{t1} + e_{M2}$; and $Y_{t2} = y_{Y1} + b_2M_{t1} + e_{Y2}$. Recall from Chapter Five that a two-wave half-longitudinal mediation model is similar to a three-wave longitudinal model except it assumes stationarity (i.e. it assumes that the relationship between mediator at time 1 and outcome at time 2 remains constant a year later between mediator at time 2 and outcome at time 3: time 3 outcome is a ghost variable).

Table 8.5.5 below reveals that the indirect effect between BMI and total HRQoL was not significantly different from zero and zero was contained within the lower and upper BC limits. Hence, when tested over time, body image perception was not found to mediate the relationship between BMI and total HRQoL (Fig. 8.8).

Fig. 8.8: Standardised regression coefficients for the relationship between BMI and total HRQoL as mediated by body image perception between year one and two (T1, T2 and T3 refer to time one and two assessments and an assumed outcome at a hypothetical time three. Assuming stationarity, the half-longitudinal mediation design predicts that path $b_2$ equals path $b_3$, and that the indirect effect $a_2b_2$ is equivalent to $a_2b_3$. ** $p < .01$).
Table 8.5.5: Path coefficients and the indirect effect confidence interval for Model 5: Half-longitudinal mediator effect of body image perception in the relationship between BMI and HRQoL in children between year one and two

<table>
<thead>
<tr>
<th>Model 5</th>
<th>Total HRQoL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
</tr>
<tr>
<td>BMI&lt;sub&gt;1&lt;/sub&gt; to BIP&lt;sub&gt;2&lt;/sub&gt; (control for BIP&lt;sub&gt;1&lt;/sub&gt;, path a&lt;sub&gt;1&lt;/sub&gt;)</td>
<td>-.267</td>
</tr>
<tr>
<td>BIP&lt;sub&gt;1&lt;/sub&gt; to HRQoL&lt;sub&gt;2&lt;/sub&gt; (control for BMI&lt;sub&gt;1&lt;/sub&gt; &amp; HRQoL&lt;sub&gt;1&lt;/sub&gt;, path b&lt;sub&gt;1&lt;/sub&gt;)</td>
<td>2.248</td>
</tr>
<tr>
<td>Indirect effect BC Cl (path a&lt;sub&gt;1&lt;/sub&gt;b&lt;sub&gt;2&lt;/sub&gt;)</td>
<td>-.583</td>
</tr>
</tbody>
</table>

Model Fit Statistics

<table>
<thead>
<tr>
<th></th>
<th>R&lt;sup&gt;2&lt;/sup&gt;</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BIP</td>
<td>.228</td>
<td></td>
</tr>
<tr>
<td>BMI</td>
<td>.778</td>
<td></td>
</tr>
<tr>
<td>HRQoL</td>
<td>.295</td>
<td></td>
</tr>
<tr>
<td>X&lt;sup&gt;2&lt;/sup&gt;</td>
<td>5.439</td>
<td>.142</td>
</tr>
<tr>
<td>CFI</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>RMSEA</td>
<td>.058</td>
<td>.344</td>
</tr>
<tr>
<td>WRMSR</td>
<td>.569</td>
<td></td>
</tr>
</tbody>
</table>

*BC CI does not contain zero, which indicates a significant indirect effect.

<sub>1</sub> and <sub>2</sub> is year one and year two.

A similar result was found for each of the HRQoL dimensions except for psychological well-being (see Table 8.5.5 continued below). Results revealed that the indirect effect between BMI and psychological well-being between year one and two was not significantly different from zero, but zero was not contained within the lower and upper BC limits. Thus, body image perception mediated the relationship between BMI and psychological well-being. More specifically, concern about body image was the real cause of the negative effect of BMI on psychological well-being.
Table 8.5.5 continued: Path coefficients and the indirect effect confidence interval for Model 5: Half-longitudinal mediator effect of body image perception in the relationship between BMI and HRQoL in children between year one and two

<table>
<thead>
<tr>
<th>Dimensions of HRQoL in children</th>
<th>Physical well-being</th>
<th>Psychological well-being</th>
<th>Autonomy and parent relations</th>
<th>Social support and peer relations</th>
<th>School environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 5</td>
<td>( \beta )</td>
<td>( \text{SE} )</td>
<td>( \text{P} )</td>
<td>( \beta )</td>
<td>( \text{SE} )</td>
</tr>
<tr>
<td>BMI(<em>{t1}) to BIP(</em>{t2}) (path ( a_2 ))</td>
<td>-.284</td>
<td>.004</td>
<td>-.287</td>
<td>.002</td>
<td>-.276</td>
</tr>
<tr>
<td>BIP(<em>{t1}) to HRQoL(</em>{t2}) (path ( b_2 ))</td>
<td>2.330</td>
<td>1.576</td>
<td>.139</td>
<td>3.077</td>
<td>1.578</td>
</tr>
<tr>
<td>Indirect effect BC CI (path ( a_2 b_2 ))</td>
<td>-.652</td>
<td>{-1.766}</td>
<td>.216</td>
<td>-.878</td>
<td>{-2.019}</td>
</tr>
</tbody>
</table>

\(^*\) BC CI does not contain zero, which indicates a significant indirect effect.

\(_{t1}\) and \(_{t2}\) is year one and year two.
8.5.6 Model 6: Half-longitudinal mediator effect of depressive symptoms

It was not possible to test the mediator effect of depressive symptoms in the relationship between BMI and HRQoL through body image perception over time. Model 6 hypothesised that depressive symptoms would mediate the relationship between body image perception and HRQoL over time. Similar to model 5, the indirect effect is equal to the product \( \alpha_2 \beta_2 \) of the following two equations: 

\[
M_{t2} = a_2 X_{t1} + e_{M_{t2}}; \quad \text{and} \quad Y_{t2} = Y_{t1} + b_2 M_{t1} + e_{Y_{t2}}.
\]

Table 8.5.6 below reveals that the indirect effect between body image perception and total HRQoL was not significantly different from zero and zero was contained within the lower and upper BC limits. Hence, when tested over time, depressive symptoms did not mediate the relationship between body image perception and total HRQoL (Fig. 8.9).

Fig. 8.9: Standardised regression coefficients for the relationship between body image perception and total HRQoL as mediated by depressive symptoms between year one and two (T1, T2 and T3 refer to time one and two assessments and an assumed outcome at a hypothetical time three. Assuming stationarity, the half-longitudinal mediation design predicts that path \( b_2 \) equals path \( b_3 \), and that the indirect effect \( \alpha_2 b_2 \) is equivalent to \( \alpha_2 b_3 \). ** p < .01).
Table 8.5.6: Path coefficients and the indirect effect confidence interval for Model 6: Half-longitudinal mediator effect of depressive symptoms in the relationship between body image perception and HRQoL in children between year one and two

<table>
<thead>
<tr>
<th>Model 6</th>
<th>Total HRQoL</th>
<th>β</th>
<th>SE</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIP\textsubscript{11} to Depressive symptoms\textsubscript{22} (control for Dep\textsubscript{21}, path a\textsubscript{2})</td>
<td>(-.911)</td>
<td>.993</td>
<td>.359</td>
<td></td>
</tr>
<tr>
<td>Dep\textsubscript{11} to HRQoL\textsubscript{22} (control for BIP\textsubscript{11} &amp; HRQoL\textsubscript{11}, path b\textsubscript{2})</td>
<td>(-.144)</td>
<td>.036</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indirect effect BC CI (path a\textsubscript{2}b\textsubscript{2})</td>
<td>(.164)</td>
<td>{-.054, .700}</td>
<td>.455</td>
<td></td>
</tr>
</tbody>
</table>

Model Fit Statistics

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>R\textsuperscript{2} BIP</td>
<td>.228</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R\textsuperscript{2} BMI</td>
<td>.778</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R\textsuperscript{2} HRQoL</td>
<td>.295</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(X^2)</td>
<td>3.721</td>
<td>.292</td>
<td></td>
</tr>
<tr>
<td>CFI</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RMSEA</td>
<td>.036</td>
<td>.483</td>
<td></td>
</tr>
<tr>
<td>WRMSR</td>
<td>.472</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* BC CI does not contain zero, which indicates a significant indirect effect.

\textsubscript{11} and \textsubscript{22} is year one and year two.

A similar result was found for each of the HRQoL dimensions except for psychological well-being (see Table 8.5.6 continued below). Results revealed that the indirect effect between body image perception and psychological well-being between year one and two was not significantly different from zero, but zero was not contained within the lower and upper BC limits. Thus, depressive symptoms mediated the relationship between body image perception and psychological well-being. In other words, depression was the real cause of the negative effect of body image concern on psychological well-being. The findings from longitudinal mediation and from cross-sectional mediation suggest that depressive symptoms may mediate the relationship between BMI and psychological well-being through body image perception.
Table 8.5.6 continued: Path coefficients and the indirect effect confidence interval for Model 6: Half-longitudinal mediator effect of depressive symptoms in the relationship between body image perception and HRQoL in children between year one and two

<table>
<thead>
<tr>
<th>Dimensions of HRQoL</th>
<th>Physical well-being</th>
<th>Psychological well-being</th>
<th>Autonomy and parent relations</th>
<th>Social support and peer relations</th>
<th>School environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIP_{1t} to Dep_{12} (path a_2)</td>
<td>-1.448</td>
<td>1.023</td>
<td>.157</td>
<td>-1.477</td>
<td>1.048</td>
</tr>
<tr>
<td>Dep_{1t} to HRQoL_{12} (path b_2)</td>
<td>.004</td>
<td>.954</td>
<td>-.200</td>
<td>.028</td>
<td>-.072</td>
</tr>
<tr>
<td>Indirect effect BC CI (path a_2b_2)</td>
<td>-.006</td>
<td>.255</td>
<td>.962</td>
<td>.361</td>
<td>.002</td>
</tr>
</tbody>
</table>

*BC CI does not contain zero, which indicates a significant indirect effect.*
t_1 and t_2 is year one and year two.
8.6 Conclusion

This chapter presented results from an investigation into the nature and extent of the relationship between BMI and HRQoL. At year one, BMI weakly negatively correlated with total HRQoL, physical well-being, autonomy and parent relations, and marginally negatively correlated with psychological well-being. Statistically significant differences were only seen between those who were obese versus those of normal weight in all aforementioned dimensions except for autonomy and parent relations. Albeit, neither weight group fell below the average European HRQoL range. Unexpectedly, BMI weakly predicted physical well-being a year later and vice versa, whilst autonomy and parent relations also predicted BMI a year later. In terms of ‘overweight’ children, those approaching adolescence (i.e. 12 years) had poorer physical and school well-being than younger children, and those whose parents had moderate to severe depressive symptoms fared worse on school well-being than children whose parents were not depressed.

Cross-sectional mediation analysis, which tests if the causal effect of an independent variable on a dependent variable is transmitted by a mediator at one time point, revealed that body image perception and depressive symptoms fully mediated the relationship between BMI and HRQoL (all dimensions and total) for all children (boys and girls aged 7 to 12 years). More specifically, the negative effect of BMI on HRQoL is mainly explained by children’s body image concerns, which can be transmitted through experiences of depression. The finding that depressive symptoms alone did not mediate the relationship between BMI and HRQoL, informs us that overweight children are not necessarily depressed. The proportion of HRQoL explained by the multiple mediator effect of body image perception and depressive symptoms is considerably less than the proportion explained by the mediator effect of body image perception alone. This suggests that there may be other factors by which body image perceptions affect HRQoL. Half-longitudinal mediation analysis revealed, however, that body image perception only mediated the relationship between BMI and psychological well-being, and that depressive symptoms only mediated the relationship between body image perception and psychological well-being over time. In other words when time lapses, only the negative effect of BMI on psychological well-being is explained by body image concerns and subsequent experiences of depression. While Kenny (1979) argued that mediator effects within the relationship between BMI and psychological well-being should not have been explored because there was no significant bivariate association between BMI and psychological well-being to begin with, this study argues like others (e.g. Preacher et al. 2007) that a significant indirect effect can still be identified even when some of the variables in the path analysis do not significantly correlate.
CHAPTER NINE

The relationship between parent/guardian mental health and health-related quality of life in children

9.1 Introduction

This chapter presents results from a series of analyses investigating the nature and extent of the relationship between parental mental health and HRQoL in children. Parent mental health refers to parent/guardian depressive and anxiety symptoms, and overall mental health status. First of all, results regarding the direct effect of parental mental health on children's HRQoL, at both year one and two, are reported. Second, the extent to which parental mental health predicted HRQoL a year later is described. As indicated in chapter Five, there was no parent/guardian data available for year two. Third, the moderator effects of the relationship between parental mental health and the HRQoL of children at year one is presented. Finally, the results from a series of mediation analysis are provided, including simple-, moderated- and half-longitudinal-mediator effects in the relationship between parental mental health and children's HRQoL. Half-longitudinal mediator effects analysis refers to mediation models with two waves of data.

9.2 Direct effect of parental mental health on the health-related quality of life in children when controlling for confounders

This section describes, at year one, the direct effect of parental mental health on HRQoL in children. As indicated in Chapter Six, none of the study variables met the criteria for confounders of the relationship between parental mental health and children's HRQoL (Table 6.4.2). Hence, the bivariate associations between parental mental health and HRQoL in children are presented here.

Table 9.2 shows that, at year one, parental mental health status was weakly positively correlated with children's total HRQoL, social support and peer relations, and school environment well-being according to non-parametric tests but not parametric tests. However, parental depressive and anxiety symptoms were not, using either test, significantly associated with children's HRQoL.
Table 9.2: Spearman’s rho correlations between parental mental health and HRQoL in children at year one

<table>
<thead>
<tr>
<th>Dimensions of and total HRQoL in children</th>
<th>Physical Well-being</th>
<th>Psychological Well-being</th>
<th>Autonomy &amp; Parent Support</th>
<th>Social Environment</th>
<th>School Environment</th>
<th>Total HRQoL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent variables</td>
<td>ρ</td>
<td>ρ</td>
<td>ρ</td>
<td>ρ</td>
<td>ρ</td>
<td>ρ</td>
</tr>
<tr>
<td>Mental health status</td>
<td>.09</td>
<td>.10</td>
<td>.06</td>
<td>.13*</td>
<td>.17**</td>
<td>.14*</td>
</tr>
<tr>
<td>Depressive symptoms</td>
<td>.02</td>
<td>-.05</td>
<td>-.01</td>
<td>.02</td>
<td>-.08</td>
<td>-.06</td>
</tr>
<tr>
<td>Anxiety symptoms</td>
<td>.03</td>
<td>-.01</td>
<td>.04</td>
<td>-.06</td>
<td>-.03</td>
<td>-.02</td>
</tr>
</tbody>
</table>

Effect size is small when ρ = ±.10 to ±.29; medium when r = ±.30 to ±.49; and large when r = ±.50 to ±1.0 (Cohen 1988).

* p < 0.05
** p < 0.01

9.3 Parental mental health and the prediction of health-related quality of life in children a year later

This section describes the ability for parental mental health to predict children’s HRQoL a year later using Spearman’s rho correlations (results were similar to Pearson’s r). Results revealed that parental mental health status predicted physical and school environment well-being a year later (Table 9.3). Parental anxiety symptoms also predicted school environment well-being a year later, but parental depressive symptoms did not. As previously indicated in Chapter Six, however, that neither physical nor school well-being significantly changed over time, but there did appear to be a slight improvement (Table 6.3).

Table 9.3: Spearman’s rho correlations between parental mental health at year one and HRQoL in children at year two

<table>
<thead>
<tr>
<th>Dimensions of and total HRQoL in children at Year Two</th>
<th>Physical Well-being</th>
<th>Psychological Well-being</th>
<th>Autonomy &amp; Parent Support</th>
<th>Social Environment</th>
<th>School Environment</th>
<th>Total HRQoL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent variables at Year one</td>
<td>ρ</td>
<td>ρ</td>
<td>ρ</td>
<td>ρ</td>
<td>ρ</td>
<td>ρ</td>
</tr>
<tr>
<td>Mental health status</td>
<td>.19**</td>
<td>.13</td>
<td>.05</td>
<td>.11</td>
<td>.18*</td>
<td>.10</td>
</tr>
<tr>
<td>Depressive symptoms</td>
<td>-.09</td>
<td>-.10</td>
<td>-.01</td>
<td>-.07</td>
<td>-.10</td>
<td>-.08</td>
</tr>
<tr>
<td>Anxiety symptoms</td>
<td>-.05</td>
<td>-.09</td>
<td>-.01</td>
<td>-.07</td>
<td>-.17*</td>
<td>-.10</td>
</tr>
</tbody>
</table>

Effect size is small when ρ = ±.10 to ±.29; medium when r = ±.30 to ±.49; and large when r = ±.50 to ±1.0 (Cohen 1988).

* p < 0.05
** p < 0.01
Due to the design of this study, it could not be investigated if the change in parent mental health was associated with the change in children's HRQoL over time. *It is worth noting, at this point, that none of the analysis in the remainder of this chapter produced significant results. Nonetheless, a summary of the results is provided below. It is important to present these results because presenting only significant findings distorts research outputs in general.*

9.4 Moderator effects in the relationship between parental mental health and health-related quality of life in children at year one

To determine if the negative effect of poor parental mental health on children's HRQoL is intensified for children who are female, approaching adolescence or reduced by being from a two-parent family or by having a parent with strong social support, moderator effects analysis was conducted using a three-step HMR model. Unexpectedly however, none of the models were significant.

9.5 Mediator effects in the relationship between parental mental health and health-related quality of life in children

Although main effects between parental mental health status and HRQoL were identified, this does not imply causality. Given the small amount of variance in children's HRQoL explained by parental mental health status, it is likely that there are other factors mediating the effect. The effect may be mediated by parenting self-efficacy and child depressive symptoms. This section presents the results from five mediation model analyses including simple-, moderated- and half-longitudinal-mediator effects in the relationship between parental mental health and children's HRQoL (see Fig. 8.4 to 8.9). Mediation exists when the indirect effect or mediating path is significantly different from zero and if zero is not contained within the upper and lower Bias Corrected Confidence Intervals (BC CIs). A description of the indirect effect path is presented for each of the five models below.

9.5.1 Model 1: Simple mediator effect of parenting self-efficacy

Model 1 hypothesised that parenting self-efficacy would mediate the relationship between parental mental health status and children's HRQoL at year one. The indirect effect is equal to the product $a \cdot b_1$ from two equations: $M = a_1X + eM$ and $Y = b_1M + c_1X + eY$. Table 9.5.1 below reveals that the regression coefficient for the indirect path did not reach statistical significance and zero was contained within its lower and upper BC limits. Thus, parenting self-efficacy did not mediate the relationship between parental mental health status and child total HRQoL (Fig. 9.1). Similar results were found across each of the five dimensions of HRQoL and these results were consistent whether
parental mental health status, depressive or anxiety symptoms were investigated (results not reported here).

Fig. 9.1: Standardised coefficients for simple mediation of parenting self-efficacy in the relationship between parent mental health status and child total HRQoL (The total effect coefficient is located parenthetically in the figure).

Table 9.5.1: Path coefficients and the indirect effect confidence interval for Model 1: Simple mediator effect of parenting self-efficacy in the relationship between parental mental health status and total HRQoL in children at year one

<table>
<thead>
<tr>
<th>Model 1</th>
<th>Total HRQoL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\beta$</td>
</tr>
<tr>
<td>Parent Mental Health Status to parenting Efficacy $^d$ (path $a_1$)</td>
<td>-.064</td>
</tr>
<tr>
<td>pEff to HRQoL (control for pMHS, path $b_1$)</td>
<td>-.037</td>
</tr>
<tr>
<td>pMHS to HRQoL (path $c$)</td>
<td>.051</td>
</tr>
<tr>
<td>pMHS to HRQoL (control for pEff, path $c_1$)</td>
<td>-.118</td>
</tr>
<tr>
<td>Indirect effect BC CI (path $a_1 \times b_1$)</td>
<td>.025</td>
</tr>
<tr>
<td></td>
<td>.132</td>
</tr>
</tbody>
</table>

Model Fit Statistics

- $R^2$ Eff  .004  .653
- $R^2$ HRQoL  .165  .391
- $X^2$  .000  .000
- CFI  1.000
- RMSEA  .000
- WRMSR  .000

BC CI is the bias corrected 95% confidence interval for the beta coefficient of the indirect effect.
CFI, RMSEA and WRMSR are Comparative Fit Index, Root Mean Square Error Of Approximation and Weighted Root Mean Square Residual.
* BC CI does not contain zero, which indicates a significant indirect effect.
9.5.2 Model 2: Simple mediator effect of child depressive symptoms

Model 2 hypothesised that child depressive symptoms would mediate the relationship between parental mental health status and child HRQoL. Table 9.5.2 below shows that the regression coefficient for the indirect path did not reach statistical significance and zero was contained within its lower and upper BC limits. Thus, child depressive symptoms did not mediate the relationship between parental mental health status and child total HRQoL (Fig. 9.2). Similar results were found across each of the five dimensions of HRQoL and these results were consistent whether parental mental health status, depressive or anxiety symptoms were investigated (results not reported here).

Fig. 9.2: Standardised coefficients for simple mediation of child depressive symptoms in the relationship between parent mental health status and child total HRQoL (The total effect coefficient is located parenthetically in the figure (**p<.01)).

<table>
<thead>
<tr>
<th>Model 2</th>
<th>Total HRQoL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
</tr>
<tr>
<td>pMHS to child Depressive symptoms (path a₁)</td>
<td>.010</td>
</tr>
<tr>
<td>cDep to HRQoL (control for pMHS, path b₁)</td>
<td>-.560</td>
</tr>
<tr>
<td>pMHS to HRQoL (path c)</td>
<td>.051</td>
</tr>
<tr>
<td>pMHS to HRQoL (control for cDep, path c₁)</td>
<td>-.106</td>
</tr>
<tr>
<td>Indirect effect BC CI (path a₁ x b₁)</td>
<td>-.005</td>
</tr>
</tbody>
</table>

Model Fit Statistics

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>R² cDep</td>
<td>.000</td>
</tr>
<tr>
<td>R² HRQoL</td>
<td>.326</td>
</tr>
<tr>
<td>X²</td>
<td>.000</td>
</tr>
<tr>
<td>CFI</td>
<td>1.000</td>
</tr>
<tr>
<td>RMSEA</td>
<td>.000</td>
</tr>
<tr>
<td>WRMSR</td>
<td>.000</td>
</tr>
</tbody>
</table>

*BC CI does not contain zero, which indicates a significant indirect effect.*
9.5.3 Model 3: Moderated mediator effect of child depressive symptoms by child age

Although mediator effects between parental mental health and children's HRQoL were not identified in this study, it is possible that mediator effects occur under certain conditions. The third model proposed that the mediational influence of child depressive symptoms in the relationship between parental mental health status and children's HRQoL is moderated by age (moderation within the path from parental mental health status to child depressive symptoms of Model 2). More specifically, it was hypothesised that child depressive symptoms only mediates the relationship between parental mental health status and children's HRQoL for children aged 10 to 12 years but not children aged 7 to 9 years. Significant moderated mediation occurs when the interaction term or path \( a_3 \) significantly contributes to the prediction of child depressive symptoms and when a significant mediator effect is identified for one age group (i.e. zero is not contained within the BC CI), but not for the other. The indirect effect is the product of \( (a_1 + a_3 \times W \text{ level})b_1 \) and is obtained from two equations: \( M = a_1X + a_2W + a_3MW + eM \) and \( Y = b_1M + c_1X + c_2W + c_3WX + eY \).

Unexpectedly, initial regression analysis indicated that the interaction of parental mental health status and child age was not significantly associated with child depressive symptoms over and above the main effects of parental mental health status and child age. Hence, child depressive symptoms did not serve as a mediator in the relationship between parental mental health status and children's total HRQoL not even for certain age groups (see Table 9.5.3 and Fig. 9.3 below). Notably, similar results were found across the five dimensions of HRQoL and these results were consistent whether parental mental health status, depressive or anxiety symptoms were investigated. Furthermore, the same analysis was also conducted when parenting self-efficacy was the potential mediator and similar results were found (results not reported here).
Fig. 9.3: Standardised coefficients for child depressive symptoms as a mediator in the relationship between parent mental health status and child total HRQoL moderated by age (**p < .01).

Table 9.5.3: Path coefficients and indirect effect confidence interval for Model 3: Moderated mediator effect of child depressive symptoms in the relationship between parental mental health status and total HRQoL in children at year one by age ____________________________

<table>
<thead>
<tr>
<th>Model 3</th>
<th>Total HRQoL</th>
<th>( \beta )</th>
<th>SE</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>pMHS to cDep (control cAge &amp; pMHS x cAge, path a)</td>
<td>-.119</td>
<td>.591</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pMHS x cAge to cDep (control for pMHS &amp; cAge, path a)</td>
<td>.138</td>
<td>.549</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cDep to HRQoL (control for pMHS, cAge, pMHS x cAge, path b)</td>
<td>-.560</td>
<td>.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pMHS to HRQoL (path c)</td>
<td>.051</td>
<td>.427</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pMHS to HRQoL (control for cDep, cAge, pMHS x cAge, path c)</td>
<td>-.366</td>
<td>.131</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conditional indirect effect for cAge (older) (^a) BC CI</td>
<td>-.969</td>
<td>{3.863  .545 ,1.387}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conditional indirect effect for cAge (younger) (^a) BC CI</td>
<td>-.130</td>
<td>{-.875  .771 ,.599}</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Model Fit Statistics

- \( R^2 \) cDep | .003 | .693 |
- \( R^2 \) HRQoL | .343 | .000 |
- \( \chi^2 \) | .000 | .000 |
- CFI | 1.000 |
- RMSEA | .000 | .000 |
- WRMSR | .000 |

\(^a\) cAge did not significantly moderate the relationship between cBMI and cBIP. Hence, conditional mediation did not occur.
9.5.4 Model 4: **Moderated mediator effect of child depressive symptoms by child gender**

The fourth model hypothesised that a mediator effect by child depressive symptoms in the relationship between parental mental health status and child HRQoL would be moderated by gender (moderation within the path from parental mental health status to child depressive symptoms of Model 2). More specifically, it was hypothesised that child depressive symptoms only mediates the relationship between parental mental health status and children's HRQoL for females not males. See model 3 above for a description of significant moderated mediation.

Unexpectedly, initial regression analysis indicated that the interaction of parental mental health status and gender was not significantly associated with child depressive symptoms over and above the main effects of parental mental health status and child depressive symptoms. Hence, child depressive symptoms did not serve as a mediator in the relationship between parental mental health status and children's total HRQoL not even for a particular gender (see Table 9.5.4 and Fig. 9.4). Notably, similar results were found across the five dimensions of HRQoL and these results were consistent whether parental mental health status, depressive or anxiety symptoms were investigated. Furthermore, the same analysis was also conducted when parenting self-efficacy was the potential mediator and similar results were found (results not reported here).

---

**Fig. 9.4:** Standardised coefficients for child depressive symptoms as a mediator in the relationship between parent mental health status and child total HRQoL moderated by gender (**p < .01**).
Table 9.5.4: Path coefficients and indirect effect confidence interval for Model 4: Moderated mediator effect of child depressive symptoms in the relationship between parental mental health status and total HRQoL in children at year one by gender

<table>
<thead>
<tr>
<th>Model 4</th>
<th>Total HRQoL</th>
<th>β</th>
<th>SE</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>pMHS to cDep (control cSex &amp; pMHS x cSex, path a₁)</td>
<td>-.025</td>
<td>.913</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pMHS x cSex to cDep (control for pMHS &amp; cSex, path a₃)</td>
<td>.040</td>
<td>.865¹</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cDep to HRQoL (control for pMHS, cSex &amp; pMHS x cSex, path b₁)</td>
<td>-.562</td>
<td>.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pMHS to HRQoL (path c)</td>
<td>.051</td>
<td>.427</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pMHS to HRQoL (control for cDep, cSex &amp; pMHS x cSex, path c₁)</td>
<td>-.208</td>
<td>.258</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conditional indirect effect for cSex (female)⁸ BC CI</td>
<td>-.143</td>
<td>{.814</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conditional indirect effect for cSex (male)⁸ BC CI</td>
<td>.004</td>
<td>{.995</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Model Fit Statistics

| R² cDep | .001 | .816 |
| R² HRQoL | .331 | .000 |
| X²      | .000 | .000 |
| CFI     | 1.000 |       |
| RMSEA   | .000 | .000 |
| WRMSR   | .000 |       |

¹ cSex did not significantly moderate the relationship between cBMI and cBIP. Hence, conditional mediation did not occur.

9.5.5 Model 5: Half-longitudinal mediator effect of child depressive symptoms

While significant mediator effects were not identified in Model 2 above, these results were based on cross-sectional path analysis. It is possible that a mediator effect may only be identified when time has lapsed. Model 5 hypothesised that child depressive symptoms would mediate the relationship between parental mental health status and children's HRQoL over time. The indirect effect is equal to the product $a_2 b_2$ of the following two equations: $M_{t2} = M_{t1} + a_2 X_{t1} + e_{M_{t2}}$; and $Y_{t2} = y Y_{t1} + b_2 M_{t1} + e Y_{t2}$.

Table 9.5.5 below reveals that the indirect effect between parental mental health status and total HRQoL in children was not significantly different from zero and zero was contained within the lower and upper BC CI limits (see Fig. 9.5). Hence, when tested over time, child depressive symptoms were not found to mediate the relationship between parental mental health and total HRQoL in children. Notably, similar results were found across the five dimensions of HRQoL and these results were consistent whether parental mental health status, depressive or anxiety symptoms were investigated (results not reported here). Furthermore, it was not possible to test the half-longitudinal mediator effect of parenting self-efficacy in the relationship between parental mental health status and children's HRQoL because there was no data on parenting self-efficacy at year two.
Fig. 9.5: Standardised regression coefficients for the relationship between parent mental health status and total HRQoL over two years as mediated by child depressive symptoms (Assuming stationarity, the half-longitudinal mediation design predicts that path $b_2$ equals path $b_3$, and that the indirect effect $a_2b_2$ is equivalent to $a_2b_3$ (** $p < .01$))

Table 9.5.5: Path coefficients and the indirect effect confidence interval for Model 5: Mediator effect of child depressive symptoms in the relationship between parent/guardian mental health and total HRQoL in children between year one and two

<table>
<thead>
<tr>
<th>Model 5</th>
<th>Total HRQoL</th>
<th>Total HRQoL</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>pMHS_{t1} to cDep_{t2} (control for cDep_{t1}, path $a_2$)</td>
<td>.063</td>
<td>.367</td>
<td></td>
</tr>
<tr>
<td>cDep_{t1} to HRQoL_{t2} (control for pMHS_{t1} &amp; HRQoL_{t1}, path $b_2$)</td>
<td>-.192</td>
<td>.003</td>
<td></td>
</tr>
<tr>
<td>Indirect effect BC CI (path $a_2$ x $b_2$)</td>
<td>-.113</td>
<td>[-.436, .426]</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model Fit Statistics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$R^2$ cDep</td>
<td>.273</td>
</tr>
<tr>
<td>$R^2$ HRQoL</td>
<td>.291</td>
</tr>
<tr>
<td>$X^2$</td>
<td>2.903</td>
</tr>
<tr>
<td>CFI</td>
<td>.99</td>
</tr>
<tr>
<td>RMSEA</td>
<td>.101</td>
</tr>
<tr>
<td>WRMSR</td>
<td>.026</td>
</tr>
</tbody>
</table>

*BC CI does not contain zero, which indicates a significant indirect effect. $t_1$ and $t_2$ is year one and year two.
9.6 Conclusion
This chapter presented the results from an investigation of the nature and extend of the relationship between parental mental health and children's HRQoL. Overall parental mental health status was positively associated with children's total HRQoL, school well-being, and social support and peer relations at year one, and it predicted school and physical well-being a year later. No factors were found to moderate these relationships. Neither parenting self-efficacy nor children's depressive symptoms mediated these relationships even when different ages and genders of the children were considered. This is despite indications from Chapter Six that parenting self-efficacy might mediate the relationship between parental mental health status and children's school well-being (i.e. significant bivariate associations were identified between all variables in the mediation path). Finally, no main or mediator effects were found between parental depressive or anxiety symptoms and children's HRQoL.
CHAPTER TEN
Discussion

As indicated earlier, the HRQoL of children has attracted the attention of government bodies, researchers and practitioners, both nationally and internationally, over the years (e.g. Hanafin et al. 2008, Erhart et al. 2009). Child poverty, particularly urban disadvantage, and associated conditions including mental health problems, obesity and exposure to parental mental ill-health, are on the agenda of many governments around the world. Many studies have investigated the risk of obesity to children’s HRQoL, but few have examined the risks to children’s HRQoL from their own and their parents’ mental health problems. However, a number of authors have called for a more systematic and comprehensive investigation of the nature and extent of the relationship between such conditions and children’s HRQoL to appropriately inform health policy and the development of effective interventions to improve children’s HRQoL (e.g. Coghill et al. 2009, Tsiros et al. 2009). Thus, this study set out to establish - in a sample of families living in areas of high urban disadvantage - the nature and extent of the relationship between children’s HRQoL and their BMI, depressive symptoms, and the mental health status of their parents. The role of individual and family factors in mediating and moderating these relationships was also examined.

This chapter discusses (1) the key findings of the study in the context of existing research; (2) the strengths and limitations of the study; (3) the implications of the findings for policy and practice in the areas of health promotion, prevention, intervention and treatment; and (4) directions for further research.

10.1 The study findings in context
10.1.1 Body mass index and health-related quality of life of children
The results reported earlier in Chapter Eight support the hypotheses that, in a sample of in urban disadvantaged children,

1) BMI is weakly inversely correlated with total HRQoL, physical well-being, autonomy and parent relations, and marginally inversely associated with psychological well-being at year one.
2) the HRQoL of obese children is significantly worse than those of normal weight (on all aforementioned dimensions except for ‘autonomy and parent relations’). Notably, neither weight group fell below the European average HRQoL range.
3) and 4) the negative effect of high BMI on HRQoL intensifies as children approach adolescence (12 to 13 years) and as parent’s depressive symptoms
become more severe (especially with respect to school and physical well-being and physical well-being, respectively).

5) BMI predicts physical well-being a year later (unexpectedly, 'physical well-being' and 'autonomy and parent relations' also predicted BMI a year later).

6) according to both cross-sectional and longitudinal mediation analysis, body image perception and depressive symptoms mediate the effect of BMI on HRQoL. More specifically, body image concern and subsequent depressive symptoms lead to poorer psychological well-being rather than weight status.

However, the hypotheses that the negative effect of elevated BMI on children's HRQoL was intensified for females, and diminished for children who live in two-parent families and whose parents have strong social support, were not supported by this study. In addition, the proposition that body image perception mediates the relationship between BMI and HRQoL to a greater extent in children approaching adolescence and those who are female than younger children and those who are male, was not supported by the study results. These findings are now discussed within the context of the child HRQoL and development literature.

The first two findings above are largely consistent with the HRQoL literature (Tsiros et al. 2009, Haraldstad et al. 2011a, Ottova et al. 2012). For example, Tsiro and colleagues (2009) in their meta-analysis reported that the risk to several dimensions of HRQoL increases as BMI scores increase and that HRQoL is significantly lower amongst those who were obese than those of normal weight, particularly with regards to total HRQoL and physical well-being. Physical well-being may be affected because obesity is associated with a range of adverse physical consequences from dermatological to functional health problems (Wabitsch 2000). Likewise, psychological well-being, autonomy and parent relations may also be impaired because of the psychosocial consequences relating to obesity including body image concerns (Wardle & Cooke 2005), weight-related teasing (Puhl & Brownell 2003, Puhl & Latner 2007), low self esteem, depression and interpersonal difficulties (Latner & Stunkard 2003, Datar & Sturm 2006). Conversely however, - unlike numerous other studies (see Tsiros et al. 2009) - , there was no inverse association between children's BMI and their 'social support and peer relations'. The finding in the literature that Irish children score above average on social support-related HRQoL and higher than any other European country (Kidscreen Group Europe 2006), may explain why weight status did not affect this dimension; perhaps having a high BMI has little effect on friendships in Irish children, although this warrants further research attention.
It is noteworthy that the mean HRQoL for either weight group did not fall below the average European or Irish general population scores (Kidscreen Group Europe 2006). Typically, obese children have been found to have below average HRQoL scores although this is not always the case (Pinhas-Hamiel et al. 2005, Zeller & Modi 2006). As highlighted in Chapter Seven, it was unexpected that the children in this study reported mean HRQoL scores within the published healthy range given that they are from low SES backgrounds. These findings may be explained by one or more factors including social desirability response bias, adaptation to deprived or overweight conditions, and/or a buffering effect as a result of these schools - amongst some of the most disadvantaged in the country - receiving additional health promoting resources (e.g. food provision programmes) as part of a Government scheme that is available only to schools designated as disadvantaged. However, further research is needed to properly explain these findings. Similar to the first two findings reported here, small effect sizes are generally found in non-clinical studies investigating the effect of BMI on children’s HRQoL (Tsiros et al. 2009, Haraldstad et al. 2011a, Ottova et al. 2012). This may be because children with high BMI who have not been screened as overweight tend to be less aware of their overweight condition and are less likely to view it as an issue for their HRQoL than children who are receiving treatment for their condition (Cummins et al. 2003, Ferrans et al. 2005).

The third finding is not consistent with the small number of studies investigating the moderator effect of age in the relationship between BMI and HRQoL that reveal no significant interactions (Pinhas-Hamiel et al. 2005, Swallen et al. 2005, Hughes et al. 2006b). However, indirect evidence supports the third finding reported here. For example, overweight children tend to report lower physical and school well-being than their non-overweight peers (Schwimmer et al. 2003, Pinhas-Hamiel et al. 2005, Zeller et al. 2006), and, irrespective of weight, children report poorer physical and school well-being as they get older (Bisegger et al. 2005, Palacio-Vieira et al. 2008, Michel et al. 2009). These findings may be due to several puberty-related factors including greater changes to body-composition (Malina et al. 2004), increased societal pressures to be thin (Blowers et al. 2003) and greater susceptibility to depression and anxiety (Patton & Viner 2007, Parker & Brotchie 2010). Notably, girls are more vulnerable than boys to the last two of these (Presnell et al. 2004, Parker & Brotchie 2010).

In terms of the overweight children in the current study, the negative effect of high BMI on school well-being was intensified for those children whose parents had moderate to severe depressive symptoms (i.e. the fourth finding). Although up until now there have been no studies investigating this moderator effect, it has been shown that depression

No further expected moderator effects were identified. The unexpected buffering effect of one-parent families on the physical well-being and social support and peer relations of those children with overweight status is difficult to explain. It may be because children living in greater disadvantage (i.e. one-parent families) are less likely to perceive themselves as overweight and to negatively evaluate these dimensions (O'Dea & Caputi 2001). See ‘Limitations’ section for an explanation of why perhaps the hypotheses that the negative effect of elevated BMI on children's HRQoL was intensified for females, and diminished for children who live in two-parent families and whose parents have strong social support, were not supported by this study.

The fifth finding is somewhat consistent with the small number of longitudinal studies conducted in this area (e.g. Herman et al. 2010, Williams et al. 2011), which reported only weak evidence on the direction of causality between BMI and HRQoL in young people. For example, Herman and colleagues (2010) found significant negative correlations between BMI and a number of HRQoL dimensions during childhood, but young people's BMI only weakly predicted psychological well-being in adulthood. The authors argue that the impaired HRQoL found years later in obese adults is more likely due to underlying mental health co-morbidities of obesity.
The latter finding supports the next finding and indeed the finding in Chapter Six. Chapter Six revealed that more than two thirds of obese children were happy with their weight, whilst one in four normal weight children were concerned about their weight; the former had a more positive HRQoL than the latter. Similarly, the sixth finding of this section showed that the negative effect of BMI on the psychological well-being of children (both genders and all ages) is due primarily to their body image concerns and subsequent depressive symptoms (depressive symptoms alone did not mediate the effect). The opposite was true with regard to the positive effect of BMI on psychological well-being which was due, for the most part, to a positive body image perception and low or no depressive symptoms. These mediator effects are supported by strong, albeit indirect evidence in the literature; obesity does not necessarily lead to depression in children (Wardle & Cooke 2005), but body image dissatisfaction can mediate the effect (Erickson et al. 2000, Wardle & Cooke 2005, Neumark-Sztainer et al. 2006b, Chaiton et al. 2009). In addition, not only are body image concerns and depression associated with poor HRQoL for children (and particularly psychological well-being) (Bastiaansen et al. 2005, Kurth & Ellert 2008, Edwards et al. 2012b, Stevanovic 2012), but body image perception is found to be a better indicator of HRQoL than BMI (Haraldstad et al. 2011a). While other mediation studies suggest that body image concern only mediates the relationship between obesity and depression in adolescents (Chaiton et al. 2009, Mond et al. 2011), the findings reported here, suggest that the effect may also occur earlier in childhood and indeed, there is some research to show that body image concerns can arise in children as young as four (Davison et al. 2003, Mushera-Eizenman et al. 2003).

These findings can be explained, at least in part, by social and cognitive theories which were discussed in Chapter Two. For simplicity, these theories are discussed with reference to overweight children. Children from a young age may have internalised, to varying degrees, "body perfect ideals" constructed by a consumer culture (Schaad 2012). To different extents these ideals may have formed part of their personal value system (see value theory, e.g. Rokeach 1973) which guide how they construe themselves, what ideals they pursue and how they respond to future body image stressors. According to social comparison theory children have a need to evaluate themselves through comparing themselves to others (Festinger 1954). Overweight children who value this "bodily ideal" as their personal goal (Collins 1996, Trampe et al. 2007) may have compared themselves to the "perfect thin body" typically portrayed in the media that most people fall short of, and may have found a discrepancy between how they see themselves (actual body image) and how they would ideally like to be (ideal body image), and this may have led to psychological discomfort (see cognitive
dissonance theory, Festinger 1957). Unfortunately, when body image distress is very high, children may fail to engage in healthy weight management behaviours because of a perceived inability to make meaningful changes in their bodies (Ball et al. 2000, Atlantis et al. 2007), or in contrast, they may engage in unhealthy dieting behaviours in a desperate but failed attempt to lose weight (Cooley & Toray 2001, Stice 2001). Thus, these children may have been unable to reduce their cognitive dissonance.

Moreover, the overweight children with body image concerns in this study may have experienced ongoing negative appraisals of the self or body image (see Beck's (1967) cognitive theory of depression) and or perceived their body shape and size to be uncontrollable due to internal, stable and global causes (i.e. distorted causal attributions, see Abramson and colleague's (1978) reformulated model of learned helplessness), which may have lead to intense, enduring and generalised depression. Finally, it may be the case that all dimensions of the HRQoL (especially psychological well-being) of depressed children with body image concerns diminished, if they perceived not only a gap between their healthy past and present ill-being (i.e. depressive symptoms have increased), but also a discrepancy between their future aspirations for HRQoL and their present standards and values in life (i.e. HRQoL is poorer than expected, see De Leval's (1995) "three-time-dimension" theory of depression and QoL).

Similarly, the same theories could help explain why a positive body image perception and mental health are mechanisms by which overweight children may have experienced a more positive HRQoL. More specifically, the cognitive dissonance theory (Festinger 1957) proposes that children are to a large extent motivated by efforts to achieve and maintain peace of mind. After social comparison and appraisal of the discrepancy between actual and ideal body image, the overweight children may have employed any of the following three cognitive and behavioural coping strategies to reduce their cognitive dissonance and optimise HRQoL. Firstly, these children may have engaged in appearance fixing through consumption and weight loss behaviours. In accordance with the symbolic self-completion theory (Wicklund & Gollwitzer 1982), they may have used material symbols (e.g. buying an attractive outfit) in order to compensate for perceived shortcomings in their body image (Braun & Wicklund 1989). Alternatively, those overweight may have pursued a diet or exercise regime to achieve a shape and size that is closer to their ideal (Heinberg & Matzon 2001, Heinberg 2005). It is important to note however, that when body image distress reaches very low levels, like it has for these children, they may not be motivated to engage in healthy eating and
exercise behaviours, even though it is necessary to improve other health outcomes (Heinberg 2005).

Secondly, it is likely that the overweight children with positive body images may have used avoidance to minimise the dissonance. Given that emotion-oriented coping and avoidance via distraction (denial or cognitive diversion) are associated with poor health and well-being, but that task-oriented efforts and avoidance via social diversion are not (Cash et al. 2005), the overweight children with positive body images, mental health and HRQoL may have engaged in the latter. Thirdly, these children may have used positive rational acceptance strategies to ensure that the mental discomfort of being overweight was reduced. These strategies entail rational self-talk about one's appearance, positive self-care and acceptance of the challenging event (Cash et al. 2005). For example, attitude change is a method of dissonance reduction (Festinger 1957), and overweight children may have modified their attitude regarding the importance of conforming to society's "thin ideal", thus reducing the discomfort experienced from their awareness of their obese state and inability to lose weight (Cooper 2007).

Similar to this study's findings, other research has found that adiposity or body fat is associated with increased morbidity and mortality, but is not a cause of morbidity and mortality risk per se (see Bacon & Aphramor 2011). Instead, the metabolic changes associated with insufficient nutrient intake, poor fitness, weight cycling, poverty, marginalisation and psychological distress (e.g. hypertension, raised cholesterol, raised blood pressure, raised triglycerides, insulin resistance and dyslipidemia), are believed to increase morbidity and mortality risk (Guagnano et al. 1999, Olson et al. 2000, Raikkonen et al. 2002, Strohacker & McFarlin 2010). The identification of potential causal factors in this current study may have implications for treatment and prevention approaches to childhood obesity as discussed later in Section 10.3.1.

**10.1.2 Depressive symptoms and health-related quality of life of children**

The results of this study support the hypothesis that, in a sample of urban disadvantaged children, (1) an increase in depressive symptoms is moderately to strongly associated with a decrease in all dimensions of HRQoL (particularly psychological well-being) at both year one and two after controlling for confounders, and that (2) depressive symptoms predict HRQoL a year later. A secondary finding to this study was that (3) a significant improvement in mean depressive symptoms was associated with a mean improvement in all HRQoL dimensions except for physical
well-being (recall that autonomy and parent relations also significantly improved over one year). However, the findings do not support the hypotheses that:

- the negative effect of depressive symptoms on HRQoL may be intensified for children who are (a) female; (b) approaching adolescence; and (c) whose parents have high levels of depressive symptoms
- the negative effects of depressive symptoms on HRQoL may be reduced for children who live in two-parent families and whose parents have strong social support.

A discussion of the findings within the context of child HRQoL and the child development literature is provided below.

The first finding above is in line with work conducted with children on their depressive symptoms (Stevanovic 2012), mood disorders (e.g. Bastiaansen et al. 2005, White-Koning et al. 2011) and overall mental health status (Ravens-Sieberer et al. 2008, Rajmil et al. 2009a). For instance, the study by Stevanovic (2012) reported that the depressive symptoms of young people in the general population had a strong negative correlation with total HRQoL both before and after controlling for other co-morbidities. While that study did not explore the relationship between depressive symptoms and the different dimensions of HRQoL, general population studies looking at overall mental health status and clinical studies investigating the effects of mood disorders on young people's HRQoL also found a moderate to strong effect on the majority of HRQoL dimensions, but particularly psychological well-being. The second and third findings above are also somewhat consistent with the only two longitudinal (general population) studies reported in the literature (Jaycox et al. 2009, Rajmil et al. 2009c). Jaycox and colleagues (2009) found that the depressive symptoms of adolescents had a lasting impact on their peer and family relations, and school well-being 6 months later. Whereas this current study showed it predicted all dimensions a year later. With similar effect sizes observed in the aforementioned studies, the findings reported here serve to support the notion that depressive symptoms have a strong, direct and protracted effect on children's HRQoL. Rajmil and colleagues (2009c) found that after three years children's HRQoL in general declined, but for those children whose mental health symptoms improved over time (as opposed to being stable or deteriorating), their HRQoL declined the least. Physical well-being appeared to decline more than other dimensions for the group of children with improved mental health symptoms.
This finding is not unexpected given that both phenomena are psychological factors that are subjective in nature and are theorised to have a strong inter-dependence (De Leval 1995). As already mentioned, De Leval’s theory postulates that children’s depressive symptoms affect their HRQoL when children perceive a gap between their healthy past and present ill-being and a difference between their future aspirations for HRQoL and their present standards and values in life. An alternative explanation is that a sad affect has the propensity to foster negative, pessimistic, ruminative thought processes about self and environment (Teasdale & Fogarty 1979, Clark & Teasdale 1982, Isen 1984), which may affect HRQoL and, in turn, fuel any depressed ruminative thoughts. Depression can have adverse consequences for nearly every aspect of a person’s life including: loss of sleep; change in appetite and weight; problems with interpersonal relationships; and impaired general health; concentration and academic performance; loss of optimism; and suicidal thoughts or acts (Nolen-Hoeksema et al. 1992, Warner et al. 1992, Lewinsohn et al. 1994, Clark & Kirisci 1996, Hankin et al. 2001, Angst et al. 2002, Brent & Weersing 2008, Klein et al. 2008). However, it has been shown that depression has a greater impact on children’s psycho-social than physical health outcomes (Jaycox et al. 2009).

Finally, the latter finding that no factor intensified or reduced the negative effect of depressive symptoms on HRQoL may be explained by the finding in Chapter Six that only a small proportion of children were deemed to have clinical levels of depression (7%), which thus, may limit the identification of an effect. Furthermore, the similarity between the constructs may mean that once children are depressed, no other factors can modify the strength and direction of the effect of depressive symptoms on HRQoL. It is worth recalling here that moderator effects analysis involved assessing if the strength of the relationship between depressive symptoms (a continuous variable) and HRQoL was dependent upon a moderator. Although depressive symptoms was a continuous variable ranging from non cases to cases with varying degrees of severity, this study was most interested in the moderator effects of the latter relationship with regard children who were considered clinical cases. Refer to the ‘Limitations’ section for additional potential explanations for not finding significant moderator effects.

10.1.3 Parental mental health status and health-related quality of life of children

The findings reported here in relation to parental mental health, support the hypothesis that, in a sample of parent-child dyads living in urban disadvantage, (1) parental mental health status is weakly positively associated with HRQoL in children (in total HRQoL, school well-being, social support and peer relations), and that (2) parental mental
health status is also predictive of low HRQoL a year later. Though, the latter finding was only in relation to physical and school well-being.

However, the following hypotheses were not supported despite some initial indications to the contrary from pre-mediation analysis:

- that beliefs of parenting inefficacy and or child depressive symptoms mediate the negative effect of poor parental mental health status on children's HRQoL (of either gender or age group); and
- that the negative effect of parental mental health on the HRQoL of children would be intensified for children who are (a) female and (b) approaching adolescence; and would be reduced for children who (c) live in two-parent families and (d) whose parents have strong social support. Refer to the 'Limitations' section for an explanation of these results.

Evidence from the literature somewhat supports the first of the above initial findings (Giannakopoulos et al. 2009, Jeske et al. 2010, Wiegand-Grefe et al. 2010, Wiegand-Grefe et al. 2012). For instance, Giannakopoulos and colleagues (2009) found that parent mental health status weakly positively correlated with all dimensions of HRQoL in children except for bullying and autonomy dimensions. However, contrary to expectation and as consistently documented in the literature - there was no association in the current study between parental mental health status and children’s psychological well-being (Goldbeck & Melches 2005, Giannakopoulos et al. 2009, Jeske et al. 2010, Wiegand-Grefe et al. 2010, Wiegand-Grefe et al. 2012). It is not clear why this may be the case, but it is likely to be due to methodological issues relating, in particular, to sampling (see Section 10.2). The majority of parents/guardians in this study had a positive mental health, and a perhaps a larger proportions of parents with clinical mental health symptoms is needed to detect the small effect common in the literature. Nonetheless, this is one of the first studies to have found that poor parental mental health predicts low levels of self-reported physical and school well-being in children a year later (i.e. the second finding). Although a study by Wilkins and colleagues (2004) looking at the effect of parental mental health from pregnancy to 6 months post birth on children’s HRQoL at 5 and 12 years, they found that poor mental health during pregnancy predicted poor physical well-being at 5 years, while poor mental health 6 months post birth predicted poor psychosocial well-being at 12 years.

The 'secondary' social consequences of parental mental health, such as the quality of parenting and the parent-child relationship, may explain the negative impact on
Findings from the literature indicate further that ineffective parenting and parental negativity associated with poor parental mental health, can also negatively affect children's school performance and their peer relationships (Scherer et al. 1996, Davies & Windle 1997, Maybery et al. 2005) thereby impacting upon their school and social support-related well-being. However, the specific effect reported here with regard to children's physical well-being is less easy to explain; this may be due to the preoccupation with self and subsequent poor monitoring and limited attention paid to their child's physical health needs as described below. Alternatively, it may be explained by the transmission (in utero or genetically) of poor parental mental health during pregnancy as implied in Wilkin's (2004) study above. Overall, these findings suggest that parental mental health difficulties can have diverse and prolonged effects on children's health, functioning and overall well being (Leinonen et al. 2003).

Smith (2004) suggests that parental mental ill-health and particularly depression, is associated with unpredictable, rejecting and inconsistent behaviours that can result in poor monitoring of children, their homework, their attendance at school, and who they spend their time with. These behaviours can also lead children to assume a misplaced sense of responsibility for their ill parent, and consequently develop feelings of guilt, uncertainty, insecurity and rejection (Mackereth et al. 1999). All of these can have an enduring negative impact on children's interpersonal functioning and educational attainment (Absler 1999). These children may also find themselves exposed to, and involved in, greater family conflict when the borders between generations become diffused (Mattejat & Remschmidt 2008) whilst children who experience parental conflict may also have more conflict in their peer relationships (e.g. Bosco et al. 2003, Amato & Afifi 2006, Buehler et al. 2009). In addition, these children may be expected to take on increased responsibility within the family and to adopt a care-giver role (Aldridge & Becker 1993, Dearden & Becker 2004, Pakenham et al. 2006), which can be time consuming and may prevent them from engaging in developmentally appropriate activities (Aldridge & Becker 1993). Young care-givers have reported missing school and experiencing difficulties with concentration at school owing to the strain of their care-giving responsibilities (Banks et al. 2002, Siskowski 2006); they have also reported limited involvement in social activities and having their friends drop by their home because of discomfort regarding their parent's illness (Aldridge & Becker 1993, Davies & Windle 1997).

The small effect of parental mental health status on children's HRQoL in this study may be explained by the fact that there are many aspects relating to the parent, child and
environment that interact and turn a potentially negative life trajectory into a positive one (where children may, for example, experience a positive HRQoL). For example, parents can continue to parent effectively and children can adjust to parent's mental health difficulties if they have lower stress appraisals, higher social support, less reliance on avoidant coping, and greater reliance on problem-focused coping (Langrock et al. 2002, Pakenham et al. 2006, Jaser et al. 2011, Dunbar et al. 2013). The small effect size reported here may also be explained by sampling methods in this study.

Although, beliefs of parenting ineffectiveness were not found to mediate the negative effect of parental mental health status on children's HRQoL, bivariate associations between the variables in the mediation path are telling. Parent's mental health status was positively associated, albeit only weakly, with parenting self-efficacy, which is consistent with the literature except that effect sizes tend to be larger than those reported here (moderate at least) (Cutrona & Troutman 1986, Olioff & Aboud 1991, Teti & Gelfand 1991, Gross et al. 1994, Gondoli & Silverberg 1997, Gross et al. 1999, Porter & Hsu 2003). Parenting self-efficacy was also weakly positively associated with children's school well-being, which is consistent with other studies that have found small effects on children's academic performance, adjustment and success (Bogenschneider et al. 1997, Wentzel 1998, Ardelt & Eccles 2001, Bandura et al. 2001, Hoover-Dempsey et al. 2001, Shumow & Lomax 2002). Indeed, beliefs of parenting efficacy, which can be impaired by mental health difficulties, influence the extent to which parents involve themselves in their children's homework and with the school; this involvement has been found to impact children's academic attributions and beliefs (e.g. attitudes about homework, competence, and self-regulation) as well as their overall behaviour and levels of educational attainment (Hoover-Dempsey et al. 1992, Hoover-Dempsey & Sandler 1997, Hoover-Dempsey et al. 2001). The small effect of parent mental health status on parenting self-efficacy may explain why mediation was not identified in this study, although methodological factors (e.g. relating to sampling, design and analysis) may also be at play.

10.2 Strengths and limitations of the study
This study had a number of key strengths. First of all, the findings address an important gap in knowledge and theory relating to the association between children's HRQoL and their depressive symptoms, BMI and their parent's mental health status by extending the research into mediators and moderators of these relationships and by creating a unique conceptual framework for children's HRQoL. As indicated earlier in this thesis, very few studies have investigated the individual and family factors that moderate or
mediate these relationships and few have reported a theoretical or conceptual framework upon which to guide their study and interpret their findings. The conceptual framework adopted in this study provided a structure upon which to incorporate the key findings from the literature, and to subsequently inform the development of the study hypotheses; it also facilitated the interpretation of the findings. The findings of this study also contribute to the body of evidence concerning the complex process by which children's HRQoL is affected by depressive symptoms, BMI and parental mental health. Furthermore, a number of secondary findings emerged in addition to the main findings that were found from testing the research questions. For example, higher than average body image concerns and overweight states for children living in urban disadvantage, an improvement in depressive symptoms being associated with an improvement in all HRQoL dimensions except for physical well-being (and vice versa), and a notable difference in the proportion of urban disadvantaged parents with anxiety over depression. These secondary findings contribute to the literature on childhood body image and obesity and adult psychopathology, and highlight the importance of reliably recording all relevant data and pursuing additional research if initial findings indicate the need to do so.

The study also involved a large sample of young children recruited from seven schools (N = 255); children are under-represented in the HRQoL literature when compared to adolescents. There is potentially much that can be learned about the risks to the HRQoL of young children, especially in terms of the mediator effect of body image perception in the relationship between BMI and health outcomes such as HRQoL. The sample was also homogenous in terms of location; all participating schools were located in socially disadvantaged areas.

A third strength of this study is its longitudinal design. Longitudinal studies are statistically more powerful and they can identify how and when children's health perceptions and problems change, they can establish factors that predict future HRQoL, and they can identify causal relationships and causal direction (Page et al. 1995). As indicated in the literature review, however, the majority of the studies, albeit limited, investigating the topics of focus in this study, are cross-sectional.

This study also has a number of strengths relating to the selection of measures used. For example, the use of a self-report HRQoL measure with the children ensured that the information retrieved was consistent with the HRQoL concept - subjective perceptions of well-being in terms of health - and that the information was reliable, given the discrepancies commonly found between proxy reports and child self-reports.
Few studies have focused on children's self-reported HRQoL in terms of the constructs of focus in this study. The general use of measures with good psychometric properties (e.g. Ravens-Sieberer et al. 2007a) and the assessment of children's BMI by trained nurses also helped to ensure that the results were reliable and can be generalised more widely to other urban disadvantaged populations. The use of a generic HRQoL measure further enhanced applicability to all population subgroups (Robitaille et al. 2007, Solans et al. 2008) (e.g. obese or disadvantaged). Children's HRQoL and parent's mental health status measures capture both positive and negative aspects of well-being and mental health, and thus, do not require researchers to infer positive outcomes from the absence of negative ones (Topolski et al. 2004). Furthermore, this study generally used measures that generated continuous data. More can be learned from analysing continuous data (Turner, Dobson & Pocock, 2010) and the use of continuous rather than discrete variables in moderation analysis also increases the chances of identifying linearity and minimises the loss of power and residual confounding (Becher 1992, Austin & Brunner 2004).

A final strength of the study was the use of the non-parametric bootstrapping method in mediation analysis which, it has been argued, is superior to other methods including parametric techniques (MacKinnon et al. 2004, Preacher & Hayes 2004, Cheung & Lau 2008).

Several limitations of the study should be considered when interpreting the findings and considering their implications for policy, practice, theory and research.

1. Firstly, participants were recruited using a non-randomised (consecutive) sampling method in order to include all possible children and parents who were available to take part in the HPS evaluation (Comiskey et al. 2012). This sampling method increases the risk of selection bias (Berra et al. 2007) and the likelihood of non-normal distributions in the independent and dependent variables. While the study findings are consistent with those of research conducted in other medium to high income countries, external validity cannot be taken for granted and caution should also be taken when generalising the results to populations other than those living in areas characterised by high levels of urban disadvantage.

2. Secondly, the recruitment of a non-clinical sample meant that the incidence of overweight/obesity in children and of mental health problems in both parents and children, was lower than would be found in clinical settings. Although moderator effects analysis assessed the interaction of continuous independent variables (i.e. BMI,
depressive symptoms and parent mental health), as mentioned in Section 10.1.2, this study was most interested in the moderator effects of the IV to DV relationship with regard children who were considered clinical cases. The small proportion of parents who reported below average mental health status and children who experienced above average levels of depression may make it difficult to identify a moderator effect by, for example, child age and gender, or parent perceived social support. The small proportion of parents who reported below average mental health status may also have precluded any meaningful analysis of the mediating effect of parenting self-efficacy on the relationship between parents’ mental health status and children’s HRQoL. The same is true for the low incidence of parents identified with moderate to severe depressive and anxiety symptoms.

(3) Thirdly, due the nature of participant recruitment, an observational-correlational design was employed in this study instead of a randomised-experimental design. While it is possible to test mediational hypotheses using this design, the most compelling tests of mediational hypotheses are based on randomised-experimental designs (Cole & Maxwell 2003). Observational-correlational approaches to mediation rely on statistical controls rather than random assignment and experimental manipulation. In randomised-experimental designs, the researcher can disable or counteract the mediator instead of relying on it to co-vary naturally as a function of other variables, only some of which are measured in the study. Nonetheless, conclusions regarding mediation can be drawn from observational-correlational designs, and in line with critical multiplism of the post-positivist philosophy, researchers can, and should, tackle questions of mediation using a variety of research designs.

(4) There are a number of other potential limitations regarding the measures that were used in this study. For example, a generic quantitative measure of HRQoL was administered to the children, but it has been argued that, unless investigators tap into the value placed by participants upon specific functional capacities, using individualised measures, then they are measuring only perceived health status and not HRQoL (Gill & Feinstein 1994). The measure used in this study, however, was developed on the basis of extensive feedback from an international sample of children recruited from several countries, and on what the test authors believe to constitute the dimensions of HRQoL. Arguably, individualised measures are also more relevant to clinical practice than research (Higginson & Carr 2001) and can be very time consuming to administer. It is also worth noting that the Kidscreen used in this study, was administered to a child cohort aged 7 to 12 years but it has not been psychometrically tested for children aged under 8 (Kidscreen Group Europe 2006). Nonetheless, only a small number of children
aged 7 were assessed (N = 21) whilst research also shows that children aged 7 can reliably report on abstract concepts like their subjective HRQoL (see Matza et al. 2004a), and several studies on the HRQoL of children aged 7 have been published (e.g. Hijmans et al. 2010).

Body image perception was assessed in this study using an instrument that has not been psychometrically tested (Balding 2008). However, the authors maintain that validity and reliability is maximised by ensuring that the questions are suitable and relevant to the children based on ongoing focus group consultation with relevant parties (e.g. pupils and health professionals) and by instructing researchers to adhere to a detailed administration manual. Furthermore however, only one aspect (i.e. body image concern) of the more complex construct of body image perception and only one body feature (i.e. body size in terms of weight) was assessed, and the responses were categorised into a simple dichotomy (concerned and not concerned about body weight) for the purposes of mediation analysis. It is possible that a different pattern of findings would have been observed had other aspects of body image perception (e.g. positive and negative body image or body dissatisfaction) and body features (e.g. shape, build and muscle) been assessed, and if responses were along a continuum.

While a BMI z-score is generally a good proxy for unhealthy body weight in children (Pietrobelli et al. 1998), it does not distinguish between fat and muscle mass (Okorodudu et al. 2010). Thus, it is possible that a different pattern of findings would have emerged had other dimensions of adiposity, such as skinfold thickness and waist circumference, been assessed. However, a number of studies have shown that other height- and weight- based indices and skinfold measurements generally do not provide additional information about excess body fat beyond BMI z-scores (Garrow & Webster 1985, Mei et al. 2002, Mei et al. 2007).

Finally, there are some concerns about the Parenting Sense of Competence (PSOC) scale used to measure parenting self-efficacy in this study. The findings that the majority of parents felt successful in their parenting role (i.e. parents had an above average mean parenting self-efficacy score and only 5% scored below the average) was, to some extent, unexpected given that economic hardship is associated with poorer parenting self-efficacy (Jackson & Scheines 2005, Jackson et al. 2009) and can negatively affect parenting (Gross et al. 1994, Elder Jr et al. 1995, Jackson 2000, Jackson & Huang 2000, Ardelt & Eccles 2001). One explanation for this may be that the PSOC is lacking in sufficient validity. Currently, there are mixed reports on the validity of the PSOC (Lovejoy et al. 1997, Ohan et al. 2000, Rogers & Matthews 2004),
although other studies, like this current one, report sufficient internal consistency (e.g., Johnston & Mash 1989). There is no denying either that the PSOC is the most frequently used parenting self-efficacy instrument in research (Jones & Prinz 2005), which suggests that authors and reviewers of studies, at least, find the scale to be valid. An alternative explanation is that some parents may have inflated their reported beliefs of competency in parenting for reasons relating to social desirability, and efforts to reduce cognitive dissonance (Festinger 1957, Cooper 2007) or because they are in denial (Conrad et al. 1992).

(5) There are some additional important variables that were not measured in this study, but that, in hindsight, should have been controlled for in order to obtain more reliable results. For instance, stronger associations and significant mediation may have been identified in the relationship between parent’s mental health and children’s HRQoL if the following were statistically controlled for: (a) timing and duration of exposure to parent’s mental health problems; (b) extent of parental involvement in childcare; and (c) information on the health of the second parent (see Smith 2004).

(6) There are further limitations to the cross-sectional and longitudinal mediation analysis employed in this study. It is recommended when investigating indirect effects that at least three waves of data are used so that model assumptions are not violated (Holland 1986, Sobel 1990, Collins et al. 1998, Cole & Maxwell 2003). Cross-sectional mediation, as conducted in Chapter’s Eight and Nine, violates the assumptions of stability, non-spuriousness, and stationarity (Kenny 1979, Sobel 1990). Hence, longitudinal mediation was also conducted. While half-longitudinal mediation models are more robust that simple mediation models (Kenny 1979, Sobel 1990, Cole & Maxwell 2003), the assumption of stationarity and that a certain time interval must elapse for one variable to have an effect on another may have been violated in this study owing to the lack of a third wave of data, but without the third wave of data, this assumption cannot be tested. Violation of these assumptions may have produced potentially biased or misleading estimates of mediation effects (see Gollob & Reichardt 1985). Hence, caution should be taken when making causal inferences. Furthermore, it is also worth noting that children’s gender, family structure and parental social support did not moderate the effect of children’s depressive symptoms, BMI and parental mental health on children’s HRQoL. While indeed it is difficult to identify moderator effects in applied studies (McClelland & Judd 1993), the lack of interaction may be due to the simplicity of the moderator effects analysis conducted. For example, while it was evident that boys in general scored significantly higher than girls on ‘social support and peer relations’ and ‘school well-being’, perhaps noticeable interactions may only have
been identified if the age and gender of the child were considered simultaneously; significant differences between genders in HRQoL are usually not seen until children reach the age of 12 (Benjet & Hernández-Guzmán 2002, Palacio-Vieira et al. 2008). In addition, perhaps a significant interaction effect was not observed with parent’s social support because social support may only serve to protect parents from stressors and not children. Alternatively, perhaps the interaction between parental perceived social support and parenting self-efficacy may have moderated (or mediated) the relationship between parental mental health and children’s HRQoL. Indeed, consistent with the literature, this study found that social support was associated with parenting self-efficacy (e.g. Stoneman & Crapps 1988, Gowen et al. 1989, Haldy & Hanzlik 1990). It was not clear from the literature whether performing this analysis within a half-longitudinal mediation design was even possible.

Finally, the proportion of variance in HRQoL accounted for by children’s BMI was only small. Although small effect sizes are consistent with non-clinical samples, larger a priori effects of BMI z scores on HRQoL would have enhanced the mediation findings in this study. However, this small effect serves to indicate that, in the absence of body image perception, increases in body fat are associated with little impairment in HRQoL.

10.3 Implications for policy and practice
The findings presented and discussed in this chapter have important implications for both policy and practice particularly in areas relating to:

- health promotion (i.e. the promotion of physical activity, healthy eating, and of positive body image, mental health and HRQoL in children, and the promotion of positive mental health in parents); and
- the prevention, intervention and treatment of childhood obesity, body image concerns, depression and impaired HRQoL, and parental mental-ill health and associated problems for their children.

This section first discusses several general implications for health policy and practice, and then proceeds to more specific implications which fall under the headings of (1) health promotion and prevention, and (2) intervention and treatment.

Before the implications are presented, it is worth noting at the outset, that over the last 30 years there has been a growing recognition of the need for a holistic approach to health promotion and prevention rather than just treating and intervening early with
specific diseases and ill-health (Rice 2012). Figure 10.1 below presents a model of health promotion that captures the different categories of health initiatives that can be implemented, their targeted population and the aims and objectives of each. 'Universal' health promotion targets the general population of children, and aims to enhance positive health and well-being by promoting resilience. 'Selective' prevention targets individuals or subgroups that are at an increased risk of developing a disorder or condition (e.g. urban disadvantaged children), and aims to reduce the probability that individuals will suffer poor health and well-being by reducing the impact of risk factors and reinforcing coping skills. 'Indicated' intervention targets high-risk children that have symptoms or signs of a disorder or condition, and aims to improve poor health and well-being through early detection/diagnosis and employing the appropriate intervention. Finally, 'indicated' treatment targets children that have a diagnosis of a disorder or condition, and aims to improve poor health and well-being by employing the appropriate of optimal management and care (Rice 2012). For health initiatives to be most effective, they must build capacity at every level of the health system (e.g. strengthen individuals and families, and reduce societal barriers to positive health), and they must have procedures to detect and treat disorders and illnesses (Funk et al. 2005).
10.3.1 General implications

Several findings of this study, reported here, have a number of general implications for policy and practice in the area of health promotion, prevention, intervention and treatment. This study revealed a higher rate of overweight and obesity and body image concerns in children and anxiety symptoms in parents than what was expected from a disadvantaged population. This study also identified that children’s HRQoL is associated with or predicted by their depressive symptoms, body image perception, and BMI, and their parent’s mental health status, parenting self-efficacy and perceived social support, in the expected direction, in that order, but to varying degrees. Drawing on a conceptual model of adult HRQoL (Ferrans et al. 2005) and a bioecological model of child development (Bronfenbrenner 1979, 2005), the conceptual framework used in this study mapped out potential pathways between children’s HRQoL and their own and their parent’s health status whilst also indicating potential intrapersonal, interpersonal and environmental factors that interact with these pathways. Overall, the findings support many of the study hypotheses, and therefore, many of the elements of the conceptual framework described in Chapter Two. Thus, these findings imply the following:

- National and international Governments may need to prioritise urban disadvantaged children in obesity and mental health policies (e.g. see Government of Ireland 2000b, Department of the Taoiseach 2006, Government of Ireland 2006, HSE 2010), develop and include simultaneous initiatives to reduce the obesity epidemic and the effect that cultural “body image ideals” are having on young children and the prevalence of anxiety in parents, and be more proactive at implementing these policies. Health initiatives that could be included are explored in Section 10.3.2 and 10.3.3.

- HRQoL is much more than the clinical symptoms experienced by children who have problems with body image concerns, depression and the mental ill-health of their parents: it represents the hidden related ‘morbidities’ from the child’s perspective (it is more of an end result rather than an intermediate measure of health); and it can capture both positive and negative well-being.

- Health promotion and prevention programmes that aim to prevent avoidable risks for children living in urban disadvantage (i.e. obesity, body image concerns and depression in children and parental mental-ill health and associated risks for their children), and intervention and treatment programmes that aim to reduce mental health symptoms and weight problems identified in these children, may also need to aim to optimise children’s HRQoL.
There may be two ways in general to optimise urban disadvantaged children's HRQoL: (1) by preventing and reducing overweight states, body image concerns and depressive symptoms in children and mental health problems in parents and or (2) by intervening at the HRQoL level. In other words, if health initiatives fail to optimise/improve the HRQoL of children by focusing on preventing or reducing the signs and symptoms of a condition, they may have to intervene at the HRQoL level targeting dimensions that children are not doing so well on. If however, health initiatives still fail to optimise children's HRQoL, children may have to adjust to their condition and re-evaluate their HRQoL (i.e. homeostasis). Approaches to optimising children's HRQoL are presented in Section 10.3.2 and 10.3.3.

The aforementioned health programmes may need to monitor children's HRQoL (an initial and ongoing comprehensive assessment) to identify dimensions that they are doing well and not so well (i.e. important intervention targets) on in order to design or adjust programmes to improve aspects of life which really matter to a child. Including HRQoL measures in intervention research may also promote better agreement between the client and the practitioner, thereby improving compliance and treatment adherence (Coghill et al. 2009). Monitoring HRQoL (arguably) could provide a more ecologically valid measure of the positive and negative impact of an intervention regime and may provide a useful benchmark therefore, against which to determine the effectiveness of health programmes from the child's perspective (see Matza et al. 2004a, Coghill et al. 2009). Thus, the assessment of children's HRQoL should help to inform the development of more effective health initiatives whilst also adding to scientific knowledge in the area. For example, some researchers have advised that the HRQoL of depressed children may be better improved through Cognitive Behavioural Therapy (CBT) and family therapy when they found that treating depression with medication did not improve family relations and role functioning dimensions of HRQoL despite improved depressive symptoms (Vitiello et al. 2006, Rademacher et al. 2007, Stewart et al. 2009, Olsen et al. 2012).

Similarly, Governments could commit to an ongoing (e.g. biennial) assessment of the HRQoL of a nationally representative sample of children (including urban disadvantaged) as well as body image perception and depressive symptoms. Such monitoring could capture the perceptions of those with poor and good health in the 'here and now', determine if any changes in well-being occur over time for certain sub-groups, predict the well-being of future generations, and assess the potential costs to the state arising from recurrent
patterns of poor HRQoL (Topolski et al. 2004, Coghill et al. 2009). This information could be used to produce more beneficial outcomes for this and the next generation of children through informed and effective policies and health initiatives (Hanafin et al. 2008).

- **Measures of HRQoL could also be included in other research** that aims to better understand: (1) the consequences of childhood depression and obesity and parental mental health; (2) how HRQoL might contribute to these; and (3) the actual mechanisms by which these affect HRQoL.

- **The conceptual framework** of children’s HRQoL described in this study could be utilised in further research to explore direct, indirect and interaction effects with children’s HRQoL in relation to the pressing kinds of issues that children face. The framework may also help to interpret the findings from research designed to monitor the HRQoL of children at a national level. In addition, the framework might offer a useful tool for practitioners or researchers in planning or designing health initiatives that aim to promote or improve the HRQoL of children (i.e. target modifiable mediators and moderators and the dimensions of HRQoL affected).

The implications of the study findings are now discussed under the headings of (1) health promotion and prevention, and (2) intervention and treatment. The reason why the discussion is subsequently divided into two sections in this way is because health promotion and prevention initiatives employ similar approaches to achieve optimal health and well-being in children. Albeit, prevention initiatives have identified particular individuals or sub-groups such as children and parents living in urban disadvantage and employ an intense health promotion initiative that focuses on their specific needs/risks and resources. Likewise, intervention and treatment initiatives both aim to improve the health and well-being of children through the delivery of similar effective programmes suited to the needs of the child and or parent. Although, treatments involve a more intense programme that facilitates long term management and care of the disability or condition than interventions do.

### 10.3.2 Health promotion and prevention

The finding that children’s concerns about their body image and their subsequent depressed thoughts lead, in large part, to poorer HRQoL (in both boys and girls from 7 to 12 years) rather than their weight status per se, challenges traditional policies for and approaches to the prevention of childhood obesity (i.e. weight management with regular physical activity and healthy eating), but offers alternative policies and practices
that may simultaneously reduce the obesity epidemic, prevailing body image concerns and depression and optimise HRQoL in children. More specifically, it challenges the assumption that achieving or maintaining a "normal weight" will lead to better well-being, but instead implies that the cognitive dissonance experienced by all children (normal- and over- weight) with body image concerns and subsequent depression may need to be reduced alongside efforts to achieve or maintain a normal weight. Two additional outcomes of this study, namely the findings that as children experience greater levels of depressive symptoms (for whatever reason), they also experience (to a strong degree) a poorer HRQoL and that this level of HRQoL could be predicted a year later, highlight the importance and potential for implementing the most effective prevention programme for childhood depression as advised by the literature and several mental health policies. Finally, the identification within this study of a significant positive association, albeit small, between each of parental mental health status, parenting self efficacy and children’s school well-being, and also between parenting self-efficacy and parent perceived social support, supports the implementation of mental health policies involving parenting skills training as a means of preventing any associated problems of being exposed to parenting inefficacy, parental mental ill-health and poor social support, thus optimising children’s health and well-being. All of the above are discussed further below.

**Preventing obesity**

Current guidelines for the prevention of obesity advise that a “normal weight” should be maintained with regular physical activity and nutritional food intake (Friedman & Schwartz 2008, HSE 2010). These guidelines are founded upon the assumptions that: (1) it is the state of being obese that leads to greater morbidity and mortality risk, such as poor HRQoL; (2) that achieving a normal weight will improve these outcomes; and (3) that self-recognition of the risks of becoming (or being) overweight will alone reinforce the adoption of healthy behaviours for weight management. However, the finding from this study that overweight BMI is associated with, but does not directly cause, poorer HRQoL, challenges the first assumption as do other similar mediation studies relating to mortality risk mentioned in Section 10.1.1 (see Bacon & Aphramor 2011). The second and third assumptions are also not well supported by the literature. For example, it has been found that recognition of the risks of being overweight is not a good predictor of meeting the recommended levels of physical activity for health benefits (Atlantis et al. 2007). Furthermore, obesity prevention programmes are only found to have a 21% rate of success in preventing obesity (Stice et al. 2006). However, these prevention programmes often do not adhere to an ecological or holistic health promotion model. There is substantial evidence to indicate that the effective
implementation of high quality comprehensive holistic health promotion and prevention programmes (i.e. carried out in collaboration with families, schools and communities) focusing on regular physical activity and nutritional eating are more effective at reducing the incidence of obesity than programmes that only focus on one system in the child’s life (e.g. the microsystem of the child such as their interaction or habits with food and their coping mechanisms) (see Donnelly et al. 1996, Kahn et al. 2002, French et al. 2004, Katz et al. 2005, Jones et al. 2009). Preventing obesity through evidence-based holistic health promotion programmes may help achieve more optimal levels of HRQoL in urban disadvantaged children.

Preventing body image concerns
While implementing a holistic health promotion programme encouraging regular physical activity and healthy eating within urban disadvantaged areas could be effective at reducing the prevalence of obesity, the findings of this study suggest that they may also need to reduce body image concerns in order to achieve better mental health and HRQoL for children who have body image concerns (i.e. cognitive dissonance). There is a body of literature which proposes that children are to a large extent motivated by efforts to minimise cognitive dissonance (Festinger 1957) and indicates three cognitive and behavioural coping mechanisms by which children can reduce it (i.e. appearance fixing, avoidance and positive rational acceptance), which in turn, may lead to better mental health and HRQoL. Given the considerable body of research showing that avoidance coping is typically deleterious for physical and mental health and well-being (see Elliot et al. 2011), strategies that promote avoidance coping are not recommended here, but appearance fixing and positive rational acceptance approaches to reducing or preventing body image concerns are now discussed.

Firstly, children with body image concerns may be motivated to participate in holistic health promotion programmes that focus on regular physical activity and nutritional eating as a means of fixing their appearance and reducing the dissonance between their perceived and ideal body image. However, while this may work for some in the short-term, it is unlikely to provide a long-term solution for those who have chronic identity deficits of feeling dissatisfied with their body. This is best explained by Heinberg and colleagues (2001) inverted U-shape description of the relationship between body image dissatisfaction and healthy weight management behaviours: when body image distress is very low, children may not engage in healthy eating and exercise behaviours, even if necessary to improve health outcomes; and while some level of body image dissatisfaction may be beneficial for children with average or above-average BMI values as it may motivate them to uptake healthy weight
management behaviours (Heinberg & Matzon 2001, Heinberg 2005); when body image distress is very high, children may fail to engage in healthy weight management behaviours because of a perceived inability to make meaningful changes in their bodies (Ball et al. 2000, Atlantis et al. 2007); or when body image distress is very high, children may, in contrast, engage in unhealthy dieting behaviours in a desperate attempt to lose weight (Cooley & Toray 2001, Stice 2001). Similarly, health promotion programmes could encourage children to use material symbols (e.g. buying an attractive outfit) to compensate for perceived shortcomings in their body image (see symbolic self-completion theory, Wicklund & Gollwitzer 1982), but this is unlikely to provide a long-term solution for those who have chronic body dissatisfaction. Efforts to appropriately prevent or reduce high levels of body image concern and subsequent depression may need to be considered alongside efforts to achieve or maintain a normal weight.

A second way that holistic obesity prevention programmes could reduce or prevent body image concerns in children is to promote positive rational acceptance strategies such as rational self-talk about one’s appearance, positive self-care and acceptance of the challenging event (Cash et al. 2005). The literature suggests that body acceptance is key to strengthening resilience and fostering positive HRQoL in all children (Allen et al. 2006) and to preventing further marginalisation of overweight children (Provencher et al. 2009). Compassion-focused behaviour change theory (Leary et al. 2007, Goss & Allen 2010), which underlies many therapies for eating disorders, proposes that when a person learns to value their body even when this differs from a desired body image (i.e. by modifying their attitude of what’s important, see Festinger 1957, Cooper 2007), that person can strengthen their ability to take care of themselves and sustain improvements in healthy behaviours. Targeting a cohort of children who share the same values at a time is important because if children think that others hold the same dissonant perceptions as them, this might validate their alternative attitude favouring diversity in physical appearance and thus reduce their dissonance (i.e. social comparison to reduce dissonance, see Festinger 1957). Online, group and whole-school prevention programmes that support positive health and well-being in all children by promoting healthy attitudes towards body weight, body-acceptance and the development of life skills have already been developed and have shown to be effective (Irving 2000, Stice & Shaw 2004, Dohnt & Tiggemann 2005, O’Dea 2007, Hutchinson & Calland 2011). For example, structured programmes of weekly lessons on body image perception are being rolled out in schools, at a national level, in countries around the world, and on a pilot basis in Ireland (e.g. Hutchinson & Calland 2011, Ryan et al. 2011). These programmes involve using step-by-step lesson plans and illustrative
books with children to promote positive body image and to reduce the negative focus and discourse on weight and shape. Not only do they encourage children to focus on non appearance-related assets and to celebrate diversity, but they also examine the continuous media and peer pressures to which children are exposed, encourage children to challenge the glorification of thinness, and assist in confidence building and the development of critical thinking abilities.

Preventing depression
The findings of this study imply an urgency to prevent childhood depression however it is caused (see e.g. Jorm et al. 1997, Link et al. 1999, Goldberg 2006, Levinson 2006), and that, if body image concerns could be prevented or reduced in urban disadvantaged children, that depressive symptoms and impaired HRQoL could also be. Thus, general health promotion programmes as well as programmes aimed at preventing obesity and body dissatisfaction may need to teach children how to cope with and manage depression and to help them build emotional resilience. Universal preventions for childhood depression generally employ Cognitive Behavioural Therapy (CBT) principles to teach children how to cope with and manage depression and to help them build emotional resilience. There is some evidence that prevention of depression using CBT techniques can effectively reduce the symptoms of depression and recurring episodes of depression, but despite early promise, there is little evidence that prevention of depression is a practical possibility at this stage (see Merry et al. 2004, Horowitz & Garber 2006, David-Ferdon & Kaslow 2008). While a systematic review by David-Ferdon and colleagues (2008), for example, found no clear evidence of the long-term effectiveness of universal preventions in preventing the development of mood disorders, other numerous benefits for children were identified (e.g. reductions in depression, hopelessness, negative thinking, anxiety, externalizing and negative problem solving and improvements in social functioning).

Preventing parenting inefficacy, parental mental ill-health and poor social support, and the associated poor health outcomes in children
The findings of this study supports the prevention of parenting inefficacy, parental mental ill-health and poor social support in parents living in urban disadvantage as a means of optimising children's HRQoL. There is a large body of research documenting effective preventions that can improve health outcomes for children through early parenting interventions and, in so doing, indirectly improves parenting self-efficacy, parental mental health and social support (e.g. Barlow et al. 2002, Royal College of Paediatrics and Child Health 2002, White et al. 2005, Furlong & Collaboration 2012, Furlong et al. 2012, Leahy Warren et al. 2012). Thus, this study supports the inclusion
of a parenting training component as part of a health initiative that aims to optimise children's HRQoL. Furthermore, health initiatives that promote effective parenting have shown to be effective at reducing and managing weight in children (see Campbell & Hesketh 2007, Hesketh & Campbell 2010), reducing negative discourse on weight in the family home, although few interventions have been evaluated (Haines & Neumark-Sztainer 2006, Haines et al. 2006, Puhl & Latner 2007), and preventing depression in children (see Horowitz & Garber 2006). Perhaps a parenting training component could be included as part of a health initiative that aims to prevent obesity, body image concerns and depression in children, as well as preventing parenting inefficacy, mental-ill health and poor social support in parents living in urban disadvantage. Parenting training may include: educating parents on their responsibilities; nutrition and physical activity; behaviour modification; decreasing stimulus exposure; parental modelling; problem solving; cognitive restructuring; coping with resistance; causes of obesity; consequences of weight stigma; social pressures to be thin; strategies to promote a bias-free home environment; recognising mental health issues; and empathising with children.

A universal programme to prevent obesity, body image concerns, depression and poor health-related quality of life in children, and parenting inefficacy, mental ill-health and poor social support in parents living in urban disadvantaged areas of Ireland

Albeit based on only a single study, the study findings reported above suggest a need for action on implementing some of Ireland's health promotion policies described in the HSE Framework for Action on Obesity, A Vision for Change, the National Children's Strategy and Towards 2016 as a means of preventing obesity, body image concerns and depression in children and parenting inefficacy, mental ill-health and poor social support in parents, and in so doing, achieving an optimal HRQoL in urban disadvantaged children (see Government of Ireland 2000b, Department of the Taoiseach 2006, Government of Ireland 2006, HSE 2010). These health promotion policies recommend the national role out of a Health Promoting Schools (HPS) initiative across all primary schools focusing on Physical Activity, Confidence and Healthy Eating (i.e. the ACE programme). In addition, the role out of the Community Mothers Programme (CMP) across all urban disadvantaged areas in Ireland is recommended in A Vision for Change (Government of Ireland 2006). These are discussed further below.

Towards 2016 and the National Children's Strategy, in particular, provide an integrated framework and the key policy context for prevention programmes targeting those living in areas of socioeconomic deprivation, many of which are implemented within the school setting. The school setting provides an opportunity to reach larger numbers of
children and, as it is a place for learning and an important source of friends and adult role models and for accessing parents, it can have a significant influence on children's health and well-being (Barry et al. 2009). Whilst a Health Promoting School's (HPS) initiative was not the subject of this study, the research here was conducted, at least in part, within the context of an evaluation of the implementation of a HPS programme.

There is substantial evidence that HPS programmes, as described in Chapter One, provide an effective approach in schools for the promotion of long-term health benefits for children as well as school staff and parents. The literature suggests that these are particularly effective in children from the most vulnerable or disadvantaged backgrounds (see Barry et al. 2009). These programmes target multiple health outcomes, involve collaboration with children, families, school staff, communities, health services and government agencies in the context of a co-ordinated whole school approach (i.e. bottom-up needs/resource analysis, decision making and implementation of mechanisms to achieve programme goals). A HPS may facilitate not only the identification of children at risk of depression, obesity and exposure to parental mental health problems and referring them appropriately onwards, but it may also be pivotal in promoting physical activity, healthy eating, positive body images, mental health and HRQoL in all children, and for promoting positive parental mental health and parenting practices.

Part of Ireland's national goal for intensifying the promotion of children's health and well-being was the adoption of a HPS approach through the introduction of a Social, Personal and Health Education (SPHE) programme in all primary schools (Nic Gabhainn & Kelleher 1998, Lahiff 2000, Dooris 2006). This curriculum, which is available to all classes, includes a central mental health component with a particular focus on problem solving and coping skills (SPHE Support Services 2006). Holistic mental health education in schools offers a number of opportunities to children including the time and space for children to examine factors that influence their mental health and to explore ways in which they can support it, including strengthening their awareness of relevant support agencies. Improving children's mental health literacy could increase the likelihood that children will recognise depression before it becomes a serious problem and it may also increase the opportunity for mental health promotion more generally (Wilson 2007, Moffatt 2008). While much progress has been made in the implementation of the SPHE curriculum, some challenges remain. Although SPHE is built on the principles and processes of the HPS framework, efforts to align the implementation of SPHE in Ireland with the HPS process have been impeded by a lack of clarity on the theoretical concepts and practical applications involved (Burtenshaw 2003). In addition, it has been found that children and parents, as key stakeholders, are
not being fully involved or consulted in the SPHE planning process (Department of Education and Skills 2009). It is also worth noting here that, while SPHE is designed to be rolled out using a whole-school approach, it has been found that once-off/short term interventions (e.g. unstructured delivery of programme teaching children to cope with challenging behaviours during circle time and events held to promote anti-bullying and self esteem) are being delivered in some schools (Department of Education and Skills 2008, Department of Education and Science 2010). Where this occurs, sustainability of programme delivery is compromised. Similar challenges have been reported in the evaluation of a pilot HPS programme in the Irish urban disadvantaged schools associated with this current study (Comiskey et al. 2012) and in evaluations conducted internationally (Dooris 2006, Rowling & Jeffreys 2006, Stewart-Brown 2006, Turunen et al. 2006).

A summary of the key steps for a school committee, consisting of an ACE coordinator, and a student, school staff, parent, community and health services representative, to effectively implement a HPS programme such as ACE are presented in Figure 10.2. These steps have been adapted from Lee's (2011) 'School health guidelines to promote healthy eating and physical activity' because the HSE Framework for Action on Obesity provides a limited description on how to implement the ACE programme. While Lee's guidelines provide in-depth evidence-based strategies of how schools can effectively establish a climate that encourages and does not stigmatise Physical Activity and Healthy Eating, the guidelines on how to create a school environment that encourages a healthy body image among all students and staff members, is accepting of diverse abilities, and does not tolerate weight-based teasing, is less in-depth. The reader should refer to 'Body image in the primary school' (Hutchinson & Calland 2011) and 'The Magnificent Toby Plum' (Ryan et al. 2011) for a detailed description of how schools can implement lesson plans that have been shown to promote positive body image and reduce the negative focus and discourse on weight and shape. Moreover, Lee's guidelines do not describe or advise of a programme to teach children how to cope with and manage depression and to help build emotional resilience. For a description of the content of a well known and applied depression prevention programme called the Penn Resiliency Program (Gillham et al. 2008b), see Gillham and colleagues (2008a). There are also other effective school-based depression prevention programmes using CBT principles that can be referred to (e.g. see Spence et al. 2003, Shochet & Ham 2004, Barrett et al. 2006).
Key steps to effectively implementing a Health Promoting School’s programme (ACE: Physical Activity, Confidence and Healthy Eating)

1) Use a coordinated approach to develop, implement & evaluate ACE policies & practices in school
2) Offer quality school meals & appealing healthy choices on site for all, & implement physical activity & life skills programme
3) Implement health education: providing knowledge, attitudes, skills & experiences needed for ACE
4) Establish school environment that supports ACE (e.g. zero tolerance for stigma)
5) Provide children with health, mental health & social services to address ACE & prevent symptoms & signs
6) Partner with families/community in ACE development & implementation
7) Provide school staff wellness programme
8) Provide professional development to staff

Figure 10.2: Key steps to effectively implementing a Health Promoting School’s programme (ACE: Physical Activity, Confidence and Healthy Eating)

It is important to note here that children’s dietary and physical activity behaviours, body image ideals and perceptions are influenced by many sectors of society, including families, schools, communities, health-care providers, government agencies, the media, and the food, beverage and entertainment industries (Schwartz et al. 2003, Brownell 2005, Puhl & Latner 2007, Puhl et al. 2009). Each of these sectors has an important, independent role to play in improving the behaviours, cognitions and emotions of children so that they can experience an optimal HRQoL. To achieve this, the media, private sector and government may need to accept shared responsibility for these problems and address obesity and weight bias collaboratively through the development and implementation of effective policies and interventions. The family home, in particular, is a place where children are most likely to identify role models and internalise values and beliefs relating to weight and preventions may need to occur there first.

Finally, in addition to an ACE programme, the findings of this study supports the role out of the Community Mothers Programme (CMP) across all urban disadvantaged areas in Ireland as a means of preventing obesity, body image concerns and depression in children and parenting ineffectivity, mental ill-health and poor social support.
in parents, and in so doing, achieving an optimal HRQoL in children. The CMP is a support programme for first-time parents of children from birth to twenty four months who live in mainly disadvantaged areas (Johnson & Molloy 1995). It trains experienced mothers from the local community to visit families and provide necessary child-rearing support that helps new parents develop effective parenting skills (Johnson et al. 1993, Johnson & Molloy 1995, Fitzpatrick et al. 1997, Johnson et al. 2000, O'Connor 2001). CMP originated in the United Kingdom and Ireland and is just one of many parenting training programmes that exist around the world. There is a large body of research documenting effective preventions that can improve health outcomes for children (e.g. BMI, body image concerns and depressive symptoms) through early parenting interventions and, in so doing, indirectly improves parenting self-efficacy, parental mental health and social support (see above).

There are a range of barriers to putting these recommendations into practice. For example, a HPS may be difficult to implement effectively if there is limited Government support for school health issues; limited funding for health initiatives and evaluations; inadequate collaboration between agencies whose expertise is needed to design and implement a HPS; inadequate vision of what HPS can achieve and poor planning; a lack of administrative support; change is imposed from the top-down; and poorly trained teachers.

Together, these kinds of health promotion and preventative strategies may prevent the development of obesity, body image concerns, depression and impaired HRQoL in children, and parenting inefficacy, parental mental health difficulties and poor social support in parents. However, these health initiatives may also need procedures in place to identify those children at risk of obesity, body dissatisfaction, depression and problems associated with being exposed to parental mental ill-health, and to ensure that both children and their parents (where relevant) receive appropriate, effective and timely intervention and treatment (see next section).

10.3.3 Intervention and treatment
Two of the findings relating to BMI and HRQoL reported here, challenge traditional policies for and approaches to intervening and treating childhood obesity, and society's negative attitudes against those who are overweight. Firstly, children's concerns about their body image and their subsequent depressed thoughts lead, in large part, to poorer HRQoL (in both boys and girls from 7 to 12 years) rather than their overweight status, and secondly, the negative effect of overweight BMI on HRQoL was intensified as children approach adolescence and when their parents were depressed. Encouraging
active embodiment, intuitive eating and body acceptance within a comprehensive intervention/treatment programme which also involves enhancing parenting skills offers a potential alternative approach to the traditional method of focusing on weight loss through physical activity and diet as a means of simultaneously reducing BMI, body image concerns and depression and improving HRQoL in children. As previously mentioned, it challenges the assumption that achieving a "normal weight" will lead to better well-being, but instead implies that the cognitive dissonance experienced by overweight children with body image concerns and subsequent depression may need to be reduced alongside efforts to achieve a normal weight. The findings relating to HRQoL and each of child depressive symptoms and parental mental health status already mentioned under 'Health promotion and prevention' above, highlight the importance of implementing the most effective intervention/treatment for childhood depression and parental mental-ill health that also improves children’s HRQoL. Furthermore, children at risk of obesity, body dissatisfaction, depression and problems associated with being exposed to parental mental ill-health must first be identified in order to receive the appropriate and effective intervention or treatment. However there are significant barriers to detecting these problems in children. The implications of the findings are discussed further below.

Intervening and treating childhood obesity and body image concerns

A common assertion regarding childhood obesity in public health policy, and health care and health insurance provision (e.g. Marketdata Enterprises 2009, HSE 2010) is that a normal weight BMI is ideal and those with an overweight BMI have a greater morbidity and mortality risk, such as poor HRQoL and should, therefore, be detected early and targeted with intervention and treatment strategies. Indeed, the finding that the HRQoL of overweight children gets worse as they get older supports such early intervention. A HPS approach such as the ACE programme described above, with its focus on providing professional development to all physical education, health education, nutrition services, supervisors, and health, mental health, and social services staff members, supports staff not only in helping students assess and change their own physical activity and eating habits, but also in identifying those children who are overweight in a sensitive manner and referring them appropriately onwards (see Lee 2011). However, the finding reported here that BMI is not a good predictor of HRQoL in children, suggests that schools and health care providers may need to consider alternative indicators of HRQoL, such as body image perception and depressive symptoms, when determining the risks to children's health and well-being and designing interventions/treatments to improve same. Healthcare providers who use BMI as an indicator of children’s health and well-being in order to screen for, and
identify, those in need of an intervention, may misidentify children as needing an intervention, or overlook those who are most in need. In other words, the findings reported here indicate that over a third of "obese" children in this study were happy with their body image, whilst one in four "normal weight" children had body image concerns and were more likely to have a poorer HRQoL than the former group. Assuming that traditional approaches to treating obesity are effective at reducing weight, a significant proportion of the money spent on screening may be wasted whilst one in four children who need help, may not receive it. Furthermore, healthcare providers who screen for obesity in schools and who single out larger children for weight-related interventions, may inadvertently increase body image concerns within, and stigmatisation and discrimination by, peers towards those children (National Education Association 1994, Latner & Stunkard 2003, Puhl & Latner 2007), all of which can lead to poorer HRQoL (see Brown et al. 2006, Russell-Mayhew et al. 2012). Currently, it remains inconclusive as to whether or not whole school obesity screening programmes can be harmful for children (Nihiser et al. 2007). It is generally recommended that children are screened for obesity in their General Practitioners (GPs) to avoid any weight-based teasing from peers (American Medical Association 2007).

Health insurance providers may also need to consider alternative indicators of HRQoL than BMI. Currently, some routine preventative health services are denied to people who have a high BMI (Olson et al. 1994, Andreyeva et al. 2008) whilst some health insurance providers also deny health care coverage for the same reason (Wildman et al. 2008), despite research showing that weight cannot be directly correlated to children's health status (see Bacon & Aphramor 2011) or HRQoL. Many larger individuals avoid seeking health care due to stigma and shame and related feelings of depression (Olson et al. 1994, Puhl & Brownell 2006, Andreyeva et al. 2008, Puhl et al. 2008) and this avoidance may exacerbate their symptoms or impaired HRQoL. Using BMI as a proxy for children's health and well-being may lead, not only to inequality in accessing health care, but also to inappropriate financing of health care, body image concerns, weight-related stigmatisation, and poor health and HRQoL in children. Thus, health care and insurance providers may need to consider alternatives such as body image perception and depressive symptoms.

Current guidelines for the treatment of obesity advise that overweight children should lose weight by engaging in lifestyle modification involving exercise and diet (Friedman & Schwartz 2008, HSE 2010). These guidelines are founded upon three assumptions that were refuted above under 'Health promotion and prevention' (i.e. being obese leads to greater morbidity/mortality risk, weight loss improves these outcomes, self-
recognition of being overweight and the risks will reinforce the adoption of healthy
behaviours). The literature on treating obesity also refutes the latter two assumptions.
For example, it has been found that a recognition of being overweight actually
decreases the likelihood of meeting recommended levels of physical activity for health
benefits (Atlantis et al. 2007) possibly due to feelings of being 'too fat to exercise' (Ball
et al. 2000). Even when individuals are initially motivated to lose weight, most of those
who follow weight loss methods are unable to maintain weight loss over the long term
(i.e. weight is regained within 5 years) and do not achieve the benefits of improved
morbidity and mortality (see Reinehr et al. 2006, Mann et al. 2007, Ingram & Mussolino
2010, Bacon & Aphramor 2011). However, longer term follow-up studies (greater than
two years) are needed to confirm this with children (see Whitlock et al. 2005, Whitlock
et al. 2010). An evaluation of childhood obesity interventions and treatments that are
employed in collaboration with families, schools and communities as opposed to
programmes that just target children is also needed. Such programmes may even help
improve the HRQoL of overweight urban disadvantaged children.

While implementing a holistic intervention or treatment programme focusing on intense
physical activity and diet could be an effective means of weight loss for urban
disadvantaged overweight children, the findings of this study suggest that they may
also need to reduce body image concerns in order to achieve better mental health and
HRQoL for children who have body image concerns. Recall that while low levels of
body image concerns can motivate children to minimise their cognitive dissonance by
engaging in healthy behaviours to lose weight (i.e. appearance fixing), high levels of
body dissatisfaction may deter children because of a perceived inability to make
meaningful changes to their bodies or may encourage children to engage in unhealthy
dieting behaviours in a desperate attempt to lose weight (Ball et al. 2000, Cooley &
This weight-focused approach is not only ineffective at maintaining weight loss,
reducing the obesity epidemic and improving morbidity and mortality, but it may in fact
be damaging for children. The focus on weight loss and management appears to be
contribute to, amongst other things, an unhealthy preoccupation with food, physique
and weight control practices (Davison et al. 2003, Holm 2007), body dissatisfaction
(Neumark-Sztainer et al. 2006a, van den Berg & Neumark-Sztainer 2007), depression,
and weight-related stigma and teasing (Neumark-Sztainer et al. 2002, Haines et al.
2006, Puhl et al. 2007, Storch et al. 2007, Bacon 2010), all of which can lead to poor
HRQoL in children.
Within intervention or treatment regimes, practitioners could encourage overweight urban disadvantage children to engage in positive rational acceptance as a coping mechanism to reduce cognitive dissonance alongside motivating them to lose weight through exercise and diet. Positive rational acceptance strategies such as rational self-talk about one's appearance, positive self-care and acceptance of the challenging event (Cash et al. 2005) may reduce their body image concerns and lead to better mental health and HRQoL. To an extent, this shift has already begun and has been orchestrated by a growing trans-disciplinary movement called Health at Every Size® (HAES) (Parham 1996). This promotes positive health and well-being for people of all sizes by focusing on body acceptance, intuitive eating and active embodiment as opposed to encouraging weight loss, cognitively-imposed dietary restriction and structured exercise. HAES research is underpinned by compassion-focused behaviour change theory (Leary et al. 2007, Goss & Allen 2010) which, as mentioned previously, proposes that when a person learns to value their body even when this differs from a desired body image, that person can strengthen their ability to take care of themselves and sustain improvements in healthy behaviours and health outcomes such as improved body image and mood (see Bacon et al. 2005, Bacon & Aphramor 2011 for a review of HAES methods and research). The HAES approach of promoting body acceptance may prevent further marginalisation of the large proportion of children identified in this urban disadvantaged population as overweight. Furthermore, it may strengthen resilience and foster positive HRQoL in all children (Allen et al. 2006, Provencher et al. 2009). Although HAES interventions can result in an improved mood, this is not targeted directly; it is also not within the HAES framework to target the parents of overweight children. The most effective interventions and treatments for overweight children who are depressed or who have parents with mental health difficulties are discussed next.

Intervening and treating childhood depression

The findings of this study imply that if body image concerns (regardless of weight) could be reduced in urban disadvantaged children, that depressive symptoms and impaired HRQoL could also be. However, there are a range of causes of depression (see e.g. Jorm et al. 1997, Link et al. 1999, Goldberg 2006, Levinson 2006). The strong negative affect that depressive symptoms can have on children's HRQoL highlights the urgency with which an effective intervention or treatment should be employed once children have been identified as at risk of depression. There is evidence to support the short-term efficacy of both pharmacological and psychotherapeutic CBT interventions and treatments in reducing depressive symptoms, but no single or combined intervention has emerged as the most beneficial (see David-Ferdon & Kaslow 2008). It has been
advised, however, that children under the age of twelve should not be treated with anti-depressants (World Health Organization Mental Health Gap Action Programme (mhGAP) 2010). Furthermore, and as described earlier, there is increasing evidence that better mental health outcomes for children may be achieved through early parenting interventions (Royal College of Paediatrics and Child Health 2002). Further evaluation of psychotherapeutic interventions and treatments for children under twelve with depression are needed which adhere to strict criteria, methods and guidelines (see David-Ferdon & Kaslow 2008).

There are a number of barriers to identifying children with symptoms of depression and appropriately referring them to Child and Adolescent Mental Health Services (CAMHS). Whilst this topic is beyond the scope of this study, it is nonetheless important to mention it in the context of childhood depression. Identifying signs of depression in children can be difficult owing to the tendency amongst parents and teachers to attribute these to the growing up process, as well as children’s reluctance to seek help due to embarrassment/stigma or a lack of mental health literacy; some children and their parents may also experience difficulty in accessing local mental health services (Michaud & Fombonne 2005, Moffatt 2008). As indicated in the literature (Mental Health Commission Ireland 2012), the effective provision of CAMHS to meet the needs of such children requires coordination across different services including health, social, educational and legal services as well as voluntary bodies, and this presents further barriers to referring children for assessment. However, the General Practitioner (GP) is often the first point of contact and parents can be reliable sources of information to GPs regarding their child’s symptoms (Ani & Garralda 2005). The GP consultation could be enhanced with the inclusion of structured screening and specific management strategies for childhood depression (Gledhill et al. 2003).

It is within schools, however, that depression is most frequently first identified as parents concerned about their children are likely to consult teachers and services within as their first step in seeking help (Moffatt 2008). While the provision of training to teachers to identify symptoms of mental ill-health has not been effective at preventing depression (e.g. Moor et al. 2007), it can effectively increase their knowledge of mental health and identifying children at risk (Jorm et al. 2010). Furthermore, children and parents value information and advice regarding mental health given to them by health professionals in the school setting (Wilson 2007, Moffatt 2008). Enhancing children’s understanding of depression and treatment, encouraging them (and their parents) to seek early effective support, and identifying and limiting barriers to help-seeking, is essential not only for early detection, but also for preventing depression and accepting
treatment (Wilson 2007, Moffatt 2008). Indeed, building the capacity of children, parents, school staff and GPs to identify mental health difficulties and to know where and how to get appropriate help and support, and developing strong collaborative networks between health, social, educational and legal services and voluntary bodies is part of the remit of a HPS model such as the ACE programme described earlier.

**Intervening and treating parent mental ill-health and the associated poor health outcomes in children**

As this study did not identify any mediators of the relationship between parental mental health and the HRQoL in children, it is not possible to advise of any mechanisms to possibly improve policy and practice in this area. However, there is a large body of research documenting effective interventions and treatments with a parenting training component that can improve health outcomes for children and, in so doing, indirectly improve parental mental health (e.g. Barlow et al. 2002, Furlong & Collaboration 2012, Furlong et al. 2012). However, there are a number of problems across Community Mental Health (CMH) services and Children and Family Services (CFS) with regard to identifying children at risk of parental mental ill-health. These issues are now discussed.

Due to the stigma of mental illness and its associated socioeconomic difficulties (which were beyond the scope of the present study), parents with mental health problems may lack the resources needed to access appropriate services and they may be reluctant to request help for fear that their children may be taken into care by Child Protection Services (Park et al. 2006, Williams et al. 2006). For a number of reasons, parents are also reluctant to discuss their mental illness with their children (Anthony 1987, Aldridge & Becker 1993, Dunn 1993, Altschuler et al. 1997, Bibou-Nakou 2000, Alakus 2004, Fudge & Mason 2004, Roberts et al. 2008). Thus, many parents struggling with mental illness continue to parent without professional intervention, and hence, the children’s right to be heard and to have their own needs met, may be denied. When parents with mental health difficulties avail of CMH services, however, there is little collaboration between CMH and the CFS and the children often do not come into contact with CFS until problems have manifested themselves. CMH practitioners have also reported their reluctance to discuss with children, details relating to their parent’s mental illness and their potential role as caregiver (Anthony 1987, Aldridge & Becker 1993, Dunn 1993, Altschuler et al. 1997, Bibou-Nakou 2000, Alakus 2004, Fudge & Mason 2004, Roberts et al. 2008). It has also been documented that adult social workers in the CMH are not trained in assessing parenting ability (DoH 2001, p. 13), or do not consider it to be a routine responsibility (Monds-Watson et al. 2010, p 43). In addition, the impact of parental mental illness on children and the particular needs of these children, are often
not fully understood by those in the Child Protection Services within the CFS (DHSS & PSNI 2006, p. 45-46).

In Ireland, current CMH and CFS policy and service planning acknowledge the potential vulnerability and specific needs of children whose parents have mental health difficulties, and offer guidelines on how to conduct risk assessments with these children (HSE 2011). However, it is acknowledged that there is a need for better communication, coordination and collaboration “within and between all services and agencies to better support mentally ill parents who are struggling to meet the needs of their children” (Social Care Institute for Excellence (SCIE) 2006). The current development of CMH and reform of CFS in an Irish context (Government of Ireland 2006, Minister for Children and Youth Affairs 2012) may help to facilitate better collaboration.

Others have long identified the need for sensitive support mechanisms for families affected by parental mental health difficulties, which are neither dominated by Child Protection nor CMH services, but rather respond to this population’s needs in a balanced, preventative manner: avoiding unnecessary risk assessments and further stigmatisation for families (Hugman & Phillips 1992, Hollon et al. 2002, Monds-Watson et al. 2010). Instead, it has been recommended that schools in collaboration with Child and Adolescent Mental Health Services (CAMHS) in the CFS and parents’ social workers in CMH are best placed to identify children at risk and to support parents and children where appropriate (Hugman & Phillips 1992, Hollon et al. 2002, Monds-Watson et al. 2010). This recommendation is supported by the findings reported here which illustrate the effect of parental mental health status on children’s school well-being.

The results of recent systematic reviews show that interventions and treatments with a parent training component that target children at risk of poor health - but where parental mental health was not known at the outset - are effective in improving a broad range of health outcomes in children in the long term and in improving parenting skills, parenting self-efficacy and parental mental health in the short to long term (see Barry et al. 2009, Sandler et al. 2011). The finding in the current study that parenting self-efficacy might mediate the relationship between parental mental health status and children’s HRQoL (correlations between all three variables), supports the approach of improving parenting as a means of improving, albeit indirectly, the HRQoL in children. There exists a vast literature on parent training programmes, but a good example of such a parent training intervention designed for children with conduct problems is the
Incredible Years (IY) *Parent, Teacher and Child Training Series* (Webster-Stratton 1987) which is currently being implemented throughout Ireland and in a number of countries throughout Europe as well as in Canada, the USA, Australia and New Zealand. The IY programme has shown to be effective in improving parental depression, parenting skills and children's health outcomes (see Taylor *et al.* 2008b, McGilloway *et al.* 2011, Furlong *et al.* 2012). It has also been adapted for use in several prevention trials (Bernat *et al.* 2007, Brotman *et al.* 2008, Gross *et al.* 2009).

However, a review of the literature undertaken as part of this study identified only one randomised experimental intervention trial that targeted specifically the mental health of children whose parents had mental health difficulties (Beardslee *et al.* 2003). Note that this programme could be considered a primary prevention trial either as it aims to prevent poor health outcomes in children of parents who have been identified as having mental health problems. This intervention was found to be effective in improving children's attitudes towards their parent's mental ill-health and reducing their internalising symptoms. This involved the provision of training in effective parenting techniques (including how to communicate to their child the effects of their mental health), and promoting appropriate coping mechanisms in both parents and children. Some of these interventions are designed to be widely used by practitioners including nurses on home-visiting programmes, General Practitioners (GPs) and psychologists.

Moreover, childhood obesity interventions and treatments that aim to support positive HRQoL in children may need to strengthen parenting skills as well as encouraging active embodiment, intuitive eating and body acceptance and strengthening coping mechanisms for depression in children. It is worth noting that childhood obesity programmes that promote effective parenting as a means for reducing and managing weight in children, are more effective than weight loss programmes that only target children (Golan & Crow 2004) or that target both children and parents (Golan *et al.* 2006, Collins *et al.* 2011). This may be because those children were less likely to feel stigmatised and to develop body image concerns. Furthermore, childhood depression interventions and treatments programmes that target parenting skills have shown to be effective at reducing depression in children (see David-Ferdon & Kaslow 2008). Thus, this study supports the inclusion of a parenting training component as part of an intervention or treatment programme that aims to improve the health (e.g. weight, body dissatisfaction, depressive symptoms and HRQoL) of children living in urban disadvantage, and the parenting ineffectivity and mental-ill health of their parents.
Optimise or improve children’s HRQoL

As recommended at the beginning, governments, schools and practitioners may need to be monitoring urban disadvantaged children’s HRQoL, and if they feel that they are not making any progress at optimising or improving HRQoL by preventing or reducing the risks, signs, symptoms or conditions discussed (i.e. obesity, body image concerns, depression, parental mental ill-health and parenting inefficacy), then they may need to intervene at the HRQoL level and try to find ways of improving the particular dimensions of HRQoL that are impaired. Figure 10.3 presents ways to optimise or improve children’s HRQoL by intervening at the HRQoL level.

**Figure 10.3: Optimising or improving children’s HRQoL by intervening at the HRQoL level**

For example, given the finding that urban disadvantaged children with body image concerns, high depressive symptoms, or exposed to parents with mental health problems have poorer school well-being than their counterparts, a recommendation would be to improve the child’s perception of school and their abilities within. Efforts could be made to cater for their individual learning style and to improve the teacher-child relationship. In addition, the findings of this study imply that practitioners can expect improvements in depressive symptoms to lead to improvements in all dimensions of HRQoL except physical well-being. Thus, physical well-being may need to be targeted specifically. By practitioners monitoring children’s symptoms and HRQoL during the intervention, they can tailor their programme to ensure that symptoms are
being reduced and HRQoL is being improved. If intervening at both levels doesn't improve children's HRQoL, then children may have to adapt to their poorer HRQoL.

10.5 Directions for future research and conclusion
The findings of the present study suggest that future research should consider developing further a theory of children's HRQoL that explains the mechanisms through which any particular health state can affect HRQoL and that sets out a clear protocol for testing the theoretical assumptions underpinning it, as is proposed for the bioecological model of child development (Bronfenbrenner 1979, 2005, Tudge et al. 2009). In addition, this study should be replicated but with some adjustments to sampling, design, measures and analysis. These might include the use of random sampling in larger more representative samples of children and their parents. This will increase the likelihood of identifying larger effects whilst also increasing the generalisability of the findings. A design with at least three waves of data could also be used to determine causality and the direction of causality (Cole & Maxwell 2003) in the relationship between children's HRQoL and their depressive symptoms, BMI and parental depression.

It might also be useful, in future research, to include more fathers. It was not possible to compare the effect of the mental health of both parents on children's HRQoL since each family was free to choose which parent responded and only a small number of fathers did so. Internalising problems in children have been found to be more strongly associated with maternal than paternal depression (see Connell & Goodman 2002), and, therefore, parent gender differences in children's HRQoL merit further research. In addition, body image perception should be assessed using a more psychometrically robust instrument that captures weight and other body features and that produces a score along a continuum. Furthermore, parent's received social support should be measured in order to obtain a more accurate representation of the actual support received from their environment.

Additional paths in the mediation analysis could also be investigated in order to gain a greater understanding of the relationship between children's HRQoL and both BMI and parental mental health. More specifically, future studies should investigate if weight-related stigma or teasing mediate the relationship between the BMI of overweight children and certain psychosocial outcomes (i.e. depression, eating disorder, low self-esteem and body dissatisfaction), and if those outcomes mediate the relationship between the weight-related stigma or teasing experienced by overweight children and their HRQoL (Russell-Mayhew et al. 2012). It may also be worth examining whether
parenting self-efficacy mediates the relationship between parent depression and parenting practices or competence, and also if such practices/competence mediate the relationship between the depressed parent's beliefs of parenting ineffectiveness and children's HRQoL. As indicated earlier in this chapter, these analyses should also attempt to control for several factors including the timing and duration of exposure to parental mental ill-health, information on the health of the second parent and the interaction between parent's social support and parenting self-efficacy.

Body image concerns could also be explored in underweight as well as overweight children whilst additional work could seek to identify precisely when in the developmental trajectory, weight and shape concerns develop and what factors account for these changes; this information could then be incorporated into interventions designed to prevent the impairment of children's HRQoL. Future studies might also seek to examine the effectiveness of health promotion, prevention, intervention and treatment programmes in optimising or improving children's HRQoL and especially if they include components aimed at promoting positive parental mental health or effective parenting, promoting body acceptance and positive mental health in children, reducing risk factors for negative body image concerns, and reinforcing children's coping mechanisms.

In conclusion, this chapter synthesised and critiqued the findings of this study within the context of existing research and recognised both the strengths and limitations of the study. The potential implications of the findings for policy, practice, research and theory were also considered, and finally, directions for future research were highlighted.
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APPENDICES

Appendix 1: Main source of information on the health and well-being of young people in Ireland

The main source of information on the health and well-being of young people in Ireland comes from in-depth nationally representative cross-sectional, on-going, and longitudinal studies, results of which are presented biennially in the State of the Nation’s Children report (DCYA 2012). Information is compiled from a range of data sources including the Health Behaviour in School-Aged Children (HBSC) survey, the Kidscreen project and more recently the Growing Up in Ireland (GUI) study (Keenaghan & Kilroe 2008, Williams et al. 2009, Kelly et al. 2012). The Kidscreen project provides information on the HRQoL of children in Ireland. The HBSC project may also adopt this indicator, but the GUI project intends to develop its own indicator of well-being. A brief summary of the Kidscreen, HBSC and GUI projects and the indicators of health and well-being they focus on is now presented.

The European Kidscreen project
The European Kidscreen project was set up in 2001 to develop a generic Health-Related Quality of Life (HRQoL) survey for young people aged 8 to 18 years (Ravens-Sieberer et al. 2001). Between 2001 and 2005 cross-sectional investigations of the HRQoL in nationally representative samples of young people were carried out in thirteen European countries including Ireland. In 2005, 1,265 children aged 8-17 years living in Ireland took part in the study. Significantly, both National and European HRQoL reference scores were created from this project (Kidscreen Group Europe 2006). Not only has HRQoL been recognised by the Department of Children and Youth Affairs (DCYA) in Ireland as an important indicator of young people’s well-being (Hanafin et al. 2008), but a measure of overall HRQoL from the Kidscreen project has since been recommended as a candidate for inclusion into the mandatory HBSC survey (Erhart et al. 2009). This recommendation is a result of a study which found that the Kidscreen instrument demonstrated feasibility and good psychometric properties in relation to the HBSC when it was added as an optional extra to the HBSC 2005/2006 survey as a means for assessing mental health problems and impaired well-being in young people.
Health Behaviour in School-aged Children

The WHO's Health Behaviour in School-Aged Children (HBSC) project was established in 1982 and was among the first international surveys to assess the health of adolescents. The first HBSC study commenced in 1983 aimed to understand adolescent smoking behaviours in three countries (England, Finland, and Norway) (AARØ et al. 1986), but since then the range of health topics covered and participation internationally has grown rapidly. The HBSC is now a large-scale international study that is cross-sectional and on-going in design; the survey is run every four years in 41 countries and recruits a nationally representative sample of children aged 11, 13 and 15 years. It focuses primarily on health behaviours and the social context of young people, but it also assesses the health status and well-being of young people using indicators such as the number and type of injuries, BMI, and self-rated health and happiness.

Growing Up in Ireland

In 2007 the Growing Up in Ireland (GUI) study was launched. GUI is a seven year longitudinal study following the progress of two nationally representative groups of children to assess their health, well-being and development: 8500 nine-year-olds and 11,000 nine-month-olds. To date, GUI is the largest longitudinal study of its kind to take place in Ireland and now forms a central part of the collated information on the health, well-being and development of young people. GUI follows a relatively long-established tradition set by a number of international longitudinal studies that explore a broad range of health and developmental outcomes (UK's Perinatal Mortality Survey, 1946; the National Child Development Study, 1958; the British Cohort Study, 1970; and the Avon Longitudinal Study of Parents and Children, 1992) and some more recent studies that explore a broad range of health, development and well-being outcomes (UK's Millennium Cohort Study, the Longitudinal Study of Australian Children (LSAC), the National Longitudinal Survey of Children and Youth (NLSCY) in Canada, and the Early Childhood Longitudinal Study (ECLS) in the US). For a breakdown of a selection of International Longitudinal Child/Youth Cohort Studies undertaken since 1946 see (Greene et al. 2010). GUI examines children's cognitive ability, expectations for the future, health behaviours, and indicators of physical (i.e. health status, illness, BMI) and socio-emotional health (i.e. internalising, externalising and social competence problems). GUI intends to provide an index of children's well-being based on cognitive ability, and physical and socio-emotional health (Cheevers & O'Connell 2012). However, this index does not capture the child's subjective feelings about their quality of life.
Appendix 2: Estimated sample size for each statistical test used in this study

This section presents a summary of the estimated sample size of parents and children needed in order to conduct every statistical test employed. To conduct a range of analyses on the relationship between children’s HRQoL and several separate but related physical and mental health constructs including their a) depressive symptoms, b) BMI and c) the mental health of their parents, the following sample sizes of parent-child dyads is required:

a) A sample size of between 29 and 558 parent-child dyads was needed to assess the relationship between depressive symptoms and HRQoL in children
b) A sample size of between 54 and 558 parent-child dyads was needed to assess the relationship between body mass index and HRQoL in children
c) A sample size of between 204 and 799 parent-child dyads was needed to assess the relationship between parent’s mental health and children’s HRQoL
Table A2: Estimated sample sizes based on a 5% alpha level, 80% power, several effect sizes, and two attrition rates when using various statistical tests

<table>
<thead>
<tr>
<th>Test</th>
<th>IVs</th>
<th>Effect Size Formula</th>
<th>Effect Size</th>
<th>N</th>
<th>Attrition Rate</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Cross-sectional analysis)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(2%)</td>
<td></td>
</tr>
<tr>
<td>1  Pearson product moment correlation</td>
<td>n/a</td>
<td>( r = \frac{\Sigma x y}{\sqrt{\Sigma x^2 \Sigma y^2}} )</td>
<td>small ( r = 0.10 )</td>
<td>783</td>
<td>16</td>
<td>799(^c)</td>
</tr>
<tr>
<td>(Cohen 1992)</td>
<td></td>
<td></td>
<td>medium ( r = 0.30 )</td>
<td>85</td>
<td>2</td>
<td>87(^b)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>large ( r = 0.50 )</td>
<td>28</td>
<td>0.6</td>
<td>29(^a)</td>
</tr>
<tr>
<td>2  Independent t test</td>
<td>2</td>
<td>( d = \frac{M_A - M_B}{\delta} )</td>
<td>small ( d = 0.20 )</td>
<td>786 (393 x 2)</td>
<td>16</td>
<td>802</td>
</tr>
<tr>
<td>(similar to Tukey HSD, Mathews, 2010)</td>
<td></td>
<td></td>
<td>medium ( d = 0.50 )</td>
<td>128 (64 x 2)</td>
<td>3</td>
<td>131(^b)</td>
</tr>
<tr>
<td>(Cohen 1992)</td>
<td></td>
<td></td>
<td>large ( d = 0.80 )</td>
<td>52 (26 x 2)</td>
<td>1</td>
<td>53</td>
</tr>
<tr>
<td>3  One way analysis of variance</td>
<td>1</td>
<td>( f = \frac{\delta_m}{\delta} )</td>
<td>small ( r = 0.10 )</td>
<td>966 (322 x 3)</td>
<td>19</td>
<td>985</td>
</tr>
<tr>
<td>(Cohen 1992)</td>
<td></td>
<td></td>
<td>medium ( r = 0.25 )</td>
<td>156 (52 x 3)</td>
<td>3</td>
<td>159(^b)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>large ( r = 0.40 )</td>
<td>63 (21 x 3)</td>
<td>1</td>
<td>64(^a)</td>
</tr>
<tr>
<td>4  Standard multiple regression</td>
<td>2</td>
<td>( f^2 = R^2 )</td>
<td>small ( f^2 = 0.02 )</td>
<td>481</td>
<td>10</td>
<td>491(^c)</td>
</tr>
<tr>
<td>(Cohen 1992)</td>
<td></td>
<td></td>
<td>medium ( f^2 = 0.15 )</td>
<td>67</td>
<td>1</td>
<td>68(^b)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>large ( f^2 = 0.35 )</td>
<td>30</td>
<td>0.60</td>
<td>31(^a)</td>
</tr>
</tbody>
</table>
5  **Bias corrected bootstrap for mediator effects**  
   (Fritz & MacKinnon 2007)  
   $M = a_1X$  
   $Y = b_1M + c_1X$  

<table>
<thead>
<tr>
<th>Effect Size</th>
<th>Medium $a_1$</th>
<th>Large $b_1$</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium</td>
<td>53</td>
<td>1</td>
<td>54$^b$</td>
</tr>
<tr>
<td>Small</td>
<td>391</td>
<td>7.82</td>
<td>399$^b$</td>
</tr>
<tr>
<td>Small</td>
<td>385</td>
<td>7.70</td>
<td>393$^c$</td>
</tr>
</tbody>
</table>

6  **Bias corrected bootstrap for moderated mediator effects**  
   (Chu & Chen 2012)  

<table>
<thead>
<tr>
<th>Effect Size</th>
<th>Small $a_1$</th>
<th>Large $b_1$</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium</td>
<td>200 to 500</td>
<td>4 to 10</td>
<td>204 to 510$^{bc}$</td>
</tr>
<tr>
<td>(a$_1 + a_3$ x W level) x b$_1$</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7  **Sequential multiple regression**  
   (refer to Shieh (2009, 2010) for estimating sample size when using moderated multiple regression tests – large samples are needed)$^1$  
   (Cohen 1992)  

<table>
<thead>
<tr>
<th>Effect Size</th>
<th>Small $f^2$</th>
<th>Medium $f^2$</th>
<th>Large $f^2$</th>
<th>10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium</td>
<td>0.02</td>
<td>0.15</td>
<td>0.35</td>
<td>558$^{abc}$</td>
</tr>
<tr>
<td>Large</td>
<td>0.20</td>
<td>0.50</td>
<td>0.80</td>
<td>943</td>
</tr>
</tbody>
</table>

8  **Paired samples t test**  
   (similar to independent t test using pooled SD)  
   (Cohen 1992)  

<table>
<thead>
<tr>
<th>Effect Size</th>
<th>Small $d$</th>
<th>Medium $d$</th>
<th>Large $d$</th>
<th>10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>0.20</td>
<td>0.50</td>
<td>0.80</td>
<td>943</td>
</tr>
<tr>
<td>Medium</td>
<td>786 (393 x 2)</td>
<td>157</td>
<td>154</td>
<td></td>
</tr>
<tr>
<td>Large</td>
<td>52 (26 x 2)</td>
<td>10</td>
<td>62</td>
<td></td>
</tr>
</tbody>
</table>

9  **Wilcoxin signed ranks test**  
   (similar to McNemar and Binomial test which draw from the binomial distribution or the Chi-squared distribution with 1 df)  
   (Cohen 1992)  

<table>
<thead>
<tr>
<th>Effect Size</th>
<th>Small $g$</th>
<th>Medium $g$</th>
<th>Large $g$</th>
<th>10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>0.05</td>
<td>0.15</td>
<td>0.25</td>
<td>940</td>
</tr>
<tr>
<td>Medium</td>
<td>783</td>
<td>85</td>
<td>30</td>
<td>36</td>
</tr>
<tr>
<td>Large</td>
<td>157</td>
<td>17</td>
<td>26</td>
<td>36</td>
</tr>
</tbody>
</table>
10 **Sequential multiple regression**  
\[ f^2 = R^2 \]  
Sequential multiple regression

<table>
<thead>
<tr>
<th>Effect Size</th>
<th>Correlation Coefficient</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>0.02</td>
<td>481</td>
</tr>
<tr>
<td>Medium</td>
<td>0.15</td>
<td>67</td>
</tr>
<tr>
<td>Large</td>
<td>0.35</td>
<td>30</td>
</tr>
</tbody>
</table>

(Cohen 1992)

11 **Pearson product moment correlation**  
\[ r = \frac{\sum xy}{\sqrt{\sum x^2 \sum y^2}} \]

<table>
<thead>
<tr>
<th>Effect Size</th>
<th>Correlation Coefficient</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>0.10</td>
<td>783</td>
</tr>
<tr>
<td>Medium</td>
<td>0.30</td>
<td>85</td>
</tr>
<tr>
<td>Large</td>
<td>0.50</td>
<td>28</td>
</tr>
</tbody>
</table>

(Cohen 1992)

---

1. In tests of moderation, the average effect size in tests of moderation with categorical variables is very small (i.e. 0.009) (Aguinis et al. 2005). Power for tests of moderation is low when moderators are categorical variables and even lower when one or both of the predictor variables are continuous (McClelland & Judd 1993). Hence, large sample sizes are needed for moderation. Calculation of these sample sizes is beyond the scope of this study.

2. This study does not predict any changes in study variables over time. Hence, sample size estimations are not considered.

3. Estimated sample size when assessing the relationship between depressive symptoms and HRQoL in children.

4. Estimated sample size when assessing the relationship between body mass index and HRQoL in children.

5. Estimated sample size when assessing the relationship between parent/guardian mental health and HRQoL in children.
Appendix 3: Kidscreen 27 (Kidscreen Group Europe 2006)

How are you? How do you feel? This is what we would like you to tell us. Please read every question carefully. What answer comes to your mind first? Choose the box that fits your answer best and cross it. This is not a test so there are no wrong answers. It is important that you answer all the questions and also that we can see your marks clearly. When you think of your answer please try to remember the last week.

Some tips to begin!

- Here are some questions for you to answer on your own.

- If any questions is unclear, ask the Healthy Schools girls for help.

Your class teachers and friends will NOT find out what your answers are. Don't look at anyone else's answers and keep your answers private.

- We are interested in your honest answers. If any problems come up for you about your health we will talk to you and your family about this at another time.

- When you have answered all of the questions watch us put this booklet in the large envelope. We will then take it away from the school.
(1) I am a... Boy □ Girl □ tick one box

(2) Age ..................... years

(3) Who do you live with? tick all the people who are in your home

Mother □ Brother(s) □ Grandmother □
Father □ Stepbrother(s) □ Grandfather □
Stepmother □ Sister(s) □ Other adult relative □
Stepfather □ Stepsister(s) □
Foster parent □

(4a) How many brothers do you have? (include your stepbrothers)

Place the number in the box (0,1,2,...)

(4b) How many sisters do you have? (include your stepsisters)

(5) If you have brothers and sisters, how many are older than you?

(6a) Is your mother from Ireland?

Yes □ No □ if no, what country is your mother from? _____________
Don't know □

(6b) Is your father from Ireland?

Yes □ No □ if no, what country is your father from? _____________
Don't know □

(6c) Are you a member of the Irish traveler community?

Yes □ No □

(7) Do you have a long-term illness, physical disability, or medical condition (like diabetes, asthma, eczema etc.) that has been treated by a doctor?

Tick the box

Yes □ if yes, what is it? ________________
No □
Don't know □
1. Physical Activities and Health

Tick one box

In general, how would you say your health is?
- excellent
- very good
- good
- fair
- poor

For all the questions please tick one box on every line.

Thinking about the last week...

2. Have you felt fit and well?

3. Have you been physically active (e.g. running, climbing, cycling)?

4. Have you been able to run well?

Thinking about the last week...

5. Have you felt full of energy?
2. General Mood and Feelings about Yourself

<table>
<thead>
<tr>
<th>Thinking about the last week...</th>
<th>not at all</th>
<th>a little</th>
<th>a fair amount</th>
<th>very</th>
<th>extremely</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Has your life been enjoyable?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Have you been in a good mood?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Have you had fun?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Thinking about the last week...</th>
<th>never</th>
<th>sometimes</th>
<th>quite often</th>
<th>very often</th>
<th>always</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Have you felt sad?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Have you felt so bad that you didn't want to do anything?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Have you felt lonely?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Have you been happy with the way you are?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Family and Free Time

<table>
<thead>
<tr>
<th>Thinking about the last week...</th>
<th>never</th>
<th>sometimes</th>
<th>quite often</th>
<th>very often</th>
<th>always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Have you had enough time for yourself?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Have you been able to do the things that you want to do in your free time?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Have your parent(s) had enough time for you?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Have your parent(s) treated you fairly?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Have you been able to talk to your parent(s) when you wanted to?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Have you had enough money to do the same things as your friends?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Have you had enough money for things you need to buy?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4. Friends

Thinking about the last week...

1. Have you spent time with your friends?
   - never
   - sometimes
   - quite often
   - very often
   - always

2. Have you had fun with your friends?
   - never
   - sometimes
   - quite often
   - very often
   - always

3. Have you and your friends helped each other?
   - never
   - sometimes
   - quite often
   - very often
   - always

4. Have you been able to rely on your friends?
   - (rely = have your friends been there for you when you needed them?)
   - never
   - sometimes
   - quite often
   - very often
   - always

5. School and Learning

Thinking about the last week...

1. Have you been happy at school?
   - not at all
   - a little
   - a fair amount
   - very
   - extremely

2. Have you got on well at school?
   - not at all
   - a little
   - a fair amount
   - very
   - extremely

Thinking about the last week...

3. Have you been able to pay attention?
   - never
   - sometimes
   - quite often
   - very often
   - always

4. Have you got along well with your teachers?
   - never
   - sometimes
   - quite often
   - very often
   - always
Kidscreen 27 permission

Dear [name],

Thank you for your interest in the Kidscreen instruments. I am a co-worker of Prof. Dr. Ravens-Sieberer, working in the co-ordination of the European Kidscreen project in Hamburg, Germany. We have received your signed collaboration form and are very happy to collaborate with you.

You are registered for the use of the Kidscreen Quality of Life questionnaires for children/adolescents and parents. For the following countries linguistic adapted language versions are available: Austria, Brazil, Czech Republic, France, Germany, Greece, Hungary, Ireland, Korea, Netherlands, Poland, Portugal, Spain, Sweden, Switzerland, United Kingdom.

The non-commercial use of the Kidscreen questionnaires is free. In case of commercial use, the licence fee is 500 Euro for each language version of the Kidscreen questionnaire in each study. If that is applying to your study you will find the corresponding invoice attached to this email.

We are looking forward to collaborating with you and wish you all the best for your studies.

With best wishes,
Anne Jager

Kidscreen Group Europe
Collaboration Center
Appendix 4: Children’s Depression Inventory – short form (CDI-S) (Kovacs 2009)

Pick out the sentences that describe you best in the PAST TWO WEEKS.

😊 1
I am sad once in a while. □ 0
I am sad many times. □ 1
I am sad all the time. □ 2

 Glyph 2
Nothing will ever work out for me. □ 2
I am not sure if things will work out for me. □ 1
Things will work out for me O.K. □ 0

❤️ 3
I do most things O.K. □ 0
I do many things wrong. □ 1
I do everything wrong. □ 2

 Glyph 4
I hate myself. □ 2
I do not like myself. □ 1
I like myself. □ 0

 Petsc 5
I feel like crying every day. □ 2
I feel like crying many day. □ 1
I feel like crying once in a while. □ 0

 Animal 6
Things bother me all the time. □ 2
Things bother me many times. □ 1
Things bother me once in a while. □ 0
I look O.K. □ 0
There are some bad things about my looks. □ 1
I look ugly. □ 2

I do not feel alone. □ 0
I feel alone many times. □ 1
I feel alone all the time. □ 2

I have plenty of friends. □ 0
I have some friends but I wish I had more. □ 1
I do not have any friends. □ 2

Nobody really loves me. □ 2
I am not sure if anybody loves me. □ 1
I am sure that somebody loves me. □ 0

Children's Depression Inventory permission

Invoices available
You are doing great!

These questions are about Food

1. How important do you think it is to eat healthy food?

<table>
<thead>
<tr>
<th>Not at all important</th>
<th>A little important</th>
<th>Fairly Important</th>
<th>Very Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>

2. Which sentence describes you best?

Please tick ONE

- I would like to put on weight
- I would like to lose weight
- I am happy with my weight as it is

THE END!

Thank you for completing this questionnaire!

While you are waiting, turn over and see if you can solve the puzzle!
Health Behaviour in School Aged Children permission

Hi

Agreement for [HRBQ] arrived this morning, thanks.
We are obliged to charge VAT - as a charity, I guess you don't get to claim this back.
Have you come across this before?
1000 Euros will be fine although if we could add the VAT on top of this it would be better from our point of view.
Year 2 questionnaire attached

Best wishes
Angela Balding
Survey Manager at the Schools Health Education Unit (SHEU)
angela.balding@sheu.org.uk
### Appendix 6: Parenting Sense of Competence scale (PSOC) (Johnston & Mash 1989)

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Slightly Agree</th>
<th>Slightly Disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. (E) The problems of taking care of a child are easy to solve once you know how your actions affect your child, an understanding I have acquired.</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2. (S) Even though being a parent could be rewarding, I am frustrated now while my child is at his/her present age.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>3. (S) I go to bed the same way I wake up in the morning, feeling I have not accomplished a whole lot.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>4. (S) I do not know why it is, but sometimes when I’m supposed to be in control, I feel more like the one being manipulated.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>5. (S) My mother/father was better prepared to be a good mother/father than I am</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>6. (E) I would make a fine model for a new mother/father to follow in order to learn what she/he would need to know in order to be a good parent.</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>7. (E) Being a parent is manageable, and any problems are easily solved.</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>8. (S) A difficult problem in being a parent is not knowing whether you’re doing a good job or a bad one.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Question</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>9. (S) Sometimes I feel like I'm not getting anything done.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. (E) I meet my own personal expectations for expertise in caring for my child.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. (E) If anyone can find the answer to what is troubling my child, I am the one.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. (S) My talents and interests are in other areas, not in being a parent.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. (E) Considering how long I've been a mother/father, I feel thoroughly familiar with this role.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. (S) If being a mother/father of a child were only more interesting, I would be motivated to do a better job as a parent.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. (E) I honestly believe I have all the skills necessary to be a good mother/father to my child.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. (S) Being a parent makes me tense and anxious.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Parenting Sense of Competence scale permission**

Dear Ms. Wynne,

Thank you for your interest in the Parenting Sense of Competence Scale. Our version of the scale is in the public domain, so you are free to copy and use it. The attached materials include two articles describing our work with the scale, a mother and father version of the measure along with scoring instructions, and a list of references to articles that have employed the measure.
The original scale was developed by Gibaud-Wallston and Wandersman and presented at an APA conference in 1978. To the best of my knowledge, these authors have not continued work with the scale.

Best of luck with your research. I'd appreciate if you could send me a copy of your results when they are available.

Thank you,
Charlotte Johnston, Ph.D.
Professor
cjlab@psych.ubc.ca

Appendix 7: Oslo Social Support scale (Meltzer 2003)

1 How many people are so close to you that you can count on them if you have serious personal problems (choose one option)?
   1. None
   2. 1 or 2
   3. 3-5
   4. More than 5

2 How much concern do people show in what you are doing (choose one option)?
   5. A lot of concern and interest
   4. Some concern and interest
   3. Uncertain
   2. Little concern and interest
   1. No concern and interest

3 How easy is it to get practical help from neighbours if you should need it (choose one option)?
   5. Very easy
   4. Easy
   3. Possible
   2. Difficult
   1. Very difficult

Oslo Social Support scale permission
Public access
Appendix 8: Quality Metric Short Form 36 (SF 36) (Ware et al. 2000)

Please answer every question. Some questions may look like others, but each one is different. Please take the time to read and answer each question carefully by filling in the bubble that best represents your response.

1) In general, would you say your health is:

- Excellent
- Very good
- Good
- Fair
- Poor

2) Compared to one year ago, how would you rate your health in general now?

- Much better now than one year ago
- Somewhat better now than one year ago
- About the same as one year ago
- Somewhat worse now than one year ago
- Much worse now than one year ago

3) The following questions are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

- Yes, limited a lot
- Yes, limited a little
- No, not limited at all

   a. **Vigorous Activities**, such as running, lifting heavy objects, participating in strenuous sports
   b. **Moderate Activities**, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf
   c. Lifting or carrying groceries
   d. Climbing **several** flights of stairs
   e. Climbing **one** flight of stairs
   f. Bending, kneeling, or stooping
   g. Walking **more than a mile**
   h. Walking **several hundred yards**
   i. Walking **one hundred yards**
   j. Bathing or dressing yourself
4) During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

<table>
<thead>
<tr>
<th>All of the time</th>
<th>Most of the time</th>
<th>Some of the time</th>
<th>A little of the time</th>
<th>None of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Cut down on the amount of time you spent on work or other activities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Accomplished less than you would like</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Were limited in the kind of work or other activities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Had difficulty performing the work or other activities (for example, it took extra effort)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5) During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

<table>
<thead>
<tr>
<th>All of the time</th>
<th>Most of the time</th>
<th>Some of the time</th>
<th>A little of the time</th>
<th>None of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Cut down on the amount of time you spent on work or other activities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Accomplished less than you would like</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Did work or activities less carefully than usual</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6) During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?

- Not at all
- Slightly
- Moderately
- Quite a bit
- Extremely

7) How much bodily pain have you had during the past 4 weeks?

<table>
<thead>
<tr>
<th>None</th>
<th>Very Mild</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
<th>Very Severe</th>
</tr>
</thead>
</table>

8) During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely
9) These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks...

<table>
<thead>
<tr>
<th>Question</th>
<th>All of the time</th>
<th>Most of the time</th>
<th>Some of the time</th>
<th>A little of the time</th>
<th>None of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Did you feel full of life?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Have you been very nervous?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Have you felt so down in the dumps that nothing could cheer you up?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Have you felt calm and peaceful?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. Did you have a lot of energy?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. Have you felt downhearted and depressed?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g. Did you feel worn out?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>h. Have you been happy?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i. Did you feel tired?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10) During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting friends, relatives, etc.)?

<table>
<thead>
<tr>
<th>Time of the Activity</th>
<th>All of the time</th>
<th>Most of the time</th>
<th>Some of the time</th>
<th>A little of the time</th>
<th>None of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

11) How TRUE or FALSE is each of the following statements for you?

<table>
<thead>
<tr>
<th>Statement</th>
<th>Definitely true</th>
<th>Mostly true</th>
<th>Don't know</th>
<th>Mostly false</th>
<th>Definitely false</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. I seem to get sick a little easier than other people</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. I am as healthy as anybody I know</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. I expect my health to get worse</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. My health is excellent</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Dear Ciara,

Thank you for your payment. Your software will be released immediately. You will be receiving an email with the link for the Activation Key. The software will arrive separately in an email with the Subject line: “Your QualityMetric Health Outcomes(tm) Scoring Software 3.0 Activation Key”. If you do not receive this email, please contact me immediately.

Good luck with your study!

Kind Regards,

Lynda

Lynda LaPlante
Administrator, Office of Grants and Scholarly Research (OGSR) • i3 QualityMetric
llaplante@qualitymetric.com
Main: (401) 334-8800 Ext. 249 • Direct: (401) 642-9249 • Fax: (401) 642-9349
Clinicians are aware that emotions play an important part in most illnesses. If your clinician knows about these feelings he or she will be able to help you more. This questionnaire is designed to help your clinician to know how you feel. Read each item below and underline the reply which comes closest to how you have been feeling in the past week. Ignore the numbers printed at the edge of the questionnaire. Don’t take too long over your replies, your immediate reaction to each item will probably be more accurate than a long, thought-out response.

<table>
<thead>
<tr>
<th></th>
<th>Do you feel tense or 'wound up':</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Most of the time</td>
</tr>
<tr>
<td></td>
<td>A lot of the time</td>
</tr>
<tr>
<td></td>
<td>From time to time, occasionally</td>
</tr>
<tr>
<td></td>
<td>Not at all</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Can you still enjoy the things you used to enjoy:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Definitely as much</td>
</tr>
<tr>
<td></td>
<td>Not quite so much</td>
</tr>
<tr>
<td></td>
<td>Only a little</td>
</tr>
<tr>
<td></td>
<td>Hardly at all</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Do you get a sort of frightened feeling as if something awful is about to happen:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Very definitely and quite badly</td>
</tr>
<tr>
<td></td>
<td>Yes, but not too badly</td>
</tr>
<tr>
<td></td>
<td>A little, but it doesn’t worry me</td>
</tr>
<tr>
<td></td>
<td>Not at all</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Can you laugh and see the funny side of things:</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>As much as I always could</td>
</tr>
<tr>
<td></td>
<td>Not quite so much</td>
</tr>
<tr>
<td></td>
<td>Definitely not so much now</td>
</tr>
<tr>
<td></td>
<td>Not at all</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Do worrying thoughts go through your mind:</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>A great deal of the time</td>
</tr>
<tr>
<td></td>
<td>A lot of the time</td>
</tr>
<tr>
<td></td>
<td>From time to time, but not too often</td>
</tr>
<tr>
<td></td>
<td>Only occasionally</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Do you feel cheerful:</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Not at all</td>
</tr>
<tr>
<td></td>
<td>Not often</td>
</tr>
<tr>
<td>Question</td>
<td>Option</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>Can you sit at ease and feel relaxed?</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Usually</td>
</tr>
<tr>
<td></td>
<td>Not Often</td>
</tr>
<tr>
<td></td>
<td>Not at all</td>
</tr>
<tr>
<td>Do you feel as if you are slowed down?</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>Very often</td>
</tr>
<tr>
<td></td>
<td>Sometimes</td>
</tr>
<tr>
<td></td>
<td>Not at all</td>
</tr>
<tr>
<td>Do you get a sort of frightened feeling like 'butterflies' in the stomach?</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Occasionally</td>
</tr>
<tr>
<td></td>
<td>Quite Often</td>
</tr>
<tr>
<td></td>
<td>Very Often</td>
</tr>
<tr>
<td>Have you lost interest in your appearance?</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>I don't take as much care as I should</td>
</tr>
<tr>
<td></td>
<td>I may not take quite as much care</td>
</tr>
<tr>
<td></td>
<td>I take just as much care as ever</td>
</tr>
<tr>
<td>Do you feel restless as if you have to be on the move?</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Quite a lot</td>
</tr>
<tr>
<td></td>
<td>Not very much</td>
</tr>
<tr>
<td></td>
<td>Not at all</td>
</tr>
<tr>
<td>Do you look forward with enjoyment to things?</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>As much as I ever did</td>
</tr>
<tr>
<td></td>
<td>Rather less than I used to</td>
</tr>
<tr>
<td></td>
<td>Definitely less than I used to</td>
</tr>
<tr>
<td></td>
<td>Hardly at all</td>
</tr>
<tr>
<td>Do you get sudden feelings of panic?</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Quite often</td>
</tr>
<tr>
<td></td>
<td>Not very often</td>
</tr>
<tr>
<td></td>
<td>Not at all</td>
</tr>
<tr>
<td>Can you enjoy a good book or radio or TV program?</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>Often</td>
</tr>
</tbody>
</table>
Hospital Anxiety and Depression Scale permission

Hi Ciara

Thank you for your completed User Agreement, please find attached my counter signature along with a copy of the HADS.

The invoice has been raised today and will be with you shortly.

Regards,
Permissions

permissions@gl-assessment.co.uk
Appendix 10: Results from Exploratory Data Analysis: Sections A – E

This section presents the finding from the Exploratory Data Analysis (EDA) of the analysis conducted in this study as described in Sections 5.7.1, 5.7.3, 5.7.4, 5.7.5 and 5.7.6. EDA was not necessary for the analysis described in Section 5.7.7 and 5.7.8 as non parametric bootstrapping was employed. The EDA for Section 5.7.1 informed Section 5.7.2. The EDA is now presented in Section A to E below.

Section A: Univariate analysis of study variables at year one and two

This section presents the EDA findings from univariate analysis of all study variables and corresponds to Section 5.7.1. The findings include a description of outliers, skewness, kurtosis and normality in each study variable distribution. In a normal distribution of data there is about a 1% chance of getting an outlying data point. Only children’s depressive symptoms and parent’s physical health status distributions at year one had more than the expected 1% of outliers (i.e. 2%) (see Table A10A(i)), although when checked, they were found to be part of the population sampled.

Table A10A(i): Outliers from univariate analysis

<table>
<thead>
<tr>
<th>Outliers</th>
<th>%</th>
<th>Extremes</th>
<th>Tail</th>
<th>Mean</th>
<th>Trimmed Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>QoL PH 11</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>left &lt; 21</td>
<td>53.57</td>
</tr>
<tr>
<td>QoL PW 11</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>left &lt; 27</td>
<td>53.56</td>
</tr>
<tr>
<td>QoL A 11</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>left &lt; 14</td>
<td>52.07</td>
</tr>
<tr>
<td>QoL SS 11</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>left &lt; 11</td>
<td>53.26</td>
</tr>
<tr>
<td>QoL SE 11</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>left &lt; 16</td>
<td>55.47</td>
</tr>
<tr>
<td>QoL Tot 11</td>
<td>0</td>
<td>0</td>
<td>11</td>
<td>right &gt; 84</td>
<td>53.86</td>
</tr>
<tr>
<td>QoL PH 12</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QoL PW 12</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>left &lt; 5</td>
<td>54.47</td>
</tr>
<tr>
<td>QoL A 12</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QoL SS 12</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>left &lt; 11</td>
<td>54.37</td>
</tr>
<tr>
<td>QoL SE 12</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QoL Tot 12</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cAge 11</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cDep 11</td>
<td>5</td>
<td>2</td>
<td>17</td>
<td>right &gt;65</td>
<td>47.17</td>
</tr>
<tr>
<td>cDep 12</td>
<td>2</td>
<td>1</td>
<td>7</td>
<td>right &gt;65</td>
<td>45.97</td>
</tr>
<tr>
<td>cBMI 11</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>right &gt;4</td>
<td>.843</td>
</tr>
<tr>
<td>cBMI 12</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cAbs 11</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>right &gt;20</td>
<td>6.570</td>
</tr>
<tr>
<td>cAbs 12</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>right &gt;23.6</td>
<td>6.266</td>
</tr>
<tr>
<td>pPHS 11</td>
<td>6</td>
<td>2</td>
<td>21</td>
<td>left &lt; 44</td>
<td>55.270</td>
</tr>
<tr>
<td>pMHs 11</td>
<td>2</td>
<td>1</td>
<td>15</td>
<td>left &lt; 27</td>
<td>47.280</td>
</tr>
<tr>
<td>pDep 11</td>
<td>3</td>
<td>1</td>
<td>9</td>
<td>right &gt;14</td>
<td>3.850</td>
</tr>
<tr>
<td>pAnx 11</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>right &gt;19</td>
<td>6.720</td>
</tr>
</tbody>
</table>

296
When the skewness or kurtosis statistics are divided by their standard error (SE) and the result is greater than 1.96, then significant skewness or kurtosis exists (Cramer & Howitt 2004) (see Table A10A(ii) below). Half of HRQoL dimensions and the majority of potential predictors of HRQoL were significantly skewed. Many measures used in the social sciences have scores that are skewed (Pallant 2003, p. 52) and may just reflect the underlying nature of the construct being measured. For example, negative skewness or clustering to the right indicates better HRQoL and most people are reasonably happy with life. There was significant kurtosis in some of the potential predictors of HRQoL, but none in HRQoL at year one. Non normal kurtosis produces an underestimate of the variance in HRQoL (Tabachnick & Fidell 2012). According to Tabachnick and Fidell (2001) in large samples with 200 plus cases as in this study, significant skewness and kurtosis will not make a substantive difference to the analysis and the risk of underestimating the variance with kurtosis is greatly reduced.

Table A10A(ii) Skewness and kurtosis from univariate analysis

<table>
<thead>
<tr>
<th></th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistic</td>
<td>S.E.</td>
</tr>
<tr>
<td>QoL PH</td>
<td>0.152</td>
<td>.153</td>
</tr>
<tr>
<td>QoL PW</td>
<td>-0.114</td>
<td>.153</td>
</tr>
<tr>
<td>QoL A</td>
<td>0.288</td>
<td>.153</td>
</tr>
<tr>
<td>QoL SS</td>
<td>-0.917</td>
<td>.154</td>
</tr>
<tr>
<td>QoL SE</td>
<td>-0.379</td>
<td>.154</td>
</tr>
<tr>
<td>QoL To t</td>
<td>0.493</td>
<td>.156</td>
</tr>
<tr>
<td>QoL PH</td>
<td>0.141</td>
<td>.172</td>
</tr>
<tr>
<td>QoL PW</td>
<td>-0.603</td>
<td>.172</td>
</tr>
<tr>
<td>QoL A</td>
<td>0.288</td>
<td>.174</td>
</tr>
<tr>
<td>QoL SS</td>
<td>-1.001</td>
<td>.174</td>
</tr>
<tr>
<td>QoL SE</td>
<td>-0.098</td>
<td>.174</td>
</tr>
<tr>
<td>QoL To t</td>
<td>0.647</td>
<td>.175</td>
</tr>
<tr>
<td>cAge</td>
<td>-0.190</td>
<td>.153</td>
</tr>
<tr>
<td>cDep</td>
<td>2.339</td>
<td>.153</td>
</tr>
<tr>
<td>cDep</td>
<td>3.121</td>
<td>.175</td>
</tr>
<tr>
<td>cBMI</td>
<td>0.494</td>
<td>.153</td>
</tr>
<tr>
<td>cBMI</td>
<td>0.401</td>
<td>.173</td>
</tr>
<tr>
<td>cAbs</td>
<td>1.035</td>
<td>.153</td>
</tr>
<tr>
<td>cAbs</td>
<td>1.660</td>
<td>.173</td>
</tr>
<tr>
<td>pPHS</td>
<td>-2.461</td>
<td>.164</td>
</tr>
</tbody>
</table>
If the Kolmogorov-Smirnova or Shapiro-Wilk test statistic has a p-value less than .05 then the assumption of normality was violated. All dimensions of HRQoL and potential predictors of HRQoL, except for children’s BMI at year two, violated the assumption of normality (see Table A10A(iii)). According to Pallant (2003), however, deviation from a normal distribution is “quite common in larger samples” (p. 57).

Table A10A(iii): Tests of normality from univariate analysis

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Kolmogorov-Smirnova</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statistic</td>
<td>df</td>
<td>Sig.</td>
</tr>
<tr>
<td>QoL PH t1</td>
<td>.102</td>
<td>253</td>
</tr>
<tr>
<td>QoL PW t1</td>
<td>.080</td>
<td>252</td>
</tr>
<tr>
<td>QoL A t1</td>
<td>.117</td>
<td>252</td>
</tr>
<tr>
<td>QoL SS t1</td>
<td>.189</td>
<td>251</td>
</tr>
<tr>
<td>QoL SE t1</td>
<td>.128</td>
<td>251</td>
</tr>
<tr>
<td>QoL Tot t1</td>
<td>.085</td>
<td>245</td>
</tr>
<tr>
<td>QoL PH t2</td>
<td>.088</td>
<td>201</td>
</tr>
<tr>
<td>QoL PW t2</td>
<td>.078</td>
<td>201</td>
</tr>
<tr>
<td>QoL A t2</td>
<td>.167</td>
<td>198</td>
</tr>
<tr>
<td>QoL SS t2</td>
<td>.203</td>
<td>197</td>
</tr>
<tr>
<td>QoL SE t2</td>
<td>.181</td>
<td>197</td>
</tr>
<tr>
<td>QoL Tot t2</td>
<td>.108</td>
<td>196</td>
</tr>
<tr>
<td>cAge t1</td>
<td>.149</td>
<td>255</td>
</tr>
<tr>
<td>cDep t1</td>
<td>.245</td>
<td>252</td>
</tr>
<tr>
<td>cDep t2</td>
<td>.260</td>
<td>194</td>
</tr>
<tr>
<td>cBMI t1</td>
<td>.086</td>
<td>253</td>
</tr>
<tr>
<td>cBMI t2</td>
<td>.063</td>
<td>198</td>
</tr>
<tr>
<td>cAbs t1</td>
<td>.106</td>
<td>254</td>
</tr>
<tr>
<td>cAbs t2</td>
<td>.123</td>
<td>198</td>
</tr>
<tr>
<td>pPHS t1</td>
<td>.181</td>
<td>255</td>
</tr>
<tr>
<td>pMHS t1</td>
<td>.149</td>
<td>255</td>
</tr>
<tr>
<td>pDep t1</td>
<td>.198</td>
<td>254</td>
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<tr>
<td>pAnx t1</td>
<td>.084</td>
<td>254</td>
</tr>
<tr>
<td>pSat t1</td>
<td>.069</td>
<td>182</td>
</tr>
<tr>
<td>pEff t1</td>
<td>.104</td>
<td>185</td>
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<tr>
<td>pAlcohol t1</td>
<td>.142</td>
<td>255</td>
</tr>
<tr>
<td>pSS t1</td>
<td>.201</td>
<td>255</td>
</tr>
</tbody>
</table>
Section B: Bivariate analysis between all study variables at year one

This section presents findings of an EDA of bivariate analysis between all study variables including homoscedasticity and linearity within the relationships assessed and corresponds to Section 5.7.3. This section also presents the findings from bivariate analysis using non parametric tests as a means of supporting the bivariate analysis with parametric tests used in this study.

In general, the assumption of homoscedasticity was not violated in tests investigating the relationship between HRQoL and variables with at least two groups (independent t tests and ANOVA tests). When equal variances were not assumed (i.e. Levene's test Sig. value was less than .05), however, SPSS provided an alternative t value and significance value to compensate for the violation.
Table A10B(i): Levene's test for equality of variances in bivariate analysis

<table>
<thead>
<tr>
<th>Variables</th>
<th>Physical wellbeing</th>
<th>Psychological wellbeing</th>
<th>Autonomy &amp; Parent Relations</th>
<th>Social Support &amp; Peer Relations</th>
<th>School Environment</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>cSex</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>cEth</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>FS</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
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<tr>
<td>cAbs20</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>Sch</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>cBIP (t test)</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>cBIP (ANOVA)</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>cBMI (ANOVA)</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>cAsth</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
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<tr>
<td>pEdu</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>pMS</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
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<tr>
<td>pHome</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
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<tr>
<td>pWork</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
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<tr>
<td>pDis</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>pSmo</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
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<tr>
<td>pSubE</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>pSubLY</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
<td>&gt;.05</td>
</tr>
</tbody>
</table>
The assumption of linearity and homoscedasticity were assessed for Pearson's r correlations investigating the relationship between HRQoL and continuous study variables using scatterplots. Scatterplots of associations between total HRQoL and study variables is provided below. While the association between depressive symptoms and total HRQoL appears linear with little overlap, the opposite is the case for the relationship between BMI and total HRQoL. In general, the assumption of linearity and homoscedasticity were not violated.

Comparing the results from the relationship between HRQoL and study variables using the parametric t tests, ANOVAs and Pearson's r correlations and their non-parametric equivalents revealed similar results. There were four instances, however, where Spearman's rho identified significant associations that Pearson's r did not. These are presented in the table below in bold. Spearman's rho identified significant small effect sizes in the relationship between BMI and psychological well-being where Pearson's r only identified a relationship that came close to significance. Spearman's rho also
identified significant small effect sizes in the relationship between parent/guardian mental health status and total HRQoL, the social support and peer relations dimension, and the school environment dimension where Pearson's r did not identify any relationship. These differences should be discussed within the results chapters.

Table A10B(ii): Spearman's rho coefficients for relationship between continuous study variables and health-related quality of life in children at year one

<table>
<thead>
<tr>
<th>Dimensions and total of HRQoL in children at year one</th>
<th>Variables</th>
<th>QoL Ph rho</th>
<th>QoL PW rho</th>
<th>QoL A rho</th>
<th>QoL SS rho</th>
<th>QoL SE rho</th>
<th>QoL Tot rho</th>
</tr>
</thead>
<tbody>
<tr>
<td>cAge</td>
<td>-.124**</td>
<td>-.019</td>
<td>.154**</td>
<td>.052</td>
<td>-.185**</td>
<td>.002</td>
<td></td>
</tr>
<tr>
<td>cDep</td>
<td>-.404**</td>
<td>-.613**</td>
<td>-.473**</td>
<td>-.454**</td>
<td>-.389**</td>
<td>-.600**</td>
<td></td>
</tr>
<tr>
<td>cBMI</td>
<td>-.180**</td>
<td>-.127*</td>
<td>-.127*</td>
<td>-.106</td>
<td>-.094</td>
<td>-.133*</td>
<td></td>
</tr>
<tr>
<td>pSS</td>
<td>.057</td>
<td>.021</td>
<td>-.022</td>
<td>.059</td>
<td>.034</td>
<td>.060</td>
<td></td>
</tr>
<tr>
<td>pDep</td>
<td>.016</td>
<td>-.053</td>
<td>-.008</td>
<td>.023</td>
<td>-.083</td>
<td>-.057</td>
<td></td>
</tr>
<tr>
<td>pAnx</td>
<td>.026</td>
<td>-.006</td>
<td>.035</td>
<td>-.055</td>
<td>-.030</td>
<td>-.017</td>
<td></td>
</tr>
<tr>
<td>pPHS</td>
<td>.016</td>
<td>.061</td>
<td>.046</td>
<td>1.04</td>
<td>-.038</td>
<td>.011</td>
<td></td>
</tr>
<tr>
<td>pMHS</td>
<td>.087</td>
<td>.098</td>
<td>.063</td>
<td>.133*</td>
<td>.167**</td>
<td>.141*</td>
<td></td>
</tr>
<tr>
<td>pSat</td>
<td>-.018</td>
<td>.031</td>
<td>.070</td>
<td>.052</td>
<td>.125</td>
<td>.097</td>
<td></td>
</tr>
<tr>
<td>pEff</td>
<td>.028</td>
<td>-.025</td>
<td>.027</td>
<td>-.035</td>
<td>.179*</td>
<td>.078</td>
<td></td>
</tr>
</tbody>
</table>
Section C: Multivariate analysis of key relationships when controlling for confounders

This section presents findings of an EDA of multivariate analysis of the relationship between depressive symptoms and HRQoL when controlling for one confounder and corresponds to Section 5.7.4. EDA investigated multivariate outliers, linearity and homoscedasticity. Multivariate outliers, known to distort results, were identified using Mahalanobis distance. Four outliers were identified when investigating the relationship between depressive symptoms and HRQoL (Mahalanobis distance > critical value of 16.27). Cases with standardised residuals ± 3, however, did not have any undue influence on the models (Cooks distance < 1.0). Hence, there was no need to remove cases. Tolerance values were above 0.1 and VIFs were above 10, which indicate that there are no problems with multi collinearity between the IVs (Pallant 2003). Finally, the assumption of linearity and homoscedasticity were checked in Normal Q-Q plots and Residual plots, which showed relatively straight lines and no sign of clustering (i.e. no clear relationship between the residual and the predicted values) (Coakes & Steed 2009), suggesting that the assumptions were not violated (see plots below).

\[ cDep_{11} \text{ and confounders} \]

\[ \text{QoL Tot} \]

Fig. A10C: Normal Q-Q plot and residual plot in relationship between depressive symptoms and HRQoL controlling for confounder
Section D: Bivariate analysis between key study variables at year one and health-related quality of life at year two

This section presents EDA findings relating to linearity and homoscedasticity that correspond to Section 5.7.4. The assumption of linearity and homoscedasticity were assessed for Pearson’s r correlations investigating the relationship between the change in HRQoL and the change in each of depressive symptoms and BMI over time using scatterplots. In terms of the associations between the change in total HRQoL and each of the change in depressive symptoms and BMI, the assumption of linearity and homoscedasticity were not violated.

Fig. A10D: Scatterplots for Pearson’s r correlations
Section E Moderator effects in the relationship between key study variables and health-related quality of life in children at year one

This section presents findings of an EDA of multivariate analysis to investigate moderator effects in the relationship between key study variables and HRQoL in children at year one and details multivariate outliers, homoscedasticity and linearity within the relationships assessed. Casewise diagnostics identified between 2 and 10 outliers in the HMR tests, but they did not have any undue influence on the models, and therefore, were not removed. Tolerance and VIFs values indicated that there are no problems with multi collinearity between the IVs. Finally, the assumption of linearity and homoscedasticity were checked in Normal Q-Q plots and Residual, which showed in most cases relatively straight lines and no sign of clustering.

(1) Child depressive symptoms
cDep and cAge

Fig. A10E(i): Normal Q-Q plot and residual plot in multivariate analysis
Fig. A10E(ii): Normal Q-Q plot and residual plot in multivariate analysis
(3) Parent/guardian depressive and anxiety symptoms

<table>
<thead>
<tr>
<th>pDep and pSS</th>
<th>pDep and FS</th>
<th>pAnx and pSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>QoL PW</td>
<td>QoL PW</td>
<td>QoL Tot</td>
</tr>
</tbody>
</table>

Fig. A10E(iii): Normal Q-Q plot and residual plot in multivariate analysis

Appendix 11: Children's demographics and health at year one and two

The table below provides absolute percentages and means for study variables at year one and year two relating to children's demographics and health.
Table A11: Children’s demographics and health at year one and two

<table>
<thead>
<tr>
<th>Variables</th>
<th>Time 1</th>
<th>Time 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N (%) M (SD) range</td>
<td>N (%) M (SD) range</td>
</tr>
<tr>
<td><strong>Child age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 to 10 years</td>
<td>170 (67) 9.73 (1.46) 7-12</td>
<td>56 (28) 10.27 (1.25) 8-13</td>
</tr>
<tr>
<td>10 to 12 years</td>
<td>85 (33) 9.73 (1.46) 7-12</td>
<td>143 (72) 10.27 (1.25) 8-13</td>
</tr>
<tr>
<td><strong>Child sex</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>128 (50) 9.73 (1.46) 7-12</td>
<td>97 (49) 10.27 (1.25) 8-13</td>
</tr>
<tr>
<td>Female</td>
<td>127 (50) 9.73 (1.46) 7-12</td>
<td>102 (51) 10.27 (1.25) 8-13</td>
</tr>
<tr>
<td><strong>Child ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>236 (95) 9.73 (1.46) 7-12</td>
<td>184 (94) 10.27 (1.25) 8-13</td>
</tr>
<tr>
<td>Other</td>
<td>13 (5.) 9.73 (1.46) 7-12</td>
<td>11 (6) 10.27 (1.25) 8-13</td>
</tr>
<tr>
<td><strong>School type</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HPS model</td>
<td>189 (74) 9.73 (1.46) 7-12</td>
<td>144 (72) 10.27 (1.25) 8-13</td>
</tr>
<tr>
<td>Non-HPS model</td>
<td>66 (26) 9.73 (1.46) 7-12</td>
<td>55 (28) 10.27 (1.25) 8-13</td>
</tr>
<tr>
<td><strong>Child BMI z-scores</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underweight/Normal</td>
<td>157 (62) 0.84 (1.15) -2.21-4.41</td>
<td>117 (59) 0.89 (1.14) -1.37-4.00</td>
</tr>
<tr>
<td>Overweight</td>
<td>41 (16) 0.84 (1.15) -2.21-4.41</td>
<td>35 (18) 0.89 (1.14) -1.37-4.00</td>
</tr>
<tr>
<td>Obese</td>
<td>55 (22) 0.84 (1.15) -2.21-4.41</td>
<td>46 (23) 0.89 (1.14) -1.37-4.00</td>
</tr>
<tr>
<td><strong>Child body image perception</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Just right</td>
<td>154 (61) 47.17 (9.86) 40-94</td>
<td>134 (68) 45.97 (8.63) 40-100</td>
</tr>
<tr>
<td>Too fat</td>
<td>85 (34) 47.17 (9.86) 40-94</td>
<td>56 (28) 45.97 (8.63) 40-100</td>
</tr>
<tr>
<td>Too thin</td>
<td>13 (5) 47.17 (9.86) 40-94</td>
<td>8 (4) 45.97 (8.63) 40-100</td>
</tr>
<tr>
<td><strong>Child depressive symptoms</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Below average</td>
<td>144 (57) 53.57 (11.05) 20.70-73.20</td>
<td>130 (67) 54.57 (12.05) 4.53-73.53</td>
</tr>
<tr>
<td>Average</td>
<td>73 (29) 53.57 (11.05) 20.70-73.20</td>
<td>38 (20) 54.57 (12.05) 4.53-73.53</td>
</tr>
<tr>
<td>Above average</td>
<td>35 (14) 53.57 (11.05) 20.70-73.20</td>
<td>26 (13) 54.57 (12.05) 4.53-73.53</td>
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<tr>
<td><strong>Physical well-being</strong></td>
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<td></td>
</tr>
<tr>
<td>Psychological well-being</td>
<td>252 (98) 53.56 (10.98) 20.55-75.53</td>
<td>199 (100) 53.51 (11.75) 20.70-73.20</td>
</tr>
<tr>
<td>Autonomy and parent relations</td>
<td>252 (98) 53.56 (10.98) 20.55-75.53</td>
<td>199 (100) 53.51 (11.75) 20.70-73.20</td>
</tr>
<tr>
<td>Social support and peer relations</td>
<td>252 (98) 53.56 (10.98) 20.55-75.53</td>
<td>199 (100) 53.51 (11.75) 20.70-73.20</td>
</tr>
<tr>
<td>School environment</td>
<td>251 (98) 53.56 (10.98) 20.55-75.53</td>
<td>195 (98) 53.51 (11.75) 20.70-73.20</td>
</tr>
<tr>
<td><strong>Child total HRQoL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>245 (96) 53.86 (12.03) 26.64-83.81</td>
<td>195 (98) 55.37 (12.59) 23.24-83.81</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Below average total HRQoL</td>
<td>Average total HRQoL</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>---------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td></td>
<td>43 (18)</td>
<td>162 (66)</td>
</tr>
<tr>
<td></td>
<td>27 (14)</td>
<td>130 (67)</td>
</tr>
<tr>
<td><strong>Family structure</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One biological parent</td>
<td>102 (40)</td>
<td>75 (38)</td>
</tr>
<tr>
<td>Two parents&lt;sup&gt;1&lt;/sup&gt;</td>
<td>153 (60)</td>
<td>124 (62)</td>
</tr>
</tbody>
</table>

<sup>1</sup> Two parents represent two biological parents, one biological and one step parent, or two foster parents.