CORA Cork Open Research Archive
Cartlann Taighde Oscailte Chorcaí

Title	Predicting expressive vocabulary change in young children growing up in Ireland
Authors	Bowles, Caoimhe
Publication date	2018-06
Original Citation	Bowles, C. 2018. Predicting expressive vocabulary change in young children growing up in Ireland. MRes Thesis, University College Cork.
Type of publication	Masters thesis (Research)
Rights	© 2018, Caoimhe Bowles. - https://creativecommons.org/licenses/by-nc-nd/4.0/
Download date	2026-11-01 18:29:59
Item downloaded from	https://hdl.handle.net/10468/10644

UCC
University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

Predicting Expressive Vocabulary Change in Young Children Growing Up in Ireland



Caoimhe Bowles BSc (Hons)

Submitted in partial fulfilment of the requirements for the MSc by Research Degree, Speech and Hearing Sciences, School of Clinical Therapies, University College Cork

July, 2018

Head of Department: Professor Nicole Müller, University College Cork

Supervisor: Dr. Ciara O'Toole, University College Cork

Supervisor: Dr Alice Lee, University College Cork

Acknowledgements

To my supervisor, Dr Ciara O'Toole, thank you for kindly agreeing to supervise this thesis and for your support, encouragement and guidance throughout. To Professor Fiona Gibbon, I would like to thank you for your input at the initial stages of this research, but also for continuing to offer your valuable insights and knowledge throughout the project. I would like to thank Margaret Cole for offering her expertise with statistical analysis, it was much appreciated. I would also like to acknowledge the Growing Up in Ireland Study for granting me access to the data. Finally, to my family for your continual love, support and reassurance this year and always.

Table of Contents

Acknowledgements…… ii

List of Tables…….. vii

List of Figures…….. viii

Declaration…… ix

Abstract…….. x

Chapter One – Introduction……. 1

1.1 Background to the study……... 1

1.2 Population-based cohort studies……..... 2

1.2.1 Age range of participants…….……... 4

1.2.2 Outcome measures…….…….. 8

1.2.3 Analytic approaches…….…… 10

1.2.4 Summary……..……. 11

1.3 Growing up in Ireland……..…….,..... 15

Chapter Two – Expressive Vocabulary Development..……..…… 18

2.1 Expressive vocabulary development……..……..... 18

2.2 Expressive vocabulary delay……..…… 20

2.3 Categories of stability of expressive vocabulary development…….. 21

2.3.1 Resolving delay..... 22

2.3.2 Late onset delay ……..…… 23

2.3.3 Persisting delay ……..... 24

2.5 Literacy outcomes associated with expressive vocabulary difficulties……. 25

2.5 Summary ……..……..... 26

Chapter Three – Risk Factors Associated with Expressive Vocabulary Development 28

3.1 Low-mutable factors…… 30

3.1.1 Gender…….. 30

3.1.2 Birth factors…….…. 31

3.1.3 Early communication skills…….……. 33

3.1.4 Child behaviour……...…..…… 34

3.1.5 Birth order…….…….. 35

3.2 Mutable-distal factors……..……...……..…… 35

3.2.1 English as an additional language…… 36

3.2.2 Household composition……..……..…. 37

3.2.3 Socio-economic factors…… 38

3.3 Mutable-proximal factors…….……...……. 40

3.3.1 Early literacy activities……. 41

3.3.2 Home learning activities……...…… 43

3.3.3 Preschool education and childcare……..……. 44

3.3.4 Screen time practices……..…..…. 46

3.4 Gaps in the current research…..……..…… 48

3.5 Aims of the current study…..……..…… 49

Chapter Four – Methodology……...……..... 51

4.1 Ethics……..……...….. 51

4.2 Sample of participants.....……...…. 51

4.3 Data collection procedures……..……..... 53

4.4 Dependent variable……..... 54

4.5 Predictor variables…….…….... 55

4.6 Data analysis…… 61

Chapter Five – Results……..……. 65

5.1 Prevalence of expressive vocabulary delay at 3 and 5 years ……... 65

5.2 Prevalence of resolving, persisting and late onset patterns of expressive vocabulary development between 3 and 5 years. 66

5.3 Risk factors associated with expressive vocabulary delay at 5 years…….. 69

5.4 Risk factors associated with resolving, persisting and late onset expressive vocabulary delays between 3 and 5 years 73

5.4.1 Model one - persisting delay group vs resolving delay group…….. 73

5.4.2 Model two - no delay group vs late onset delay group……..... 74

5.5 Summary of the main findings……... 78

Chapter Six – Discussion……..….. 80

6.1 Prevalence of expressive vocabulary delay at 3 and 5 years……... 80

6.2 Prevalence of resolving, persisting and late onset expressive vocabulary delays between 3 and 5 years…… 83

6.2.1 Resolving delay group……..…….. 85

6.2.2 Late onset delay group …….……..……. 86

6.2.3 Persisting delay group……..…… 87

6.3 Risk factors associated with expressive vocabulary delay at 5 years…….. 88

6.3.1 Learning English as an additional language……. 89

6.3.2 Low parent education levels……...…….. 92

6.3.3 Home learning environment…….……

6.3.3.1 Home literacy environment…….. 97

6.3.3.2 Additional home learning activities…….. 99

6.4 Risk factors associated with resolving, persisting and late onset expressive vocabulary delays between 3 and 5 years…….. 100

6.4.1 Model one - persisting delay group vs resolving delay group…….. 100

6.4.2 Model two - no delay group vs emerging delay group……. 102

Chapter Seven – Conclusion……...…… 105

7.1 Strengths and limitations of the study……..... 105

7.2 Implications for clinical practice and social policy …… 106

7.3 Implications for future research…….….. 108

References…… 114

List of Tables

Table 1. Risk and protective factors addressed in key population studies…….. 29

Table 2. Breakdown of incomplete data at 3 and 5 years…… 52

Table 3. A comparison of children with complete and incomplete data ……..... 53

Table 4. Assessment procedures conducted by GUI at 9 months, 3 years and 5 years…… 54

Table 5. Mean, standard deviation, and range vocabulary scores for the GUI sample…… 55

Table 6. Low mutable factors included in the study..... 58

Table 7. Mutable distal factors included in the study…….. 59

Table 8. Mutable proximal factors included in the study……. 60

Table 9. Percentage of children with an expressive vocabulary delay at 3 and 5 years…….. 65

Table 10. Percentage of monolingual children with an expressive vocabulary delay at 3 and 5 years…….. 66

Table 11. Stability categories of expressive vocabulary development between 3 and 5 years…….. 66

Table 12. Bivariate associations between risk factors and expressive vocabulary delay status at 5 years……. 70

Table 13. Multivariate associations between risk factors and expressive vocabulary delay status at 5 years……. 72

Table 14. Bivariate logistic regression results: Resolving vs persisting group……..…….. 74

Table 15. Bivariate logistic regression results: No delay vs late onset delay group ……. 76

Table 16. Multivariate logistic regression results: No delay vs. emerging delay group …. 77

List of Figures

Figure 1. Breakdown of cases according to participation at 9 months, 3 years and 5 years… 52

Figure 2. Mean expressive vocabulary scores for each group at 3 years…….. 67

Figure 3. Mean expressive vocabulary score for each group at 5 years…… 68

Declaration

I, Caoimhe Bowles, confirm that this thesis is my own work and has not been submitted for any other degree, either at University College Cork or elsewhere.

Signed: _____

Date: _____

Abstract

During the preschool years expressive vocabulary development is highly variable, which makes it difficult for healthcare and education professionals to identify children with delays that require early intervention services. Previous research has highlighted the need to identify a reliable set of risk and protective factors which predict expressive vocabulary outcomes. The current study explored patterns of expressive vocabulary development between 3 and 5 years using a large population-based sample of 8,266 children. Expressive vocabulary was measured using the naming vocabulary subtest of the British Abilities Scales (BAS) and information relating to additional risk factors was gathered through questionnaires with the primary caregiver. Four patterns of expressive vocabulary development were identified, 89.9% of children had no expressive vocabulary delay, 2.8% of children were delayed at 3 years only (resolving delay), 5.0% were delayed at 5 years only (late onset delay) and 2.3% had a persisting expressive vocabulary delay. Five factors differentiated between the no delay and late onset delay groups. These factors were, learning English as an additional language, low parent education levels, low frequency of book reading, low frequency of home learning activities and few children's books in the home. Learning English as an additional language was the only factor which differentiated between resolving delay group and children with a persisting delay. The information gleaned from the current study has implications for clinical practice and identifies the need for a service delivery model which incorporates monitoring over time and providing intervention on the basis of language abilities and associated risks.

Chapter One - Introduction

1.1 Background to the Study

Language problems during the preschool years are likely to have long-term consequences for individuals with respect to social-emotional well-being, mental health, literacy and employment (Hulme, Nash, Gooch, Lervag, & Snowling, 2015; Law, Rush, Schoon & Parsons, 2009; Roulstone, Law, Rush, Clegg, & Peters, 2011). The most recent prevalence figures indicate that between 7% and 14% of children will present with language difficulties during the school years (Law et al., 2017). An important question for clinical services is whether early detection and intervention during the preschool years would support language growth and alleviate the negative consequences associated with language difficulties. The preschool years are a critical period in language development and an optimal time to access early intervention services. A recent multinational and multidisciplinary Delphi consensus study, 'Criteria and Terminology Applied to Language Impairments: Synthesising the Evidence' (CATALISE; Bishop et al., 2016), advised that intervention should be provided to a child whose language difficulties has a functional impact on daily activities and is likely to persist during the school years. However, challenges have arisen in the early detection of persisting language difficulties. Firstly, several longitudinal studies have indicated that between 50 and 80% of children with early language delays will have caught up before school entry with little or no intervention (Dale, Price, Bishop, & Plomin, 2003; Henrichs et al., 2011; Law, Rush, Anandan, Cox, & Wood, 2012). This resolving pattern of development suggests that early intervention is not warranted for all children with early language delays and may be even be deemed unethical, particularly if it diverts funding away from more severe long-term cases. For other children, approximately 30%, an early language delay is the first sign of a more enduring language disorder which may persist throughout the school years. Furthermore, research has highlighted a group of children who

show late onset language difficulties (Law et al., 2012; Zambrana et al., 2014). This group of children start off by demonstrating typical language growth but fall behind their peers later in development. Language development during the preschool years is highly variable and previous research has shown that early language abilities alone are not enough to predict later language outcomes (Law et al., 2012; Reilly et al., 2010; Zambrana et al., 2014).

Tomblin, Hardy and Hein (1991) have recommended identifying risk and protective factors associated with language disorder during the preschool years. Understanding risk and protective factors will support clinicians in accurately identifying children in need of early intervention services. Furthermore, it will help guide preventative interventions for children who are at a greater risk of presenting with language difficulties. To date there is relatively limited evidence regarding the risk and protective factors associated with language disorder (Bishop et al., 2017). The multidisciplinary Delphi study 'CATALISE', advises that further longitudinal research is required to identify a set of risk and protective factors which predict language disorder. The current study will use the Irish longitudinal study, Growing up in Ireland (GUI), to investigate expressive vocabulary growth between 3 and 5 years. Chapter one will discuss the value of population-based research and review previous longitudinal studies which have investigated language growth during childhood. Chapter two will provide a summary of the research relating to expressive vocabulary development. This chapter will explore the stability of expressive vocabulary development and discuss patterns of resolving, persisting and late onset language difficulties. Finally, chapter three will identify risk and protective factors associated with the different categories of language stability.

1.2 Population-based Cohort Studies

Population-based cohort studies aim to answer research questions for defined

populations. A target population is selected and observed longitudinally in order to assess exposure to different risk and protective factors (Szklo, 1998). There are many advantages for using population-based research when investigating child health and development and researchers are increasingly capitalizing on the availability of population data to investigate speech and language development. One advantage of population-based studies is that they include large samples of participants that are representative of the general population and not just the individuals included in the study. This allows the results of the research to be generalized to the whole population, ensuring external validity. Moreover, it limits selection bias which can be found in small scale studies which recruit participants through clinical referrals or volunteering. The process of self-selection can impact the internal validity of the study (Tripepi, Jager, Dekker, & Zoccali, 2010) In addition, population-based studies offer a wide range of data which can be used to address multiple research questions and control for cofounding variables such as sex and socioeconomic status. In the field of speech and language therapy, population-based cohort studies have been used to estimate the prevalence of varying communication problems, conduct unbiased evaluations of risk and protective factors and generate comparisons between different populations. In recent years several researchers have used population-based cohort studies to gain a better understanding of the different patterns of language growth. These studies include, the Early Language in Victoria Study (ELVS; McKean et al., 2015, 2017), the Longitudinal Study of Australian Children (LSAC; Christensen, Zubrick, Lawrence, Mitrou, & Taylor, 2014; Harrisson & McLeod, 2010; Taylor, Christensen, Lawrence, Mitrou, & Zubrick, 2013; Zubrick, Taylor & Christensen, 2015), the Western Australian Pregnancy Cohort (Raine) Study (Armstrong et al., 2017), the Twins Early Development Study (TEDS; Dale et al., 2003), the Millennium Cohort Study (MCS; Law et al., 2012) and Growing up in Scotland (GUS; Bradshaw, 2011).

The research completed to date has gleaned interesting information about the different

patterns of language development. Research has shown that language growth during childhood follows both stable and unstable patterns of development. Most children show stable patterns of language development across childhood, this means that they present with either typical language development or persisting language difficulties over time. In contrast, some children show unstable language growth, demonstrating either an improvement or a decline in their language abilities. Although, these four patterns of development have been consistently identified (Henrichs et al., 2011; Law et al., 2012; McKean et al., 2015; Zambrana et al., 2014), previous studies have reported different percentages of children in each group. This may be partly explained by the heterogeneity of language development, but also the lack of consistent inclusion criteria used among the studies. Inconsistencies have been noted in the age range of the participants used, the outcome measures selected, and the type of analytic approaches carried out. Each of these factors has independently contributed to varying results and this will be discussed in more detail below.

1.2.1 Age range of participants.

The rate and stability of language growth is dependent on a number of factors including the age of the child. To date, previous studies have explored language development across different age ranges, including the early years (18 months – 3 years) (Dale, et al., 2003; Henrichs et al., 2011; Peyre et al., 2014), the preschool years (3 – 5 years) (Law et al., 2012; Zambrana et al., 2014) and the school years and beyond (Armstrong et al., 2016; McKean at al., 2017; Reilly, McKean, & Levickis, 2014; Taylor et al., 2013). Henrichs et al. (2011) is one study which has explored language development during the early years. This study used a population-based cohort in the Netherlands to investigate expressive vocabulary growth between 18 months and 3 years in a sample of 3,759 children. Expressive vocabulary was measured using parental report tools at each age. At 18 months, vocabulary skills were

assessed using the MacArthur-Bates Communicative Development Inventory—Netherlands (CDI–N; Zink & Lejaegere, 2003), while at 30 months expressive vocabulary was measured using a Dutch translation of the Language Development Survey (LDS; Rescorla, 1989). The use of different assessment tools at each age point was identified as a significant limitation of this study. While both parent report tools have similarities, differences also exist. The LDS is a checklist which contains 310 words (Rescorla, 1989), while the MacArthur-Bates CDI includes a significantly higher 680 words. Henrichs et al. (2011) highlighted four patterns of language growth, as discussed above. The study reported that 85.2% of the sample had no expressive vocabulary delay at either 18 or 30 months, 6.2% of the sample were delayed at 18 months only (resolving delay), 6.0% were delayed at 3 years only (late onset delay) and a small percentage of 2.6% were delayed at both 18 months and 3 years (persisting delay). Comparable findings were also reported by Peyre et al. (2014) who used the EDEN Mother-Child Cohort Study to explore expressive language development between 2 and 3 years in a French population of children (1002). At 24 months of age, the parents completed the short French version of the MacArthur-Bates CDI (Kern, 2003) and at 3 years expressive language was assessed using subtests from the Evaluation du Langage Oral de L'enfant Aphasique (ELOLA; De Agostini et al., 1998). Similar to Henrichs et al. (2011) four patterns of language growth were noted, 84.3% of the sample had no expressive vocabulary delay at either 2 or 3 years, 5.8% of the sample were delayed at 2 years only (resolving delay), 5.8 % were delayed at 3 years only (late onset delay) and 4.1 % were delayed at both 2 years and 3 years (persistent delay). Both Henrichs et al. (2011) and Peyre et al. (2014) concluded that expressive vocabulary abilities at 18 months and 2 years had poor predictive power of expressive vocabulary abilities at 3 years. Most of the children presenting with a delay at 2 years or under had recovered by 3 years, while a significant proportion of children delayed at 3 years were not detected at 2 years. These results suggest that expressive vocabulary

development is not stable between these age points and there may be limited value in predicting later outcomes at such a young age. The limitations of these studies should also be recognised. Firstly, both studies used parent report tools only to measure expressive vocabulary outcomes at 18 months and 2 years. The use of direct assessment, a structured diary system or clinical observations would have added to the value of the study. Additionally, both studies used different assessment tools at each age point. Therefore, the increase of variance explained by risk factors between 18 months and 3 years needs to be interpreted with caution.

Research has also investigated language growth between 3 and 5 years, however, to a lesser extent than the early years (18 months – 3 years). Zambrana et al. (2014) explored the growth of general language skills between 3 and 5 years using data from the Norwegian Mother and Child Cohort Study (MoBa). The study included 10,587 children and language was measure using the Ages and Stages Questionnaire (ASQ; Squires, Potter & Bricker, 1990). The ASQ is a general development screening tool, which is widely used across many countries. It is a popular screening tool as it is cost effective and can be administered easily in the home environment (Singh, Jung Yeh & Boone Blanchard, 2017). The ASQ does however have limitations as a screening tool for language disorder. Berkman et al. (2015) evaluated the use of screening tools to identify speech and language difficulties in primary care settings and found that the MacArthur Bates CDI and the LDS outperformed the ASQ especially in terms of their specificity. Results showed that the LDS correctly identified 91% of children with a language disorder, while the CDI identified 82% and the ASQ identified a significantly lower 58%. Zambrana et al. (2014) showed that across time, 85.5% had no language difficulties, 5.0% were delayed at 3 years only (resolving delay), 6.5% were delayed at 5 years only (late-onset delay) and 3.0% were delayed at both 3 and 5 years

(persistent language difficulties). These results should, however, be interpreted with caution given the limitations of the ASQ.

Law et al. (2012) also explored language growth between 3 and 5 years using a large sample of participants (13,016) from the Millennium Cohort Study (MCS). This study differed from Zambrana et al. (2014) in that a specific component of language was measured, expressive vocabulary. This study also used a direct assessment tool, the vocabulary naming subtest of the British Abilities Scales (BAS; Elliott, Smith, & McCulloch, 1997). Law et al. (2012) reported different prevalence figures. The study found that 92.7% had no delay at 3 and 5 years, 4.4%presented with a resolving delay, 1.4% had a late onset delay and 1.5% showed persisting difficulties. The different prevalence figures reported by Zambrana et al. (2014) and Law et al. (2012) may be associated with the difference in using parent report tools and direct assessment tools. Additionally, Law et al. (2012) used a single language measure (expressive vocabulary), while Zambrana et al. (2014) assessed general language abilities using a composite language score. Both factors will be discussed further in section 1.2.2.

As children grow older their language abilities appear to become more stable. Significantly higher rates of stability have been reported from 4 and 5 years onwards (Bornstein, Hahn & Putnick, 2016; Tomblin, Zhang, Buckwalter, & O'Brien, 2003). Research has shown that children whose language difficulties persist beyond 5 years are unlikely to catch up with their typical language peers (Beitchman et al., 1994; Beitchman et al., 2008; Johnson, Beitchman & Brownlie, 2010; Tomblin et al., 2003). Reilly et al. (2010, 2014) used the Early Language in Victoria Study (ELVS) cohort to explore language development between 2 and 7 years and found that language skills were predicted more reliably between 4 and 7 years than they were between 2 and 4 years. Although, language development appears to become more stable during the school years, patterns of change and variability continue to

exist, and this has been demonstrated in a number of studies, examining both expressive and receptive language skills (Armstrong et al., 2016; McKean et al., 2017; Taylor et al., 2013). McKean et al. (2017) found that between 4 and 11 years 94% of children had stable language development, indicating that their language profile did not change between these time points. In contrast, 6% of children demonstrated instability, with most of these children showing a decrease in language skills during the school years.

1.2.2 Outcome measures.

The use of different outcome measures has certainly contributed to the inconsistent results across population-based studies. Considering expressive vocabulary specifically, a variety of assessment tools have been used including parent report tools (Dale et al., 2003; Henrichs et al., 2011; Zambrana et al., 2014), direct assessment tools (Law et al., 2012) and a combination of both (Peyre et al., 2014). The choice of assessment tool is often dependent on the age range of the children being assessed and this is consistent with clinical practice. During the early years, parent report tools are most commonly used. While direct assessment tools are advantageous, very young children may have difficulty cooperating with direct assessment procedures or present with short attention spans which yield results which are under representative of the child's ability. The MacArthur–Bates CDI (Fenson et al., 2007) and the LDS (Rescorla, 1989) are the most common parent report tools used with children under 3 years. Studies which investigated the psychometric properties of these assessment tools have shown that parents are relatively good informants about their child's expressive vocabulary development, from ages 18 to 30 months (Rescorla & Alley, 2001). However, concerns have been raised about the accuracy of using parental tools with older children and also the reliability of reports where parents are from low socioeconomic backgrounds (Feldman et al., 2000; Roberts, Burchinal, & Durham, 1999). Moreover, Robinson and

Mervis (1999) highlighted that parent report tools peak in accuracy at about 14 months. This study compared the use of a parent report checklist (The MacArthur–Bates CDI) and a diary system. The study indicated that parent report checklists underestimated children's expressive vocabulary skills, particularly children with well-developed productive vocabularies. Furthermore, the discrepancy between parent report checklists and the diary system grew as vocabulary size increased with age. From 3 years onwards, direct assessment tools are more commonly used and provide more reliable and accurate results. Law et al. (2012) measured expressive vocabulary abilities using the naming vocabulary subtest of the BAS. The BAS is considered compatible with current psychological practice and has demonstrated construct validity and high test-retest reliability (Elliott et al., 1997).

In addition to assessment tools, diversity exists among the domain of language assessed. Language is a complex developmental skill which is comprised of many factors including semantics, syntax, phonology, morphology and pragmatics. Many children will demonstrate strengths and weaknesses across different domains of language and will show unique growth trajectories for each domain. Some studies have explored the growth trajectories of general language skills (Armstrong et al., 2017; McKean et al., 2017; Zambrana et al., 2014), while other studies have looked specifically at changes in receptive vocabulary (Armstrong et al., 2016, Christensen et al., 2014; Taylor et al., 2013; Zubrick et al., 2015) and expressive vocabulary (Henrichs et al., 2011; Law et al., 2012; Peyre et al., 2014). These differences have certainly contributed to the varying prevalence reported among population-based studies.

1.2.3 Analytic approaches.

Finally, studies exploring language development during childhood have used different

analytic approaches. Most studies have used a categorical approach to define the different patterns of language development overtime. These studies assigned children to either delayed or typical groups using definitive cut-off points in language scores at two or more age points (Law et al., 2012; Snowling, Duff, Nash & Hulme, 2016; Zambrana et al., 2014; Zubrick et al., 2015). Studies have defined language delay using different cut-off points in language scores and this may also contribute to varying results. Firstly, studies which explored early language development (Dale et al., 2003; Henrichs et al., 2011; Peyre et al., 2014) typically defined delayed language as scores which fell below the 10^{th} percentile on standardised parent report tools. A different approach is often applied in studies which use direct assessment tools with children 3 years or older. Many of these studies categorise language delay as a score which falls -1 or -1.5 standard deviations below the mean (Law et al., 2012; Snowling et al., 2016). Additionally, some studies have created a 'low' language group based on the bottom 10% or 15% of the sample (Zubrick et al., 2015). Furthermore, studies differ in how the cut-off points are derived. Some studies identify language delay using the mean and standard deviations outlined in the test manual. This approach was used by Armstrong et al. (2016) who measured receptive vocabulary using the Peabody Picture Vocabulary Test-Revised (PPVT-R) (Dunn & Dunn, 1981). Armstrong et al. (2016) defined vocabulary impairment as a standard score which is one standard deviation or more below the mean according to the test manual. In contrast, other studies modified the mean and standard deviations based on the participants of their study (McKean et al., 2017). This approach may be more favourable, as the mean and standard deviations represent the participants of the study and the wider population of which the study is to be generalised.

While most studies have used a categorical approach to define the different subgroups in language, McKean et al. (2017) used an advanced analytical approach, latent class analysis (LCA). This type of analysis allows individuals to be classified into mutually

exclusive and exhaustive types, or latent classes, based on their pattern of answers on a set of categorical variables. The results of this approach classify cases into their most likely latent class which is not based on a distinct cut off point. McKean et al. (2017) used latent class analysis to identify categories of stability from 4 to 11 years with direct assessment carried out at 4, 5, 7 and 11 years of age. This approach was chosen as it minimises measurement errors which can lead to instability in group membership for children who score marginally above or below the cut-off points. Although this approach is advantageous it is not suitable for all studies, particularly when there are only two assessment points. This approach usually requires a large-scale dataset consisting of longitudinal measures of variables at a minimum of three points in time (Jung & Wickrama, 2008).

1.2.4 Summary.

In summary, population-based cohorts provide an opportunity to conduct large scale research with a representative sample. To date several researchers have used population-based studies to investigate language development across different periods of childhood. These studies have shown that different patterns of language development exist. Firstly, a large group of children, between 84 and 92%, will demonstrate stable age appropriate language development across time (Henrichs et al., 2011, Law et al., 2012; Zambrana et al., 2014). A second group of children, between 2 and 6%, will present with early language difficulties, but will recover over time (Henrichs et al., 2011, Law et al., 2012; McKean et al., 2017; Zambrana et., 2014). A third group of children, between 1 and 6%, demonstrate typical language abilities during the early years but fall behind their peers later in development. This group of children show late onset language difficulties. Finally, there is a group of children, between 1 and 4%, who show persisting language difficulties across time (Henrichs et al., 2011, Law et al., 2012; McKean et al., 2017; Peyre et al., 2014). Although these four patterns

of development have been consistently identified (Henrichs et al., 2011; Law et al., 2012; McKean et al., 2015; Zambrana et al., 2014), previous population-based studies have reported different percentages of children in each group. This inconsistency appears to be related to the lack of consistent inclusion criteria used among the studies. Evidently, there is a need longitudinal, population-based studies, applying the same instruments and selection criteria. This will allow for more reliable findings regarding typical and atypical patterns of language growth.

Furthermore, previous studies have identified different risk and protective factors associated with persisting language difficulties or language disorder. According to Bishop et al. (2017) predictors of persisting language difficulties vary with a child's age. Firstly, research has indicated language abilities at 18 month or 2 years have poor predictive power of later language problems (Dale et al., 2003; Henrichs et al., 2011). To strengthen the predictive power, population-based studies have aimed to identify risk factors associated with poor outcomes. Poor language comprehension, limited use of gestures, poor joint attention and a family history of speech and language difficulties have been identified as key risk factors for language disorder in children under 3 years (Ellis & Thal,2008; Roy & Chiat, 2014; Rudolph & Leonard, 2016). During the preschool years, research has shown that language development continues to change over time (Law et al., 2012; Zambrana et al., 2014). According Bishop et al. (2016) language difficulties which impact both expression and comprehension are likely to persist beyond the preschool years. Furthermore, Bishop and Edmundson (1987) stated that language problems are more likely to persist when a greater number of language domains are impacted. Additional risk factors for persisting language difficulties between 3 and 5 years include a family history of language and literacy difficulties, poor early language skills, behaviour problems and low maternal education (Law et al., 2012; Zambrana et al., 2014). Finally, language abilities appear to become more stable

during the school years. As stated previously, research has shown that children who reach 5 years with poor language skills are unlikely to catch up with their typical language peers (Beitchman et al., 1994; Beitchman et al., 2008; Johnson et al., 2010). Risk factors for language disorder or a declining profile of language development during the school years include poor language comprehension, emotional and behavioural difficulties, neurodevelopmental disorders, low non-verbal IQ, a family history of literacy difficulties and social disadvantage (Clarke et al., 2007; McKean et al., 2017; Rice & Hoffman, 2015).

To date several large-scale cohort studies have investigated the risk and protective factors associated with persisting language difficulties, however, the results have been inconsistent. Although the results of each cohort can be generalised to the wider populations from which they are drawn, precautions should be taken in generalising to other populations with different languages, cultures and government policies. To date no population-based cohort study has investigated patterns of language growth between 3 and 5 years in a sample of children growing up in Ireland. Ireland is a unique country which has changed significantly in terms of diversity over the past 20 years. There is now a growing number of children born in Ireland to immigrant parents and with this comes a diverse society in terms of ethnicity, religion, culture and languages. Using the Growing up in Ireland cohort study Röder, Ward, Frese and Sánchez (2014) identified the percentage of second-generation children in Ireland born between the 1st of December 2007 and the 30th of June 2008. Röder et al. (2014) reported that 33% of children in the Growing up in Ireland study had at least one migrant parent. This figure can be further broken down to represent 10.7% from the United Kingdom, 6.7% from EU accession states (countries that joined the EU between 2004-2013), 3.5% from African countries, 2.7% form Asian countries, 1.9% from EU-13 countries and a remaining 2.8% from other counties across the world. Röder et al. (2014) also the described the profile of second-generation children in Ireland. Firstly, there is now an increasing

number of children learning more than one language in the home environment. The 2016 Irish Census indicated that 612,018 Irish residents spoke a foreign language at home, this figure was up 19 per cent from 2011 (Central Statistics Office, 2016). Research has found that learning additional languages. The most commonly used language was Polish, and this was followed by French, Romanian and Lithuanian. While several advantages have been linked with bilingual language learning, research has shown slower rates of single language growth during the early years (Conboy & Thal, 2006; Hoff et al., 2012). The higher incidence of bilingual and multilingual children in Ireland contributes significantly to language growth during the early years. Röder et al. (2014) also examined the socio-demographic characteristics of second-generation children in Ireland. Second generation children from the United Kingdom, countries in Asia and EU-13 counties typically had similar socio-demographic characteristics to native Irish families. In contrast, immigrants from the EU Accession States and African countries experienced higher rates of unemployment, lower occupational attainment and lower overall household incomes. Low socioeconomic factors may also impact language growth for this group of children in Ireland and this will be further discussed in chapter 3, section 3.2.3.

Precautions should also be taken when generalising results across different periods of time. Armstrong et al. (2017) recruited from the Raine Study, where each of the participants were born between 1989 and 1991. In contrast, Law et al. (2012) used a sample from the Millenium Cohort Study where all the children were born between 2000 and 2001. Although, there are only ten years in the difference between both studies, advancements in technology and continuous changes in education and government policies ensure that there are distinct differences for children growing up in each decade. For children growing up in Ireland several changes have occurred in recent years. One significant change is the introduction of the Free Preschool Year (FPY) in January 2010. This policy has broadened access to early

childhood education. According to McGinnity, Russell and Murray (2015) 96% of eligible children in the GUI study have attended care centres under the scheme. The significantly high proportion of children attending preschool school in Ireland may also impact expressive vocabulary development. This will be further discussed in chapter three, section 3.3.3. The current study aims to build on previous research findings from population-based cohort studies using data from the infant cohort, Growing up in Ireland. This data includes Irish children who were born between 2007 and 2008, ensuring that the results can be generalised to the current population of Irish children.

1.3 Growing up in Ireland

Growing up in Ireland (GUI) is the first national longitudinal study of children and youth in Ireland. It is a Government-funded study conducted by the Economic and Social Research Institute (ESRI) and Trinity College Dublin. The study began in 2006 and follows two cohorts of children from age 9 years (child cohort) and 9 months (infant cohort). The study was designed to develop an insight into the lives of Irish children over time and establish an understanding of the key factors which support or hinder development. GUI is an invaluable research tool for anyone interested in child development including Speech and Language Therapists. The information gleaned from GUI to date has been used positively to influence government policies. For example, information regarding the prevalence of obesity (ERSI, 2011; William, Murray, McCrory & McNally, 2013) was used to inform the document 'Tackling Childhood Obesity', prepared by the Health Service Executive (HSE).

The GUI dataset provides large samples of participants which are representative of an Irish population of children. The infant cohort includes an initial sample of 11,134 infants at 9 months, with 9,793 participating at 3 years and 8,712 participating again at 5 years. The infant cohort addresses speech and language development at each of these age points. Early

communication skills were assessed at 8 months through to 12 months using the Ages and Stages Questionnaire (ASQ; Squires et al., 1999), a developmental screening tool completed by parents in English. At 3 and 5 years, speech, language and fluency were examined through parental report and expressive vocabulary development was measured using a standardised assessment tool, the naming vocabulary subtest of the British Abilities Scales (BAS; Elliott et al., 1997). This assessment measured expressive vocabulary skills in English only. This measurement of expressive vocabulary was also used in other large-scale population-based studies, including Growing up in Scotland (GUS) and the Millennium Cohort Study (MCS).

Law et al. (2012) used the naming vocabulary subtest of the BAS to predict changes in expressive vocabulary abilities between 3 and 5 years. As reported previously, this study highlighted four patterns of development, with 92.7% showing no delay at 3 and 5 years, 4.4% presenting with a delay at 3 years only (resolving delay), 1.4% delayed at 5 years only (late onset delay) and 1.5% delayed at both 3 and 5 years (persisting delay). This study also aimed to identify risk factors that predict change in vocabulary development between 3 and 5 years. The study included biological risk factors (child behaviour, small for gestational age, gross and fine motor development) and parent risk factors (parent education and parent concerns regarding hearing and language development). However, this study did not address social or environmental factors.

The current study aims to build on the research conducted by Law et al. (2012) using data from GUI. The study is concerned with expressive vocabulary growth between 3 and 5 years. The study will explore the stability of expressive vocabulary development and discuss patterns of resolving, persisting and late onset language difficulties using a population of children growing up in Ireland. Expressive vocabulary growth is an important research focus as it forms the foundation for a number of linguistic skills and also contributes to later social and academic outcomes (Preston et al., 2010; Roos & Weismer, 2008). The fundamentals of

this will be further discussed in chapter two. This study will also identify associated risk and protective factors associated with the different categories of stability. The study will focus on social and environmental factors which can be modified to create positive changes in vocabulary growth. Chapter three will explore what is already known about the risk and protective factors associated with expressive vocabulary growth during childhood.

Chapter Two - Expressive Vocabulary Development

Expressive vocabulary development is both an important and prevailing area of research. Expressive vocabulary acquisition not only forms the foundation for a number of linguistic skills, such as syntax and phonology, but also sets the stage for later reading ability and school achievement (Preston et al., 2010; Roos & Weismer, 2008). Although expressive vocabulary is only one dimension of the complex language system, it is likely to be a good estimate of a child's global language ability between 3 and 5 years. This finding is highlighted in recent studies which have investigated the dimensionality of language ability in young children (Language and Reading Research Consortium, 2015; Tomblin & Zhang, 2006). The Language and Reading Research Consortium (2015) examined the dimensionality of language ability using a sample of 915 children between aged between 4 and 8 years. The children were grouped according to their age and for each group vocabulary, grammar and discourse skills were assessed. The study found that the three language skills existed as a single construct at 4 and 5 years. It was only during the formal school years (after 5 years) that the unique dimensions of language emerge as distinct skills. Comparable results were also reported by Tomblin and Zhang (2006) who conducted similar research investigating dimensions of vocabulary and grammar. Overall these results highlight that the independent dimensions of language exist as a single construct until approximately 5 years, indicating that expressive vocabulary is a good predictor of a child's overall language ability between 3 and 5 years. The following chapter provides an overview of the research findings associated with expressive vocabulary development during early childhood.

2.1 Expressive Vocabulary Development

Expressive vocabulary refers to the words a child can express or produce. Expressive

vocabulary development in English begins during the first year of life and is typified by the production of a child's first 'true' word. A 'true' word is classified as a word which sounds similar to the adult's production of the word and is used consistently in the presence of the same person, object or event. Based on typical growth patterns of the English language, children usually produce their first true word between 10 and13 months (Fenson et al., 1994). Following a child's attainment of their first true word further development of new words occurs slowly over the next few months. Around the time children acquire a vocabulary of 50 words (e.g. 17–20 months), the rate of acquisition sharply increases. For English speaking children these first words typically reflect everyday experiences and consist primarily of nouns, referring to the names of familiar people, animals, food and toys (Bates et al., 1994). According to Bates, Bretherton and Snyder (1988) the timing of the onset of two-word combinations is related to the size of the child's expressive vocabulary, so children who are delayed in their acquisition of single words may combine words at a later age.

Although the majority of children will learn to speak during the first few years of life it is important to recognise that the rate at which they do so varies considerably between individuals. This variability is reflected clearly in the English language normative data collected from the MacArthur-Bates CDI (Fenson et al., 2007). This data illustrates that at 2 years children in the top 10th percentile have an expressive vocabulary of approximately 542 words while children who fall in the bottom 10th percentile have fewer than 77 words. Similar levels of variability are also reported in a study conducted by Stokes and Klee (2009), who examined the expressive vocabulary abilities of 232 toddlers aged between 2;0 and 2;06 years. The average number of words produced at this age was 329, however, the range of words used varied from 15 to 666. This variability may be explained by several reasons, including a family history of speech and language difficulties, birth factors, and limited language stimulation in the home environment (Dale et al., 2003; Henrichs et al., 2011; Reilly

et al.,2007). Risk factors for delayed language development will be further discussed in chapter three. Expressive vocabulary continues to develop throughout the preschool period, the school years and even in to adulthood. During this time expressive vocabulary development typically advances so rapidly that it becomes unmanageable to determine the size of a child's vocabulary. Pence and Justice (2008) have estimated that the average pre-schooler's vocabulary in English grows from approximately 200 words at 24 months to approximately 2000 at 5 years and it is well recognised that large variations continue to exist.

2.2 Expressive Vocabulary Delay

Almost all children acquire vocabulary naturally through interactions and exposure to the ambient language, suggesting that expressive vocabulary acquisition is a resilient developmental process. However, as stated above individual differences continue to exist throughout childhood and even into adulthood. While some differences represent variation within typical development, others are indicative of a developmental problem. Children with early delays in expressive vocabulary development are often referred to as 'late talkers' in the literature (Rescorla, 2011). Varying criteria have been used among studies in identifying late talkers, the most commonly used being, an expressive vocabulary containing fewer than 50 single words or no two-word combinations at 24 months (Rescorla, 1989; Rice, Taylor, & Zubrick, 2008). Other criteria used include performance below the 10^{th} percentile on the MacArthur-Bates CDI at 24 months of age or below the 15^{th} percentile on the LDS between 18 and 23 months of age (Rescorla & Achenbach, 2002). Irrespective of these differences in parameters for inclusion, 'the late talker label is applied to children who demonstrate limited expressive vocabulary in the face of otherwise typical development' (Ross & Ellis Weismer, 2008 p. 2)

Delayed expressive vocabulary development in the absence of any known primary

cause is one of the most common reason for referral to speech and language therapy services. Late talkers are typically identified based on parent-report measures such as the LDS (Rescorla, 1989), the MacArthur-Bates CDI (Fenson et al., 2007) or the ASQ (Squires et al., 1990). From 3 years onwards, expressive vocabulary delays are more commonly identified using a direct assessment tool. Expressive vocabulary abilities in English may be assessed using a single assessment tool such as the Expressive Vocabulary Test 2nd Edition (Williams, 2007) or as a subtest of a composite language assessment tool such as the Clinical Evaluations of Language Fundamentals Preschool 2nd Edition (Semel, Wiig, & Secord, 2006) or the British Abilities Scales (Elliott et al., 1997). Using the assessment tools discussed above the prevalence of late talking at 2 years has been estimated to range between 10 and 20% (Rescorla, 1989; Rescorla & Alley, 2001; Zubrick, Taylor, Rice, & Sledger, 2007). There is, however, limited information regarding the prevalence of expressive vocabulary delays between 3 and 5 years. Law et al. (2012) examined expressive vocabulary growth between 3 and 5 years in a large representative sample of 13,016 children in the United Kingdom. This study found that 5.9% of children were delayed at 3 years and 2.9% of children were delayed at 5 years. The prevalence of expressive vocabulary delay at 3 and 5 years reported by Law et al. (2012) fall below the prevalence estimates for general preschool language difficulties of 7% and 14% (Law et al., 2017).

2.3 Categories of Stability of Expressive Vocabulary Development

As stated previously, it is estimated that between 10 and 20% of children present with an early expressive vocabulary delay (Rescorla, 1989; Rescorla & Alley, 2001; Zubrick et al., 2007). Research has shown that this large group of children follow different categories of stability. Firstly, a significant proportion of these children, 50-80%, will recover age appropriate expressive vocabulary skills before school entry (Henrichs et al., 2011; Zambrana

et al., 2014). For other children an early expressive vocabulary delay is the first sign of more significant language disorder which may impact social, emotional and academic outcomes (Preston et al., 2010; Roos & Weismer, 2008). Furthermore, research has highlighted a group of children who show late onset language difficulties (Law et al., 2012; Zambrana et al., 2014). This group of children appear to start by showing typical language growth but fall behind their peers later in development. The following sections will explore these three profiles in further detail**.**

2.3.1 Resolving delay.

Several longitudinal studies have indicated that between 50 and 80% of children with early language delays will have caught up with their typical language peers before school entry (Dale et al., 2003; Henrichs et al., 2011; Law et al., 2012). This group of children are often referred to as 'late bloomers' in the literature. Late bloomers move into the typical range of vocabulary development before preschool or school entry based on their performance on norm-referenced language assessments (Ellis Weismer, 2007; Ghassabian et al., 2014; Paul, 1996). However, research has shown that many of these children will continue to score below their typical language peers and may demonstrate residual weaknesses across additional language measures, including phonology and syntax. This has been demonstrated by Rescorla (2002, 2005, 2009) who documented the progress made by 34 late talkers through the school years.

Rescorla (2002) first examined the impact of late talking status on language development between 6 and 9 years. The study used a sample of 34 late talkers and 25 children with typical language development. Both groups were matched according to age, socioeconomic status and non-verbal ability. At 6 years of age, only 6% of late talkers scored below the 10^{th} percentile on two or more subtests of the Test of Language Development 2

(TOLD-2; Westby, 1988). The majority of late talkers scored within the average range on most language measures, however, they scored below the control group on measures of vocabulary, grammar, phonology, and verbal memory tasks. The language development of this group of children was again assessed at 13 years (Resorla, 2005) and 17 years (Rescorla, 2009). At age 13 the late talker group (28 children) scored within the average range on all language assessments, however they continued to score lower than their typical language peers on measures of vocabulary, grammar, verbal memory and reading comprehension (Rescorla, 2005). While at age 17 years the late talking group (26 children) had lower scores on vocabulary, grammar and verbal memory (Rescorla, 2009). Similar findings were also reported by Scarborough and Dobrich (1990) who introduced the concept of 'illusory recovery'. Scarborough and Dobrich (1990) use the term 'illusory recovery' to describe the pattern in which children with early language delays move into the normal range on standardised tests but continue to show some residual difficulties in selected aspects of oral language and later literacy skills. Although the concept of illusory recovery has been widely accepted among researchers and clinicians there is limited practical evidence to support it. Firstly, small sample sizes have been used to demonstrate illusory recovery. For example, Scarborough and Dobrich (1990) had a sample size 16 children with only four of the children presenting with an early language delay. Secondly, there are large scale longitudinal studies which have found little evidence to support the concept of 'illusory recovery'. Using a sample of 3,598 pairs of twins Dale et al. (2014) explored patterns of recovery across early childhood. The study concluded that children with early language delays (2 years) were likely to score in the low average range at 4 years but this group of children did not show an elevated risk for language and literacy difficulties at 7 and 12 years. Dale at al. (2014) recommended that all children with low average language scores at 4 years should continue to be monitored, regardless of their early history.

2.3.2 Late onset delay.

In addition, research has highlighted a group of children who show late onset language difficulties (Law et al., 2012; Zambrana et al., 2014). This group of children experience a deterioration in their expressive vocabulary ability overtime. The identification of late onset language difficulties indicates that despite typical language skills early in development, there are a subset of children who are vulnerable to later language problems (Armstrong et al., 2016, Law et al., 2012; Poll, Betz & Miller, 2010). This group of children would not have been identified by any early developmental screening, however, previous research has indicated that this group of children may present with low average language scores during early development (Law et al., 2012). Using a population of 13,061 children, Law et al. (2012) reported that 1.4% (177) of children presented with late onset expressive vocabulary difficulties at 5 years. This group of children had scored within the average range at 3 years, however, their vocabulary scores were significantly lower than the typical language group. This information suggests that children who score in the low average range during early development require monitoring, as they may be vulnerable to later language difficulties.

2.3.3 Persisting delay.

Finally, for some children, an early language delay is the first sign of a more enduring language problem which may persist throughout the school years and impact on everyday social interactions or educational progress. The recent multinational and multidisciplinary Delphi consensus study, CATALISE , recommends using the term ‘language disorder’ to describe children who are likely to have language difficulties which persist into middle childhood and beyond (Bishop et al., 2017). Although it is important for professionals to use consistent terminology when describing language problems, it is often challenging for Speech

and Language Therapists to predict which children will present as late bloomers and which children will present with a persisting language disorder.

Research indicates that the risk of presenting with a language disorder is heightened significantly by expressive language difficulties which persist beyond the preschool period (Bishop & Edmundson, 1987). According to Wake et al. (2011) between 5 and 8% of preschool children have delayed language development which persists throughout the school years. Children who start school with expressive language difficulties are at risk of poor academic and literacy outcomes (Bishop & Adams, 1990; Catts, Fey, Thomblin, & Zhang, 2002; Snowling, et al., 2016). Prognosis appears particularly poor when language comprehension is further impaired (Beitchman, Wilson, Brownlie, Walters, & Lancee, 1996) and when nonverbal ability is relatively low (Johnson, Beitchman, & Brownlie, 2010; Rice & Hoffman, 2015). The literacy outcomes associated with persisting expressive vocabulary difficulties will be further discussed in section 2.4.

2.4 Literacy Outcomes Associated with Expressive Vocabulary Difficulties

The Bercow Review (2008) examined services for children and young people (0 to19 years) with speech, language and communication needs in the United Kingdom. This review found that children who fell below the nationally expected reading levels typically experienced delays in early language and communication. An interesting study conducted by Snowling, Duff, Nash and Hulme (2016) described the language and literacy profiles of children with persisting, resolving and late onset language difficulties. Snowling et al. (2016) recruited children with preschool language difficulties, children with a family history of dyslexia and typically developing controls. The language skills of each group were assessed at 3 years, 5 years and 8 years and using these results three categories of language development were formed. These categories included children with resolved language

difficulties, children with persisting language difficulties and children who developed late onset language problems. The literacy skills of each group were also assessed at 5 and 8 years and interesting results were reported. Consistent with the results reported by Dale et al. (2014) the resolved group scored within the average range at 8 years, but continued to score below the typically developing group. The resolved group performed at the same level as the typically developing group on all measures of literacy This is in contrast with the results reported by Scarborough and Dobrich 1990. Snowling et al. (2016) hypothesised that if early language delays resolved before formal literacy instruction there would be little or no risk for later reading difficulties.

In Snowling et al. (2016) the children with late-onset language difficulties scored in the average range at 3 years. However, their scores were typically below the control group. The late onset group performed significantly worse than the resolved group on literacy measures, with 48% of this group diagnosed with dyslexia at 8 years. It is interesting to note that 76% of this group had a family history of dyslexia and therefore this is a significant risk factor for this group. Furthermore, Snowling et al. (2016) identified a persistent group who scored significantly below their typical language peers at 3 year, 5 years and 8 years. Children within this group were noted to have more significant impairments than the resolved group at 3 years and were more likely to have receptive language difficulties and lower IQ scores. The persistent group also has significant reading difficulties at 8 years. Overall, 41% of this group received a diagnosis of dyslexia by age 8 years. This further adds to the evidence that children who experience language difficulties beyond the preschool period are at an increased likelihood of presenting with later language and literacy impairments. This finding is further highlighted by Norbury et al. (2016), who showed that in a UK sample of children between 4 and 6 years, 88% of children with developmental language disorders did not make expected academic progress.

2.5 Summary

This chapter has indicated that expressive vocabulary development is an important skill which influences later academic outcomes. This information would suggest that children presenting with early expressive vocabulary delays should be detected early and provided with the appropriate support. The reasoning is that by intervening early, there is an increased chance of avoiding poor language and literacy outcomes and making effective changes while the brain is still plastic. However, research has indicated that expressive vocabulary development is highly variable, and a significant proportion of late talkers will improve with little or no specific intervention. Some researchers have suggested that therapy should not be provided until it can be ascertained that a child has persistent difficulties (Norbury et al., 2015). It is not clear, however, what age this would be. Thus an important research aim is to differentiate between early expressive vocabulary delays which resolve spontaneously versus those that will persist into later childhood and also identify risk factors for children who will present with late onset difficulties. Research has highlighted that language disorder is associated with a multifactorial causal mechanism, inclusive of a multitude of biological and environmental factors (Bishop, 2006). Therefore, to gain a better understanding of expressive vocabulary delays and the patterns of change which occur between 3 and 5 years it is important to explore the risk and protective factors which shape vocabulary development. Chapter three will explore what is already known about the risk factors associated with expressive vocabulary growth during childhood and will outline the aims of the current study.

.

Chapter Three - Risk Factors Associated with Expressive Vocabulary Development

The first two chapters have highlighted the importance of expressive vocabulary development during the preschool years and recognised the need to investigate biological and environmental factors, beyond early language status alone which may be influencing later language and academic outcomes. To date a number of studies have explored specific risk and protective factors which influence language development during early childhood. Although variability exists among these studies, when considering the factors broadly, some consistent themes emerge. Table 1 provides a summary of some of the key findings from population-based studies. Studies investigating expressive vocabulary development only and expressive vocabulary development as part of a general language assessment were examined.

McKean et al. (2015) categorised risk and protective factors based on their 'mutability'. Mutability refers to a factors ability to be modified through intervention. Low-mutable factors refer to risk factors which cannot be modified easily through intervention. These often include biological or inherited factors such as gender and perinatal factors. Mutable-distal factors include factors which cannot be modified through direct intervention with the family or child, but can be supported at a population level through social policy. These factors have an indirect impact on language development and include parent education and household income. Finally, mutable-proximal factors are factors that can be modified through direct intervention with the family or child. These factors, which include parent-child book reading, can be used as direct targets for intervention. Table 1 and the contents of the following chapter are arranged under the categories, low-mutable, mutable-distal and mutable-proximal factors.

Table 1

Risk and protective factors addressed in key population-based studies

Predictors	**Population-based studies**							
	Henrichs et al. (2011)	Zubrick et al. (2007)	Harrisson & Mcleod (2010)	Reilly et al. (2010)	Law et al. (2012)	Zambrana et al. (2014)	McKean et al. (2015)	McKean et al. (2017)
Low-Mutable								
Gender	**R**	**R**	**R**	**R**	**N**	**R**	**N**	-
Developmental disability	-	-	-	-	-	-	**R**	**R**
Hearing status	-	-	**R**	-	**N**	-	-	-
Birth weight	**R**	**R**	-	**R**	-	**N**	**N**	**R**
Gestational age	**R**	**R**	-	**N**	**N**	-	-	-
Birth order	-	**R**	**R**	**N**	-	**R**	**R**	-
Behaviour	-	**N**	-	-	**R**	-	**R**	**R**
Temperament	-	**N**	**R**	-	-	-	**R**	
Early LD	**R**	-	-	**R**	-	**R**	-	-
Receptive LD	**R**	-	-	-	-	-	-	-
Non-verbal IQ	**R**	-	-	-	**R**	-	**R**	**R**
Family History LD	-	**R**	-	**R**	-	**R**	**R**	**R**
Mutable-Distal								
Parent Education	**R**	**N**	**N**	**R**	**R**	**R**	**N**	**N**
Lone parent household	**R**	**N**	-	-	-	-	-	-
Family income	**N**	-	**N**	-	-	-	**R**	-
Maternal age	**R**	**N**	**N**	**N**	-	**R**	**N**	**R**
Parent stress	**N**	-	**R**	**N**	-	-	-	-
EAL	-	-	-	**R**	-	**N**	**R**	**R**
Mutable-proximal								
Screen time	-	-	**N**	-	-	-	**R**	**N**
HLA	-	**N**	**R**	-	-	-	-	-
Number of books	-	-	-	-	-	-	**R**	**R**
Book reading	-	-	-	-	-	-	**R**	**N**
Childcare/ Preschool	-	**N**	-	-	-	-	-	-

Note. LD = Language Disorder, EAL = English as an additional language, HLA = Home learning activities, N = No effect, R= Risk Factor.

The current study is particularly interested in the impact of mutable-proximal factors. In recent years, the focus of speech and language therapy has shifted to include the family as a major role in intervention. Parents are commonly acknowledged as 'children's first language teachers' (Roberts & Kaiser, 2011, p. 180). They are the constant in their children's lives and the outcomes of speech and language intervention ultimately rely on the family. It is important for Speech and Language Therapists and other professionals supporting early language development to help families create a language rich environment for their child. Understanding the relationship between expressive vocabulary categories of stability and mutable-proximal factors will help us reach this goal. The following chapter explores low-mutable, mutable-distal and mutable-proximal risk factors associated with expressive vocabulary development during childhood. It must be recognised that the current study was restricted to include only predictors which were readily available in the GUI dataset. The following chapter discussed the relevant literature associated with the predictors which were addressed in GUI.

3.1 Low-Mutable Factors

Child or biological factors such as gender, birth factors, early communication skills, birth order and child behaviour have all been shown to influence expressive vocabulary development during early childhood. As stated previously, these factors are categorised as low-mutable factors in a study conducted by McKean et al (2015). Although these factors cannot be modified through speech and language intervention programmes it is important to understand the level at which they impact expressive vocabulary growth.

3.1.1 Gender.

It is well established that male gender is a risk factor for both expressive and receptive

language delays across the first 30 months of life. This early difference has been reported by several large scale studies across different countries, languages, and mixed socioeconomic status (SES) (Bornstein & Cote, 2005; Eriksson et al., 2012; Huttenlocher, Haight, Bryk, Seltzer, & Lyons, 1991). Large population studies have indicated that boys are nearly twice as likely as girls to present with expressive vocabulary delays at 2 years (Dale et al., 2003). Some studies suggest that this gender difference may exist only during the early years as boys appear to catch up with girls as they approach 3 years (Huttenlocher, Waterfall, Vasilyeva, Vevea, & Hedges, 2010; Simonsen, Kristoffersen, Bleses, Wehberg, & Jørgensen, 2014). However other studies have shown a consistent disadvantage for boys through the preschool period and early school years (Bornstein, Hahn, & Haynes, 2004; Reilly et al., 2007) Overall the contribution of gender as a risk factor was found to be small.

Studies have also explored the relationship between gender and the different patterns of language development. Dale et al. (2003) found that gender was not a significant factor in predicting patterns of recovery. The study reported that boys are at a heightened risk at being delayed at 2 years, however, once in the delayed group, they are only slightly more likely to remain in it. Zambrana et al. (2014) found that male gender predicted patterns of recovery to varying degrees between 3 and 5 years and was most associated with persisting language difficulties. Overall, further exploration of gender as a predictor of recovery in relation to expressive vocabulary development is required.

3.1.2 Birth factors.

Birth factors such as low birth weight (LBW) and preterm birth have also been linked with delayed expressive vocabulary development. The World Health Organisation (2018) defines preterm birth as born before 37 weeks gestation. Subcategories including very preterm (28 to 32 weeks) and extremely preterm (less than 28 weeks) are also described.

Several studies have found an association between preterm birth and delayed expressive language development, with some research showing that preterm birth can impact expressive language development beyond the early years and preschool period (Guarini et al., 2009). Overall the impact of preterm birth on expressive language development has been inconsistently reported among studies. Reilly et al. (2007) reported that preterm birth did not contribute as a risk factor for early language delay, while Peyre et al. (2014) found that preterm birth was associated with a late onset expressive language delay. Furthermore, Roberts, Bellinger and McCormick (2007) found that preterm infants from high SES families showed fewer problems later in life when compared to preterm infants from low SES families, suggesting that the initial biological impact of prematurity can be alleviated with environmental support.

Additionally, a correlation between LBW and a declining trajectory of expressive language development has been observed (McKean et al., 2017; 2015). The World Health Organisation (2004) has defined LBW as a birth weight of less than 2500g. Subcategories also include very low birth weight (VLBW) of less than 1,500 grams and extremely low birth weight (ELBW) of less than 1000g. Most of the previous studies of language development have categorised LBW as less than 2500g. Byrne, Ellsworth, Bowering and Vincer (1993) aimed to determine the number of LBW infants presenting with delayed expressive language at 12 and 24 months of age. The sample included 71 LBW infants, 36 of whom were 12 months old and 35 of who were 24 months old. The study found that 8.3% had delayed expressive language at 12 months while an increasing 28% of LBW infants were had delayed at 24 months. Consistent with this result McKean et al. (2017, 2015) demonstrated that LBW was associated with a declining trajectory of general development or a late onset delay, suggesting a cumulative vulnerability for this factor over time. These results should, however, be interpreted with caution given the small number of children categorised as LBW

in the Early Language in Victoria Study (ELVS). Tomblin et al. (1997), who defined LBW as less than 2500g and Reilly et al. (2007), who used a continuous scale of birth weight both reported that low birth weight was not a significant predictor of expressive language outcomes. In light of these inconsistent results it is clear that a further investigation of the impact of LBW and preterm birth on expressive vocabulary development is required.

3.1.3 Early communication skills.

Early communication skills, in particular the use of pointing and gestures are recognised as predictors for later expressive vocabulary outcomes (Beuker, Rommelse, Donders, & Buitelaar, 2013; Colonnesi, Stams, Koster, & Noom, 2010; Luke et al., 2017; Rowe & Goldin-Meadow, 2009; Rowe, Raudenbush, & Goldin-Meadow,2012). Luke et al. (2017) showed that index finger pointing at 12 months is associated with language acquisition at 2 years, while Rowe et al. (2012) found that children who used more varied gestures at 14 months had acquired larger expressive vocabularies at ages 4 and 5 years. Furthermore, research has shown that early communication skills such as eye gaze and expression of emotion also shape language development (Balwin, 1995; Morales et al., 2000). To date few studies have examined the impact of the relationship between preverbal communication skills and expressive vocabulary outcomes between 3 and 5 years. Using the GUI dataset, Williams, Murray, McCrory and McNally (2013) demonstrated that infants, who scored low on measures of communication at 9 months, score lower on the naming vocabulary subtest of the BAS at 3 years. Further analysis is required to determine the relationship between early communication delays and the categories of expressive vocabulary growth between 3 and 5 years.

3.1.4 Child behaviour.

According to Willinger et al. (2003) approximately one-third of children with language developmental disorders, including expressive vocabulary delays, present with significant behavioural difficulties. However, the relationship between expressive language disorders and behavioural difficulties is not clear. It is possible that expressive language difficulties lead to emotional or behavioural problems as children experience hurt and frustration with the challenges of trying to express themselves. Adversely, behavioural problems may impact language development by exerting a negative influence on the communication channels between the child and their parents. Most of the research conducted to date has explored the relationship between behavioural problems and general language abilities and often neglects the differentiation among the domains of language. The GUI dataset includes a standardised measure of expressive vocabulary, the naming vocabulary subtest of the BAS and a standardised measure of behaviour, the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997). The SDQ is a 25-item parent-report measure that has been widely used in epidemiological and clinic-based work. The SDQ investigates components of behaviour including emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems and prosocial behaviour and has demonstrated good psychometric properties (Stone et al., 2010). The inclusion of this standardised measure allows the relationship between expressive vocabulary growth and behaviour to be addressed in the current study in the context of a large sample of participants.

3.1.5 Birth order

Another factor which is often assumed to impact expressive vocabulary development is birth order. In a recent study by King et al. (2017) parity was shown to have a negative impact on Single Word Reading. However, contrasting results were reported by Coates and

Messer (1996) in relation to oral language development. Coates and Messer (1996) found that later born children experienced social interactions which were less supportive than first born children. These environmental differences resulted in later born children having smaller receptive vocabularies, but better conversational skills at 5 and 6 years. The impact of birth order on expressive vocabulary outcomes has been further researched and most studies have concluded that there is little or no association between the two. Berglund, Eriksson and Westerlund (2005) reported that first-born children frequently reached the 50 word milestone earlier than their later-born siblings. Berglund et al. (2005) further explained that once children had reached the 50-word mark, there were no differences in expressive vocabulary development between first and later-born children. Bornstein, Leach and Haynes (2004) found that mothers frequently reported larger expressive vocabularies in first born children, however, standardized assessments and clinical observations have indicated that there were no statistical differences between the two. Furthermore, Reilly et al. (2007) revealed that birth order was not a reliable risk factor for predicting later language outcomes. Considering this research, the impact of birth order will not be addressed in the current study.

3.2 Mutable-Distal Factors

Mutable-distal factors include factors which cannot be modified directly through intervention with the family or child, but can be supported at a population level through social policy. These factors often relate to the parents or the family context. These factors include household composition, languages used in the home and an array of socio-economic factors such as family income, parent education levels, parent employment status and neighbour status. Many of these factors exert an indirect influence on expressive vocabulary outcomes during early childhood. Mutable-distal factors cannot be targeted through direct speech and language interventions with the family or child. However, these factors can be

changed at a population level through social policy. It is important to understand how mutable-distal factors impact expressive vocabulary development, but also how they interact with the more direct factors in the child's home environment.

3.2.1 English as an additional language.

Learning English as an additional language is an important factor to consider, particularly as Ireland is a country which is continuing to grow in diversity with an increasing number of different languages being used in the home environment. As previously mentioned, the 2016 Irish Census indicated that 612,018 individuals residing in Ireland spoke a foreign language in the home environment, this figure was up 19 per cent from 2011 (Central Statistics Office, 2016). While a number of advantages have been linked with bilingual language learning the research has shown slower rates of single language growth during the early years (Conboy & Thal, 2006; Hoff et al., 2012; Marchmann & Martinez-Sussmann, 2002). It has also been reported that bilingual children show larger discrepancies between their receptive and expressive language abilities compared to monolingual peers (Gibson et al., 2012). This means that bilingual language learners typically have greater difficulties in tasks which involve language production compared to tasks which involve language comprehension.

A number of large-scale population studies have shown that bilingual language learning is consistently associated with early language delays, particularly delays in the child's second language. Many individuals learning English as an additional language will not have caught up with their peers between 3 and 5 years and may perform poorly on assessments of English language ability. McKean et al. (2015) found that learning English as an additional language applied the highest level of disadvantage on English language scores at 4 years, however, this risk factor was also associated with the fastest rate of development

between 4 and 8 years. The regression models completed by McKean et al. (2015) were adjusted for other risk factors including neighbourhood disadvantage and low income. The study found that when children learning English as an additional language made limited progress between 4 and 8 years the source of their difficulties is most likely to be related to broader social risks. McKean et al. (2017) and Taylor et al. (2013) reported equivalent results when exploring general language growth and receptive language growth respectively. Overall, the previous research suggests that learning English as an additional language is associated with an increasing language trajectory or the resolving pattern of development as discussed in section 2.3.1. To date, limited research has explored the impact of learning English as an additional language on expressive vocabulary development. This information is relevant, given that previous research would suggest that learning English as an additional language may exert a more significant or prolonged impact on expressive vocabulary abilities compared to receptive vocabulary knowledge.

3.2.2 Household composition.

Household composition is a description of the household according to the characteristics of its membership. It includes information about the number of people residing in a home and also their relationships with each other. Examining household composition can reveal much about a society. Factors relating to household composition have changed dramatically over time and great diversity exists among different countries and communities. In Ireland the average household size is now 2.75 people (Central Statistics Office, 2016) and recent figures estimate that one in every five children in Ireland are living in a one-parent family home (Central Statistics Office, 2016). Using data from the Growing up in Scotland (GUS) study, Kelly (2008) reported that lone parent households are more likely to have concerns about their child's speech and language development. However, lone parenthood

itself does not explain the adverse effects. The differences are accounted for by socioeconomic factors such as income, parental education and the age of the mothers. It is of value to further investigate the impact of lone parent households on expressive vocabulary outcomes. Specifically, this should be conducted between 3 and 5 years, an important period in language development.

3.2.3 Socioeconomic factors.

Socioeconomic factors should also be considered in understanding variability in expressive vocabulary development between 3 and 5 years. Research has consistently demonstrated higher incidents of language difficulties in socially disadvantaged areas (Basit, Hughes, Iqbal, &Cooper, 2015; Law, McBean, & Rush, 2011). Vocabulary development appears to be the component of language most vulnerable to the effects of SES and this is demonstrated in a study conducted by Hart and Risley (1995). This study documented differences in vocabulary size among children from different backgrounds. By 3 years of age, the children from higher SES backgrounds had produced over 1000 different words while the lower SES children had produced half that many. A recent study by Law, Todd, Clark, Mroz and Carr (2013) further highlighted that the level of social disadvantage impacts language development. Law et al. (2013) found in a UK sample that an increase in the level of social disadvantage related to an associated rise in the percentage of children experiencing language problems.

Roy and Chiat (2012) proposed that, for some children living with social disadvantage, the low scores obtained on standardised assessments do not reflect language difficulties. Rather, they may represent unfamiliarity with the testing context or difficulties with attention and listening skills (Roy & Chiat, 2012). In relation to expressive vocabulary, standardised assessments may include pictures of vocabulary items which some children in

socially disadvantaged homes have not yet had exposure to. Irrespective of the underlying cause of these difficulties, children from socially disadvantaged homes are at increased risk of presenting with receptive and expressive language delays which may impact their 'ability to process language in the classroom and meet the oral language demands of formal schooling' (Law et al., 2017, p. 20).

Differences in vocabulary growth among SES groups are evident in children as young as 18 months (Fernald, Marchman &Weisleder, 2013) with a six month gap developing between higher and lower SES toddlers by 24 months (Fernald et al., 2014), indicating that these gaps in ability continue to persist as children get older This information suggests that if we are to alleviate the problem through preventative interventions, we need to do so early in development. Using data from the Millennium Cohort Study, Blanden and Michin (2010) found that children raised in higher income households with low vocabulary at 3 years progressed at a faster rate than their lower-income peers. Blanden and Michin (2010) also investigated changes between 3 and 5 years and found that ability gap between these groups did not widen significantly during this time, but it also did not narrow with children from low income households continuing to lag behind their higher income's peers in expressive vocabulary development. Such evidence has led researchers to conclude that patterns of language cognitive development are more difficult to modify once children begin formal schooling (Heckman & Wax, 2004)

A number of SES factors have been shown to influence expressive vocabulary growth including income, parent's level of education, and area deprivation. According to Bradshaw (2011) parent's level of education is the primary social background factor which influences expressive vocabulary outcomes during the preschool years. In light of this information the current study will consider the impact of the primary caregiver's level of education on expressive vocabulary outcomes. Using data from Growing Up in Scotland

(GUS) Bradshaw (2011) found that at age five children with a degree educated parent demonstrated expressive vocabulary abilities approximately 18 months ahead of children whose parents had no qualifications. The impact of SES factors including parent's education level on children's development has been explained through the home learning environment. SES factors exert an indirect effect on expressive vocabulary outcomes and according to Hoff (2003) it is the quality of children's early language environment that actually mediates the link between SES and vocabulary. Family income and parent's level of education have been found to relate to the amount of money parents invest in educational materials and the time they spend engaging in joint activities with their children (e.g., reading books). These types of investments have been shown to have the potential to enhance children's cognitive skills and support expressive vocabulary development. Using data from the GUS study Bradshaw (2011) controlled for the effect of parent's education level and found that home learning practises such as reading and playing with the child continued to influence changes in expressive language outcomes during preschool years. This analysis showed that the impact of parent education on vocabulary growth may be associated with elements of the child's home environment and the choices and behaviours of the parents.

3.3 Mutable Proximal Factors

Factors which fall under the category mutable-proximal have the potential to be modified through direct interventions with the child or family (McKean et al., 2015). These factors often include elements of the child's home environment. Children develop vocabulary through shared experiences which capture their interests and attention, thus a child's home learning environment is widely recognised as an important contributing factor in the development of expressive vocabulary (Bradshaw, Knudsen, & Mabelis, 2015; Bromley 2009; Son & Morrison, 2010). The home learning environment captures both the quality and

quantity of verbal stimulation and the frequency at which children partake in high-quality learning activities. Previous research has aimed to identify the components of a stimulating home learning environment and has suggested that the following features may be particularly important, engaging in early literacy activities, making learning materials available in the home and engaging in routine learning activities (Rodriguez & Tamis-Le Monda, 2011). Furthermore, engagement with screen time has shown both a positive and negative influence on early language development. Understanding the value of mutable-proximal factors is important for parents, Speech and Language Therapists and early educators who all wish to support and develop the expressive vocabulary skills of preschool children. The following section considers the previous literature relating to the impact of early literacy activities, additional home learning activities, preschool education, childcare and screen time.

3.3.1 Early literacy activities.

There is evidence to suggest that participation in early literacy activities can provide children with excellent opportunities for expressive vocabulary growth. Several studies have demonstrated the positive effects of shared book reading on expressive language outcomes (Bus, Van Ilzendoorn, & Pellegrini, 1995; Mol, Bus, deJong, & Smeets, 2008). Parent child book reading provides parents with the opportunity to expand their child's vocabulary in a structured setting. It can create an environment which fosters joint attention and shared interest between adults and children. It is estimated by Beck, McKeown and Kucan (2002) that for every 100 unfamiliar words introduced in shared book reading, between five and fifteen of these will be acquired by the child.

The frequency of book reading is often used as the key variable when measuring the impact of book reading on expressive vocabulary outcomes. A national household survey conducted by the Irish Central Statistics Office (2014) revealed that 71% of

children aged between 3 and 7 years are being read to on a daily basis which is consistent with the recommendations provided by the American Academy of Pediatrics (2008). Senechal, Pagan, Lever and Ouellette (2008) reported that the frequency of book reading accounted for 10% of the variance in children's expressive vocabularies at age 4 years, while Farrant and Zubrick (2013) demonstrated that children who engaged in low levels of parent-child book reading across early childhood were at increased risk of delayed vocabulary development during the preschool years. McKean et al. (2015) reported that the frequency of shared book reading during the first four years of life impacted language outcomes at age 4years, but also had lasting influences during the school years. A strong relationship between frequency of book reading and SES has also been reported. Using information from the Growing up in Scotland (GUS) dataset, Bradshaw (2011) demonstrated that children living in the most socially disadvantaged areas were less likely to have been read to on a daily basis at 10 months, than children in the rest of Scotland. Similar trends were found between children whose families had the lowest incomes and children whose mothers had no education qualifications.

Exposure to reading materials has also been shown to impact expressive language outcomes. A number of population-based studies have explored the relationship between language development and the number of children's books in the home. Tomopoulos et al. (2006) reported that the number of children's books provided to infants at 18 months was highly related to both cognitive and language outcomes at 21 months and 3 years respectively. The number of children's books in the home continued to exert an influence as children grew older. According to McKean et al. (2015) fewer than 10 children's books in the home at 4 years increases the risk of language delay during the preschool years.

The frequency of shared book reading and the number of books in the home are both

powerful proximal tools which can be used to influence expressive vocabulary growth. Using the data from Growing up in Ireland, Hourigan (2015) showed that the frequency of book reading and the number of books in the home at age 3 years were both associated with expressive vocabulary outcomes at age 3 years. Further research is required to investigate the impact of these factors between 3 and 5 years and determine if parent-child book reading and exposure to reading materials can generate change in expressive vocabulary abilities over time and help promote recovery of expressive language skills.

3.3.2 Home learning activities.

Beyond book reading there are a number of additional home learning activities which have been linked to the promotion of early expressive vocabulary skills. Research has explored the role of early learning activities such as arts and crafts, exposure to alphabet and numbers, jigsaws, puzzles and active games. Most of the activities have little or no monetary costs, ensuring that they are accessible to all communities. Research indicates that routine home learning activities provide young children with a familiar structure for language acquisition. During routine activities children benefit from spoken language which is frequent and varied (Dickinson & Tabors, 1991; Weizman & Snow, 2001), but also responsive to their interests (Tamis-LeMonda, Shannon, Cabrera, & Lamb, 2004). Given this information it is important to explore the impact of a range of different home learning activities.

Using data from GUS, Melhuish (2010) examined the relationship between the frequency of home learning activities at 10 months, 22 months and 34 months and expressive vocabulary abilities at 34 months. Statistical analysis revealed that while parent's education and SES factors are important, home learning activities apply a stronger and independent influence on children's expressive vocabulary development at 3 years. Evidently, the home

learning environment appears to be an effective platform for nurturing expressive vocabulary during early childhood. Engaging in early literacy activities, making learning materials available in the home and engaging in routine learning activities are all associated with positive expressive vocabulary scores and have been found to mediate the effects of low SES factors (Farrant & Zubrick, 2011; Melhuish, 2010). However, to date most of the research has been conducted between 10 months and 3 years, further research is required to determine the impact of the home learning environment during later points of development, particularly, between 3 and 5 years. Moreover, there is a need to determine whether home learning activities can generate changes in expressive vocabulary abilities over time. Bradley and Cadwell (1982) reported that the quality of a child's home learning environment remains stable, however, more recent findings (Son & Morrisson, 2010) suggest that some home learning practices may change over time, particularly during the period of school transition. Using data from the US NICHD Study of Early Child Care and Youth, Son and Morrisson (2010) found that children who experienced improvements in the quality of their home learning environment showed developmental changes in language, based on scores from the Preschool Language Scale—Third Edition (PLS–3; Zimmerman, Steiner, & Pond, 1992). This standardised assessment assesses vocabulary, grammar, morphology, and language reasoning. Son and Morrisson (2010) have provided empirical evidence which suggests that modifications in the quality and quantity of home learning activities during the preschool years may improve expressive vocabulary abilities.

3.3.3 Preschool education and childcare.

Learning contexts outside the family home can also have an independent effect on expressive vocabulary development, such contexts may include a child's childcare environment or preschool setting. Research has found that preschool centres can have a

significant impact on children's s cognitive and language development (Currie, 2001; Dunn, Beach, & Kontos, 1994; Sylva, 2009). Preschool programmes support language development through the provision of high-quality learning experiences. Although preschool education provides opportunities for children to expand their expressive vocabularies, some researchers argue that only children from low socioeconomic backgrounds will improve their expressive vocabulary substantially (Becker, 2011). Becker (2011) used data from the UK Millennium Cohort Study (MCS) to determine whether preschool education could help close the gap that exists in the vocabulary abilities of children from different social backgrounds. The study concluded that preschool attendance positively influenced the vocabularies of children with lower educated parents only, suggesting that preschool education may have a compensatory impact, that is, compensating for the lack of language stimulation in the home.

At present, the vast majority of children in Ireland take up their statutory pre-school entitlement. The free preschool year programme was introduced in January 2010 and has broadened access to early childhood education. Initially, children were entitled to one free year and could enter the scheme at any age between 3 years 2 months and 4 years 7 months. The new criteria outline that children are entitled to two full academic years or 76 weeks and can enter the programme at 2 years 8 months (Early Childhood Ireland, 2018). According to McGinnity, Russell and Murray (2015) 96% of eligible children in the GUI study have attended care centres under the scheme. Given that such a high proportion of children are now attending preschool, it would not be worthwhile to compare the vocabulary effects of children who attended versus children who did not attend preschool education. Therefore, preschool attendance will not be included as a predictor in the current study.

Furthermore, the impact of childcare arrangements on expressive vocabulary outcomes have been previously addressed by McGinnity et al. (2015) using the Growing up in Ireland data. McGinnity et al. (2015) investigated the impact of early childcare at 3 years

on expressive vocabulary outcomes at 5 years. The study found that there was no difference in expressive vocabulary scores for children cared for full-time by their parents and children who attend different forms of childcare at age 3 years. There was no benefit of childcare for children from low socioeconomic backgrounds, however the study provided evidence of some benefit of early centre-based care for children learning English as an additional language. In light of these findings, the current study will not include childcare has a predictor.

3.3.4 Screen time practices.

The American Academy of Pediatrics (2016) has recommended that children younger than 2 years of age should not be exposed to television, while children between 2 and 5 years of age should be restricted to a maximum of 1 hour of television viewing a day. Zimmerman et al. (2007) surveyed parents from Minnesota and Washington State and found that the average child begins watching television at 9 months, while approximately 40% of children are exposed to television as early as 3 months of age. Furthermore, Christakis, Ebel, Rivara and Zimmerman (2004) found that television viewing is particularly prevalent between the ages of 3 and 6 years, a critical period for the development of both receptive and expressive language skills.

To date a number of studies have explored the relationship between television viewing and expressive vocabulary development and variable findings have been reported. There is some evidence to suggest high quality television programmes with age appropriate content can positively impact vocabulary development. Rice, Huston, Truglio, and Wright (1990) conducted a 2-year longitudinal study which compared language outcomes in response to different television programmes. The data revealed that the children's television programme Sesame Street contributed to vocabulary development while other cartoons and

general programmes did not, indicating that the content of the television programme is an important factor. Child-directed television programmes can potentially provide opportunities for vocabulary learning, however, Linebarger (2004) detected that these opportunities may be particularly important for children who may not have access to other educational resources or activities.

Contrasting research has identified limitations to the positive effects discussed above. According to Webb and Rogers (2009) children must possess a notable amount of words for incidental vocabulary learning to take place through television viewing. More specifically, a television programme must be comprehensible for children to learn vocabulary. Furthermore, the positive effects associated with television viewing are incomparable to other educational and communicative activities, such as, parent-child book reading. Krcmar, Grela and Lin (2007) compared children learning novel words across three different mediums. A comparison was made between learning words through a children's television programme, adult speaker via television and direct adult-child interaction. Overall, children identified the target words most successfully in the joint reference condition. The negative association between language development and television viewing is often linked with the quantity of television watched. McKean et al. (2015) reported that high levels of television viewing were negatively associated with language outcome. McKean et al. (2015) stated that 'children who watched an average of more than 3 hours of TV per day fell behind their peers, perhaps through the displacement of other activities that would benefit language development' (p. 16).

The Growing up in Ireland database also includes variables which relate to rules regarding television viewing and access to technology within a child's bedroom. To date several studies conducted in the United States have researched the incidence of technology in children's bedrooms and negative factors associated with this. Sisson, Broyles, Newton,

Baker and Chernauseka (2011) used the 2007 US National Survey of Children's Health to investigate the impact of bedroom televisions in a sample of 48,687 children between 6 and 17 years. Overall, 49.3% of the sample had a television in their bedroom and this was associated with several negative consequences including problematic social behaviours, overweight status and sleep disturbances. To date, little is known about the impact of bedroom televisions on children's language development.

In conclusion, for television to exert a positive influence on language development it would seem pertinent that parents actively monitor what programmes their children are watching and where possible engage in co-viewing with their children, providing opportunities for direct adult-child interaction. On the contrary high exposure to television viewing and sources of technology within a child's bedroom appear to be negatively associated with language development. Ultimately, more research using a large population-based study is required to support these theories and ascertain whether modifications in screen time can contribute to changes in expressive vocabulary abilities over time.

3.4 Gaps in the Current Research

A number of large population-based studies have investigated risk and protective factors associated with language development during childhood. However, as discussed in chapter one, considerable variation among studies exists which in turn has led to a number of inconsistencies in the results reported. There is certainly a need for longitudinal, population-based studies, applying consistent instruments and selection criteria. To date few studies have examined the impact of risk and protective factors on expressive vocabulary outcomes during between 3 and 5 years. This is a critical period for vocabulary development and an important time to access speech and language therapy services. Previous research has demonstrated that positive changes during the preschool years can have a powerful impact on expressive

language development (Son & Morrison, 2010). Few studies have investigated risk factors in the context of change, such as, identifying which risk factors are associated with positive and negative change in expressive vocabulary outcomes overtime. As language development is highly variable during early childhood this information is important for early detection, but also decision making regarding early intervention services.

Using data from the Millennium Cohort Study, Law et al. (2012) explored risk factors associated with expressive vocabulary change between 3 and 5 years. While some valuable information was gleaned, this study concluded that replication using a comparable large-scale representative data set is required. There is a need to build on the results reported by Law et al. (2012) by including a larger set of potential predictors. Law et al. (2012) included a number of low-mutable and mutable distal factors, but did not address mutable-proximal predictors which related to the home environment. It is important to address mutable-proximal factors, as these are factors which can be modified through direct intervention with the family or child. The current study will include a number of mutable-proximal factors including the frequency of book reading, home learning activities and screen time.

The current study is specifically interested in the language outcomes of children growing up in Ireland. To allow the results of the current study to be generalised to the wider population of Irish children it is important to conduct research using a large sample of children growing up in Ireland in the 21st Century.

3.5 Aims of the Current Study

The current study will explore the development of English expressive vocabulary skills in a representative sample of Irish children between 3 and 5 years. Four research questions have been devised and these are outlined below. The current study will use the terminology ‘expressive vocabulary delay’, rather than ‘expressive vocabulary disorder’ as

the study includes a subset of children who are learning English as an additional language. This group of children may have language needs because they have had insufficient exposure to the language used by their school and community. Bishop et al. (2017) stated that in this case, the term language disorder should not be used, unless there is evidence of language problems in their home language too. The research questions are as follows:

- What is the prevalence of expressive vocabulary delay at 3 and 5 years in an Irish population of children?
- What is the prevalence of resolving, late onset and persisting patterns of expressive vocabulary delay in an Irish population of children?
- What risk factors are associated with delayed expressive vocabulary development at 5 years?
- What risk factors are associated with changes in expressive vocabulary development between 3 and 5 years?

Chapter Four – Methodology

The aims of the study were addressed using data from the Irish longitudinal study, Growing Up in Ireland (GUI).

4.1 Ethics

All aspects of the GUI project were subject to rigorous review by the Irish Health Research Board's standing Research Ethics Committee. Procedures relating to child protection were informed by the Children First: National Guidance for the Protection and Welfare of Children (Department of Children and Youth Affairs, 2011). Additionally, information pertaining to the Data Protection Acts 1988 and 2003, and the Statistics Act 1993 were highly considered by the research team. The Irish Social Science Data Archive (ISSDA) granted access to the infant cohort data file to facilitate this study.

4.2 Sample of Participants

The current study used archived data from the infant cohort of GUI. The infant cohort includes data collected from children at 9 months, 3 years and 5 years. The initial sample included 11,134 infants who were randomly selected using the child benefit register. The sample was selected on a systematic basis, pre-stratifying by a number of factors including marital status and county of residence. No additional children were invited to participate as the study progressed, however, the sample size was reduced at consecutive waves due to interwave non-response and attrition. The total number of children who participated at all three waves was 8,712. Please refer to Figure 1 for an illustration of the participation figures at 9 months, 3 years and 5 years.

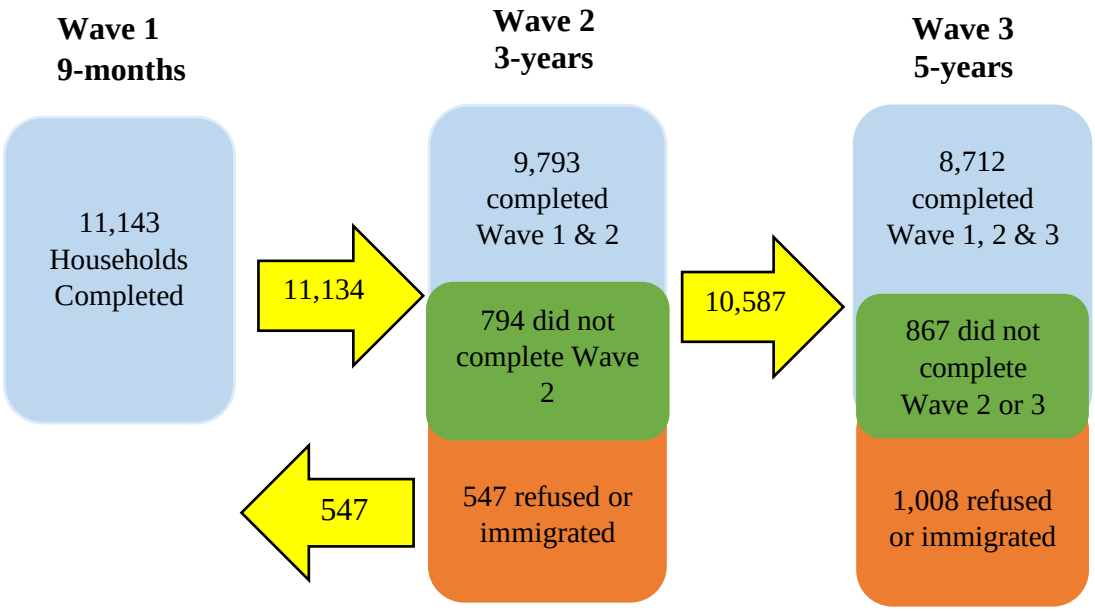


Figure 1. Breakdown of cases according to participation at 9 months, 3 years and 5 years.

Furthermore, the current study is only concerned with the subset of children who completed an expressive vocabulary assessment at both 3 and 5 years. In total 8,266 children had complete expressive vocabulary data at 3 and 5 years, while 446 children had incomplete data. Please see Table 2 for a breakdown of incomplete data at 3 and 5 years.

Table 2

Breakdown of incomplete data at 3 and 5 years

Data	Number
Incomplete data at 3 years only	337
Incomplete data at 5 years only	36
Incomplete data at 3 and 5 years	73
Total incomplete data	446

Chi-square analyses was used to examine the influence of participant attrition by comparing the included and excluded participants across a number of different biological and sociodemographic variables. This information is summarised in Table 3. The incomplete data primarily reflected the study child's inability to complete a formal expressive vocabulary

assessment in English. Children did not attempt the expressive vocabulary test if the primary caregiver felt they had insufficient knowledge of the language. It can be seen in Table 2 that 63% of children with incomplete data were learning English as an additional language. This is significantly higher than the complete data group, which included 4% of children learning English as an additional language. Furthermore, Table 3 highlights that 26.1% of children with incomplete date had behaviour scores in the clinical range at 3 years, as measured by the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997). This percentage is significantly higher than the 11.7% of children with behavioural difficulties in the complete data group. It can be hypothesised that the incomplete data may represent a subset of children that did not cooperate fully with the assessment procedures due to factors relating to behaviour including poor attention and concentration skills. The incomplete data represents 5.1% of the total data. The incomplete includes a significantly higher percentage of children learning English as an additional language and with behavioural problems, therefore, this must be recognised as a bias in the current study.

Table 3

A comparison of children with complete and incomplete data

Predictor	**Complete Data**	**Incomplete Data**
Male Gender	51%	55%
Low birth weight (< 2500g)	6.0%	7.5%
English as an additional language	4%	63%
Behaviour problems (< 10^{th} percentile on the SDQ)	11.7%	26.1%
Lone parent household	14%	15%
PCE (Incomplete secondary education or less)	14%	14%

Note. SDQ =Strengths and Difficulties Questionnaire, PCE = Primary Caregiver Education.

4.3 Data collection procedures

Trained social interviewers visited the participants and their families in their homes at

each wave of data collection and a number of fieldwork procedures were carried out. Please see Table 4 for a list of the assessment procedures carried out at each age point. In each household, questionnaires were completed by the primary caregiver and secondary caregiver (where relevant). The current study utilises information collected from the primary caregiver, 99.6% of whom were the child's mother. This questionnaire was administered by the interviewer using a laptop, otherwise known as Computer Assisted Personal Interviewing (CAPI). The questionnaire is broken down into a number of sections, each relating to a different domain, including child health and socio-demographics. The current study also utilises information collected through direct assessment of the study child's expressive vocabulary ability. At 3 and 5 years, expressive vocabulary development was measured using the naming vocabulary subtest of the British Abilities Scales (BAS; Elliott et al., 1997).

Table 4

Assessment procedures conducted by GUI at 9 months, 3 years and 5 years.

Assessment Procedure	9 months	3 years	5 years
Primary Caregiver Questionnaire	√	√	√
Secondary Caregiver Questionnaire	√	√	√
Physical Measurements	√	√	√
Child Cognitive Tests		√	√
Principal Questionnaire			√
Teacher Questionnaire			√

4.4 Dependent variable

Expressive vocabulary ability was measured using the naming vocabulary subtest of the British Abilities Scales (BAS; Elliott et al., 1997). A particular advantage of the BAS is that each of the core subtests can be interpreted individually. The BAS is considered compatible with current psychological practice and has demonstrated construct validity and high test-retest reliability (Elliott et al., 1997). Furthermore, the assessment has undergone an extensive piloting period for GUI (Murray, McCrory, & Williams, 2014) and has previously

been used in similar longitudinal studies such as the Millennium Cohort Study and Growing up in Scotland. The naming vocabulary subtest was administered to each of the participants at 3 years and again 5 years of age. In the assessment, the trained interviewer showed each child, 36 pictures of everyday items and the child was required to name the object in English. The assessment criteria outline that the test should be terminated if five successive items are answered incorrectly. The scores obtained for each participant were presented in three forms, raw scores, standardised scores and t-scores. The current study considers the child's t-score as this score compares the child's performance to other children the same age. The assessment manual (Elliott et al., 1997) outlines that the mean score for the naming vocabulary subtest is 50, the standard deviation is 10, and the scores are bounded between 20 and 80. This assessment was standardised on a British population of children, however, the current study uses mean and standard deviation scores which were calculated using the GUI sample of participants. Please see Table 5 for a summary of these figures.

Table 5

Mean, standard deviation, and range vocabulary scores for the GUI sample

	Mean	**Standard deviation**	**Range**
3 years	50.92	12.54	20-80
5 years	55.98	11.42	20-80

4.5 Predictor variables

A three-step process was used to select predictors for the current study. Firstly, previous population-based cohort studies were reviewed, and potential risk factors were identified. Table 1 in chapter three (page 24) provides a summary of the findings from key population-based studies. This table addresses 23 predictors. Secondly, the researcher analysed the GUI dataset to determine if the predictors were addressed in the dataset and identify if sufficient information was provided. Seven factors were excluded as there was

insufficient information in the GUI study. These factors included, developmental disability, child temperament, hearing status, non-verbal IQ, family history of language disorder, receptive language disorder, and parental stress. Finally, the research associated with the remaining predictors was reviewed. Following this, four factors were excluded. These factors were birth order, family income, maternal age and childcare/preschool. A summary of the literature relating to these risk factors is provided in chapter three.

Following this three-step process 12 predictors remained. The predictor screen time was split into three components given the information provided in the GUI dataset. The dataset includes information regarding frequency of viewing, rules regarding television and television and technology in the child's home. Therefore, the final set of predictors included 14 risk and protective factors which were grouped according to their level of 'mutability'. Mutability refers to a factors ability to be modified through intervention. Factors which are highly mutable can be considered by Speech and Language Therapists when planning interventions for expressive vocabulary development. Each predictor was categorised as low-mutable, mutable-distal or mutable-proximal. This approach is identical to that used by McKean et al. (2015). For the purpose of this study the category low-mutable includes risk factors which cannot be modified through intervention, either at the level of social policy or direct intervention with the child or family (McKean et al., 2015). The category mutable-distal includes risk factors which have an indirect influence on expressive vocabulary development and can be supported or modified at the level of social policy. Furthermore, the category mutable-proximal, contains factors which have the potential to be modified through direct intervention with the child or family (McKean et al., 2015). Please refer to Table 6, Table 7 and Table 8 for the complete list of the low-mutable, mutable-distal and mutable-proximal factors which are addressed in the current study. Each of the predictors was derived from information collected from the primary caregiver questionnaire at 9 months, 3 years or 5

years. Many of the predictors included in the current study were modified based on recommendations from previous research, policy guidelines, or as a result of the preliminary analysis conducted. The preliminary analyses included cross tabulations with each of the categorical variables and analysis of variance tests with each of the continuous variables.

Table 6

Low-mutable factors included in the study

Predictor	Age	Measure	Derivation
Gender	9months	PCQ	The PC indicated the study child's gender in the 9 month questionnaire.
Low birth weight	9 months	PCQ	The PC recorded the study child's birth weight in the 9 month questionnaire. Using the World Health Organisation (2017) definition for low birth weight, a dichotomous variable was derived categorising children as low (<2500g) or typical (>2500g) birth weight.
Preterm birth	9 months	PCQ	The PC recorded after how many weeks' gestation the study child was born in the 9 month questionnaire. Using the World Health Organisation (2017) definition for preterm birth A dichotomous variable was derived categorising children as premature (<36 weeks) or typical (>36 weeks).
Early communication skills	12 months	ASQ	Early communication skills were assessed using the communication section of the Ages and Stages Questionnaire (ASQ; Squires, Potter, Bricker, 1990). This is a parent report measure of early communication skills and forms part of the PC main questionnaire and is also further described below. Each child was categorised into a pass or fail group in GUI dataset.
Child behaviour	3 years	SDQ	Behaviour was assessed at 3 years using the Strengths and Difficulties Questionnaire (SDQ). The GUI dataset included a SDQ total score based on 40 items across 4 subtests (emotional, conduct, hyperactivity and peer problems). The percentile banding method suggested by Goodman (1997) was used to identify cut-off scores. Total SDQ scores in the bottom 10^{th} percentile were classified as being in the clinical range. A dichotomous variable was derived to compare children who scored above and below the clinical range.

Note. PC = Primary Caregiver, PCQ = Primary Caregiver Questionnaire, ASQ =Ages and Stages Questionnaire, SDQ = Strengths and Difficulties Questionnaire.

Table 7

Mutable-distal factors included in the study

Predictor	Age	Measure	Derivation
English as an additional language	3 years	PCQ	The PC was asked in the 3 year questionnaire if the study child's first language was English, Irish or other. A dichotomous variable was derived categorising English as the primary language or English as a second language.
Lone parent household	3 years	PCQ	The PC indicated whether or not the study child was residing in a lone parent household.
Parental Education	3 years	PCQ	The PC indicated their highest educational qualification by selecting one of twelve options from primary education to doctorate. Similar to previous analyses (Armstrong et al. 2016, 2017) two categories were derived, 'incomplete secondary or less' and 'complete/further secondary education'.

Note. PC = Primary Caregiver, PCQ = Primary Caregiver Questionnaire.

Table 8

Mutable-proximal factors included in the study

Predictor	Age	Measure	Derivation
Number of children's books in the home	3 years	PCQ	The PC estimated the number of children's books in the home. Following preliminary analysis the current study derived three categories 'fewer than 10', '10-30' and '30 or more'. This categorisation is also used by McKean et al. (2015).
Frequency of book reading	3 years	PCQ	The PC was asked on average how many days per week someone at home engaged in shared book reading with the study child. For the current analysis the number of days were merged into three categories as follows, '0-2 days', '3-5 days' and '6-7 days'. This categorisation is similar to McKean et al. (2015).
Frequency of home learning activities	3 years	PCQ	The PC was asked to indicate on average how many days per week someone at home engaged in different home learning with the study child. For the current analysis the activities were merged together. Following preliminary analyses three categories were created comparing high activity levels (20% of sample) typical activity levels (60% of sample) and low activity levels (20% of sample).
Frequency of television viewing	3 years	PCQ	The PC was asked to estimate how many hours per day the study child spends watching television or video/DVDs. The primary caregiver recorded this information by providing estimation in hours and minutes. In previous research, 3 hours or more of television viewing has been identified as a risk factor for poor language performance (McKean et al., 2015). A dichotomous variable was created, 3 hours or more or less than 3 hours.
Rules regarding television viewing	3 years	PCQ	The PC was asked whether there were any rules in the family about what the study child may watch on television. The PC provided a direct yes or no answer.
Screen in the child's room	3 years	PCQ	The PC was asked whether there is a television or computer (including games console) in the study child's bedroom. The PC provided a direct yes or no answer.

Note. PC = Primary Caregiver, PCQ = Primary Caregiver Questionnaire.

4.6 Data analysis

The following section describes the analytic procedures used to address the study's research questions. All analyses were completed using SPSS statistics version 24. The data was statistically adjusted prior to analysis to account for attrition at subsequent waves and ensure that the sample was fully representative of an Irish population of children. The Economic and Social Research Institute (ERSI) used a standard procedure, GROSS system, to generate a weighting scheme. The GUI data set includes two statistical adjustment factors, the 'weighting factor' and the 'grossing factor'. The current study used the 'weighting factor', which adjusts the data to account for the total number of children in the complete GUI sample (McCrory, Williams, Murray, Quail, & Thornton, 2013).

The statistical analysis procedures are described step by step below in the sequence of the research questions asked.

- What is the prevalence of expressive vocabulary delay at 3 and 5 years in an Irish population of children?

For the purpose of analysis, we have defined children as having an expressive vocabulary delay if they scored -1.5 SDs below the mean score on the naming vocabulary subtest of the BAS II (Elliott et al., 1997). This approach is identical to that of Law et al. (2012) who conducted similar research using data from the Millennium Cohort Study (a national UK birth cohort). In order to determine the prevalence of expressive vocabulary delay at 3 and 5 years, descriptive statistics were used to calculate the frequency of delay status at both ages.

- What is the prevalence of resolving, late onset and persisting expressive vocabulary delays in an Irish population of children?

Categorical assignment of expressive vocabulary delay at 3 and 5 years was used to cross tabulate expressive vocabulary delay status at both ages. This cross tabulation yielded four different distinct categories of children, children with no delay, children with a delay at 3

years only (resolving delay), children with delay at 5 years only (late onset delay) and children with a delay at 3 and 5 years (persisting delay).

- What risk factors are associated with delayed expressive vocabulary development at 5 years?

Logistic regression analysis was used to identify the risk factors associated with delayed expressive vocabulary development at 5 years of age. The analysis was conducted in two phases. In the first phase bivariate regression analysis was implemented to examine the contribution of each of the risk factors with expressive vocabulary delay status at 5 years, in which delay was coded as a binary variable (delay = 1; no delay = 2). Results report the odds ratio (OR), 95% confidence interval (CI) and significance level for each equation. For logistic regression, the OR describes the strength of association between expressive vocabulary delay and the individual risk factors. An OR of 1.00 or more indicates that the predictor will increase the likelihood of presenting with an expressive vocabulary delay. As Harrison and McLeod (2010, p. 517) state 'ORs that are above 1.00 indicate that an increase in the predictor increases the odds of impairment'. There are guidelines which estimate the correspondence between ORs and meaningful effect sizes (Allen & Le, 2008; Haddock, Rindskopf & Shadish, 1998), however, the interpretation of meaningful effect sizes is the responsibility of the researcher and must be considered within the context of their field of study (Valentine & Cooper, 2003). In the current study an odds ratio of 2 or greater was established as the cut-off for a moderate effect size from which to draw the final set of predictors. This approach is identical to that of Christensen et al., (2014) and Zubrick et al., (2015) who conducted similar research examining receptive vocabulary development. All predictors with an odds ratio of 2 or more in the bivariate analysis were carried through to the multivariate model. Before investigating the adjusted associations, independent variables were examined in order to assess possible collinearity. Variables which demonstrated

multicollinearity were consequently removed from the multivariable base logistic regression model (variation inflation factor; VIF >5) (Menard, 1995).

Multivariable logistic regression was used to examine the effects of the individual predictors, whilst adjusting for the impact of all other predictors identified in the bivariate analysis. The predictors entered the model in set blocks. Block one included mutable-proximal factors, mutable-distal factors were added in block two, low-mutable factors were added in block three and 3-year expressive delay status was added to the model in block four. The final model included only those significant predictors with an adjusted p-value of less than 0.05. The adjusted OR results were grouped into small, medium and large effect sizes based on the cut-offs provided by Rosenthal (1996), where 1.5 to 1 = small effect (or weak association), about 2.5 to 1 = medium (or moderate), about 4 to 1 = large (or strong), about 10 to 1 = very large (or very strong).

- What risk factors are associated with changes in expressive vocabulary development between 3 and 5 years?

In order to determine which risk factors are associated with change in expressive vocabulary abilities between 3 and 5 years, bivariate and multivariate logistic regression models were used. Two separate binary logistic regression models were run, as the study compared risk factors associated with two patterns of development. Firstly, the study explored the two groups who presented with delayed expressive vocabulary skills at 3 years, namely the resolving delay group and the persisting delay group. Both groups presented with similar profiles at 3 years, however, between 3 and 5 years the persisting delay group remained stable and the resolving delay group demonstrated a positive change. This comparison allowed for identification of factors which may lead to positive changes in expressive vocabulary between 3 and 5 years. Secondly model two, explored the two groups who presented with typical expressive vocabulary skills at the 3 years, the no delay group and the

late onset group. Both groups presented with similar profiles at 3 years, however, between 3 and 5 years the no delay group remained stable and the late onset delay group demonstrated a negative change. This comparison allowed for identification of factors which may lead to negative changes in expressive vocabulary development between 3 and 5 years.

Chapter Five – Results

The following chapter outlines the results of the current study. Each finding is outlined below under the research question asked. A summary of the key findings is provided at the end of the chapter.

5.1 Prevalence of Expressive Vocabulary Delay at 3 and 5 years

The first set of analyses estimated the prevalence of expressive vocabulary delay in an Irish population of children at 3 and 5 years. The results indicated that 5.1% of the representative sample had an expressive vocabulary delay at 3 years, while 7.3% of the sample presented with an expressive vocabulary delay at 5 years. Please see Table 9 for an illustration of these results. It is important to note that these figures include a subset of children who are learning English as an additional language. It is not known whether these children also have a delay in their first language. Table 10 provides an illustration of the percentage of monolingual children in the sample presenting with an expressive vocabulary delay at 3 and 5 years. These figures are significantly lower, with 3.6% delayed at 3 years and 5.6% delayed at 5 years.

Table 9

Percentage of children with an expressive vocabulary delay at 3 and 5 years

	Delay	**No Delay**	**Total**
3 years	421	7845	8,266
	(5.1%)	(94.9%)	(100%)
5 years	603	7663	8,266
	(7.3%)	(92.7%)	(100%)

Table 10

Percentage of monolingual children with an expressive vocabulary delay at 3 and 5 years

	Delay	No Delay	Total
3 years	285	7641	7926
	(3.6%)	(96.4%)	(100%)
5 years	447	7479	7926
	(5.6%)	(94.4%)	(100%)

5.2 Prevalence of Resolving, Persisting and Late onset Expressive Vocabulary Delay between 3 and 5 years.

Using the prevalence figures reported in Table 9, distinct categories of expressive vocabulary growth between 3 and 5 years were determined. The study yielded four groups, children presenting with no delay at both ages, children with a delay at 3 years only (resolving delay), children with a delay at 5 years only (late onset delay) and children with a delay at 3 and 5 years (persisting delay). The results are displayed in Table 11 below.

Table 11

Stability categories of expressive vocabulary development between 3 and 5 years

Stable Patterns of Development 92.2% (7620)	
No delay	89.9% (7431)
Persisting delay (delayed at 3 and 5 years)	2.3% (189)
Changing Patterns of Development 7.8% (846)	
Resolving delay (delayed at 3 years only)	2.8% (232)
Late onset delay (delayed at 5 years only)	5% (414)

As seen in Table 11, 92.2% of participants demonstrated stable patterns of development between 3 and 5 years. This included 89.9% of children who had no expressive vocabulary delay at either age and 2.3% who had a persistent expressive vocabulary delay. Furthermore,

7.8% of the sample showed changing patterns of development between 3 and 5 years. This included 2.8% of children who were delayed at 3 years only (resolving delay) and 5.0% were delayed at 5 years only (late onset delay). The mean expressive vocabulary score for each of the four groups was also calculated at 3 and 5 years. Firstly, Figure 2 provides an illustration of the mean expressive vocabulary score for each group at 3 years.

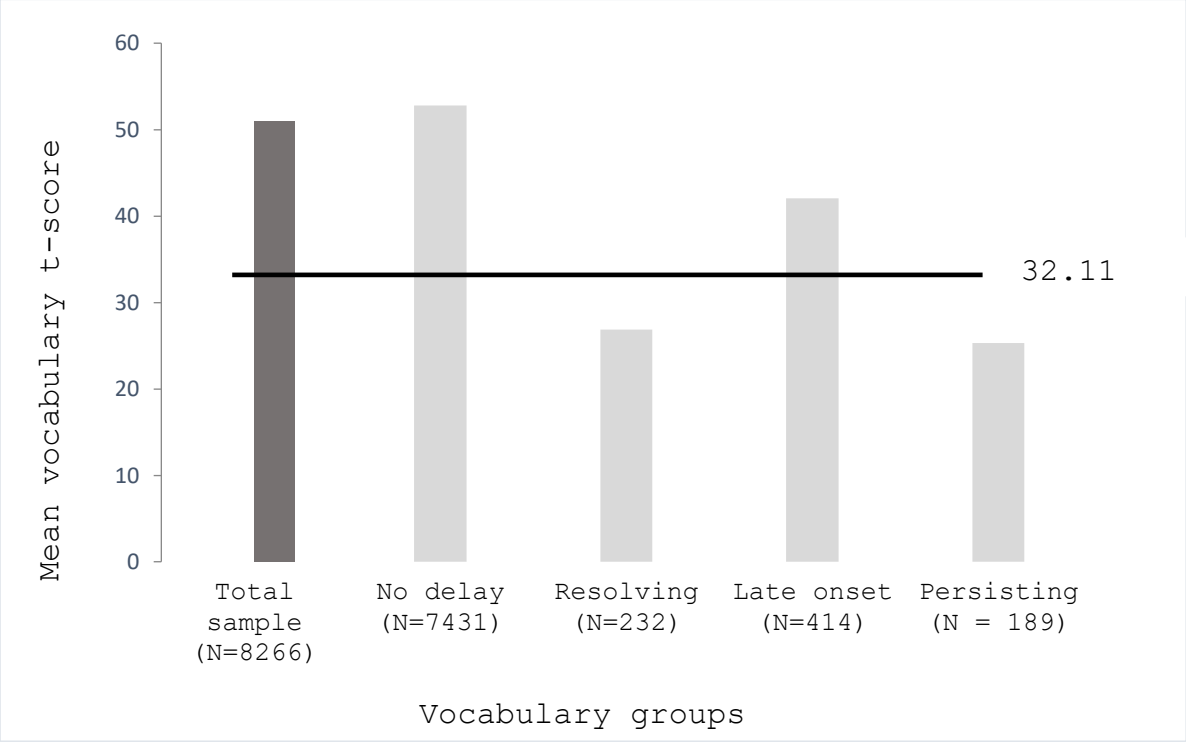


Figure 2. Mean expressive vocabulary scores for each vocabulary group at 3 years. The line represents the cut-off point for delay status at 3 years.

As seen in Figure 2, the mean expressive vocabulary score for the total sample (8,266) at 3 years is 50.92. This score is illustrated as a dark grey bar in Figure 2. Delay status at 3 years is categorised as a score which falls -1.5 SD below the mean of the total sample, in this case a score of 32.11 or less. The line highlights the cut-off point for delay status at 3 years. The mean score for each specific group is represented in light grey. The mean score for the 'no delay' group is 52.81, this score is above the mean score for the total sample. The mean score for the 'resolving' group is 26.85 and the mean score for the 'persisting delay' group is 25.33. Both scores indicate delayed expressive vocabulary abilities at 3 years and there is a small

discrepancy of 1.52 points between the both groups. Finally, the mean score for the ‘late onset’ group is 42.07. This score is above the cut-off point for delay status, but 8.85 points below the mean for the total group.

Secondly, Figure 3 provides an illustration of the mean vocabulary scores for each group at 5 years.

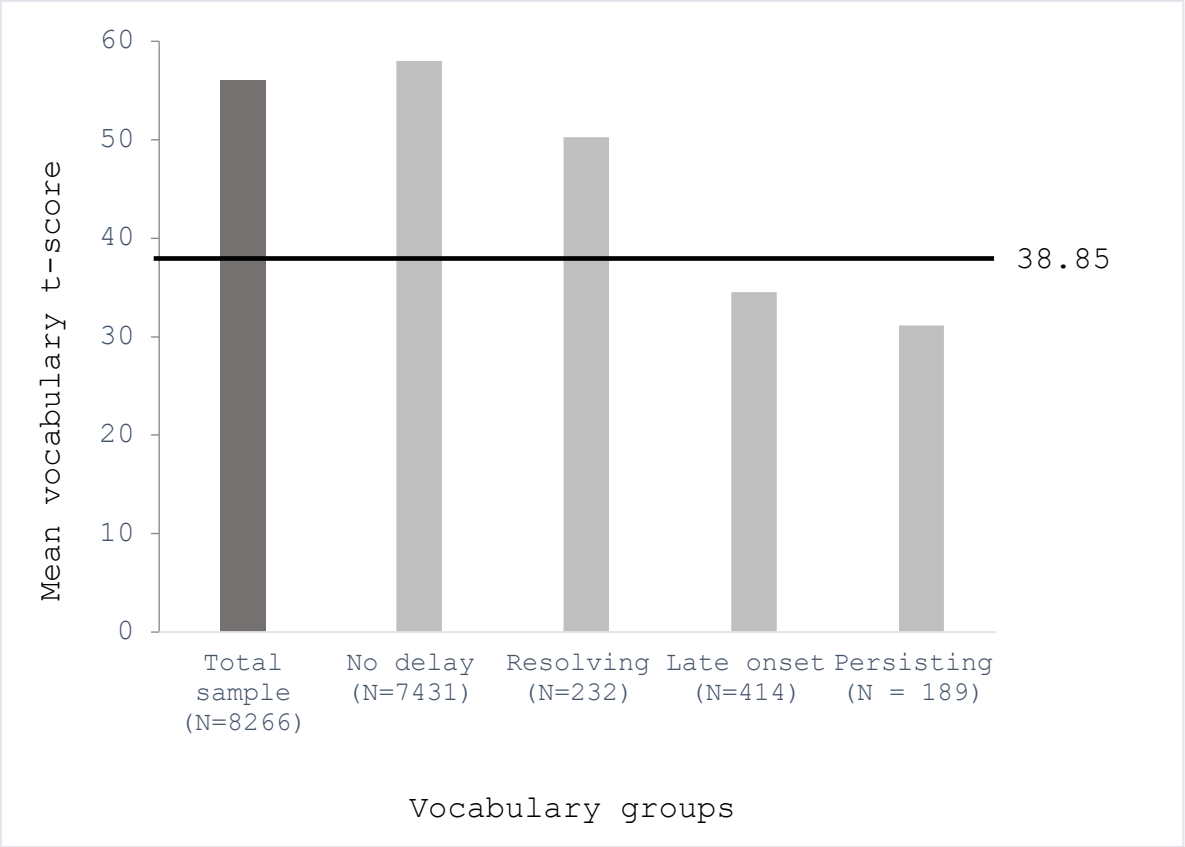


Figure 3. The mean expressive vocabulary score for each group at 5 years. The line represents the cut-off point for delay status at 5 years

The mean expressive vocabulary score for the total sample (8,266) at 5 years is 55.98. This score is illustrated as a dark grey bar in Figure 3. Delay status at 5 years is categorised as a score which falls -1.5 SD below the mean of the total sample, in this case a score of 38.85 or less. The line highlights the cut-off point for delay status at 5 years. The mean score for each specific group is represented in light grey. The mean score for the ‘no delay’ group is 57.98,

which is 2 points above the mean score for the total sample. The mean score for the resolving delay group is 50.23. This score is above the cut-off point for delay status, but 5.75 points below the mean for the total sample. Furthermore, the mean score for the 'late onset' group is 34.55 and the 'persisting delay' group is 31.15. There is a discrepancy of 3.4 points between the mean scores of the 'late onset' and 'persisting delay' delay group at 5 years. This is greater than the discrepancy between the 'resolving' and 'persisting delay' group at 3 years.

5.3 Risk Factors Associated with Delayed Expressive Vocabulary Development at 5 years.

The risk factors associated with delayed expressive vocabulary development at 5 years were determined using logistic regression analysis. First bivariate regression analysis was used to test the strength of the association for each of the predictors with expressive vocabulary delay status at 5 years. Please refer to Table 12 for the odd ratios (OR), confidence intervals (CI) and significance levels (p-value) of each variable.

Table 12

Bivariate associations between risk factors and expressive vocabulary delay status at 5 years

Predictor Variables	No Delay (Reference)	Delay	OR (95% CI)	p-value
	7663 (92.7%	603 (7.3%)		
Gender				
- Male	50.4%	58.9%	1.41 (1.19-1.67)	**.000**
- Female	49.6%	41.1%		
12 months Communication skills (ASQ)				
- Fail	22.4%	27.8%	1.33 (1.11-1.61)	**.002**
- Pass	77.6%	72.2%		
Birth weight				
- Low birth weight (<2500g)	5.7%	7.4%	1.31 (.951-1.813)	**.097**
- Typical (>2500g)	94.3%	92.6%		
Gestational age at birth				
- Premature (<36 weeks)	3.9%	4.7%	1.21 (.815-1.80)	.343
- Typical (> 36 weeks)	96.1%	95.3%		
Behaviour at 3 years (SDQ)				
- Clinical range	7.8%	14.%	1.91 (1.49-2.44)	**.000**
- Typical	92.2%	86.%		
English as an additional language				
- Yes	2.4%	25.7%	14.07 (11.14-17.78)	**.000**
- No	97.6%	74.3%		
Lone parent household				
- Yes	13.7%	21.1%	1.68 (1.36-2.06)	**.000**
- No	86.3%	78.9%		
Primary Caregiver Education				
- Incomplete secondary or less	13.2%	23.7%	2.03 (1.67-2.48)	**.000**
- Second level or higher	86.8%	76.3%		
Television Viewing in hours				
- 3 hours or more	20.5%	27.5%	1.47 (1.22-1.78)	**.000**
- Less than 3 hours	79.5%	72.5%		
TV/computer in child's bedroom				
- Yes	15.1%	26.0%	1.97 (1.63-2.39)	**.000**
- No	84.9%	74.0%		
Parental rules regarding TV viewing				
- No	14.6%	20.6%	1.52 (1.23-1.87)	**.000**
- Yes	85.4%	79.4%		
Number of children's books				
- < 10 books	6.2%	15.5%	3.86 (2.98-5.00)	**.000**
- 11-30 books	37.3%	48.0%	1.98 (1.66-2.38)	**.000**
- > 30 books	56.5%	36.5%		
Frequency of book reading				
- 0-2 days per week	9.0%	20.3%	2.96 (2.36-3.71)	**.000**
- 3-5 days per week	7.7%	31.6%	1.49 (1.23-1.80)	**.000**
- 6-7 days per week	63.3%	48.2%		
Frequency of home learning activities				
- Low (20%)	21.3%	31.7%	2.02 (1.57-2.60)	**.000**
- Medium (60%)	57.5%	51.2%	1.17 (.925-1.48)	.189
- High (20%)	21.2%	16.1%		
Expressive vocabulary delay at 3 years				
- Delay	3.0%	31.3%	14.65 (11.80-18.18)	**.000**
- No Delay	97.0%	68.7%		

Note. OR = odds ratio, CI = confidence interval, p-value < 0.10 are in boldface.

Fifteen initial unadjusted predictors of expressive vocabulary delay were entered in the bivariate model, refer to Table 12. In total, six of these predictors were above the criterion odds ratio cut-off of 2.0. These factors were then chosen for multivariate modelling. In order of increasing magnitude of effect size these were, delay status at 3 years (OR = 14.65), learning English as an additional language (OR =14.07), few children's books in the home (<10 books) (OR = 3.86), low frequency of book reading (< 2 days per week) (OR =2.96), low level of primary caregiver education (incomplete secondary education or less) (0R = 2.03) and low frequency of home learning activities (lowest 20% of the sample) (OR = 2.02). Eight predictors of expressive vocabulary delay were statistically significant at the level of $p < .1$ in the bivariate model, but fell below the OR 2.0 cut-off. These included, the presence of a TV or computer in the child's room (OR = 1.97), behaviour difficulties at 3 years as measured by SDQ (OR = 1.91), lone parent household (OR =1.68), parent rules regarding TV viewing (OR = 1.52), high frequency of television viewing (3 hours or more) (OR =1.47), male gender (OR = 1.41), delayed communication skills at 12 months (OR = 1.33) and low birth weight (<2500g) (OR = 1.31). One predictor, preterm birth, defined as being born before 36 weeks' gestation was not significant at the level $p < .1$ in the bivariate model. The six predictors meeting the initial cut-off criterion in the unadjusted analyses were then included in the multivariate model, please refer to Table 13.

Table 13

Multivariate associations between risk factors and expressive vocabulary delay status at 5 years

Predictor Variables	Block 1		Block 2		Block 3		Block 4	
	OR (95%CI)	**Sig**	**OR (95%CI)**	**Sig**	**OR (95%CI)**	**Sig**	**OR (95%CI)**	**Sig**
No. of children's books								
< 10 books	2.83 (2.14-3.75)	**.000**	2.56 (1.93-3.41)	**.000**	1.44 (1.81-1.76)	**.000**	1.37 (1.12-1.68)	**.003**
11-30 books	1.78 (1.48-2.14)	**.000**	1.67 (1.38-2.01)	**.000**	1.41 (1.02-1.94)	**.039**	1.28 (.920-1.79)	**.141**
> 30 books								
Frequency of reading								
0-2 days per week	1.87 (1.45-2.41)	**.000**	1.81 (1.41-2.34)	**.000**	1.58 (1.20-2.08)	**.001**	1.49 (1.13-1.99)	**.006**
3-5 days per week	1.19 (.977-1.46)	**.084**	1.17 (.953-1.42)	.137				
6-7 days per week								
Frequency of HLA								
Low (20%)	1.45 (1.11-1.90)	**.006**	1.48 (1.13-1.94)	**.004**	1.54 (1.16-2.04)	**.003**	1.71 (1.28-2.30)	**.000**
Medium (60%)	1.04 (.817-1.32)	**.076**						
High (20%)								
PCE								
< second level			1.53 (1.24-1.88)	**.000**	1.58 (1.26-1.97)	**.000**	1.81 (1.44-2.27)	**.000**
≥ second level								
EAL								
Yes							7.19 (5.46-9.47)	**.000**
No								
EVD 3 years								
Yes					12.20 (9.71-15.33)	**.000**	7.39 (5.76-9.48)	**.000**
N0								

Note. OR = odds ratio, CI = confidence interval, Sig = significant level or p-value. All p-value < 0.10 are in boldface. HLA = Home Learning Activities, PCE= Primary Caregiver Education, EAL = English as an additional language, EVD = Expressive vocabulary delay.

There was no evidence of multicollinearity between the six factors, as a variation inflation factor (VIF) of less than five was recorded. The predictors were organised into functional sets which were entered consecutively into the analysis. Block 1 included mutable-proximal factors, in block 2 mutable-distal factors were added, low-mutable factors were added in block 3 and three-year expressive delay status was added to the model in block 4. The final model generated six risk factors which remained significant at the level of $p < .05$. In the final multivariate model two predictors exhibited a substantial effect size: 3 year

vocabulary delay status (adjusted OR =7.39) and English as an additional language (adjusted OR= 7.19). Using the guidelines provided by Rosenthal (1996) both may be categorised as large effect sizes. Small effect sizes were observed for all other predictors, primary caregiver education (adjusted OR=1.81), low frequency of home learning activities (adjusted OR=1.71), low frequency of book reading (adjusted OR=1.49) and few children's books in the home (adjusted OR=1.37).

5.4 Risk Factors Associated with Resolving, Persisting and Late onset Expressive Vocabulary Delays between 3 and 5 years.

Logistic regression analysis was used to examine the risk factors associated with changes in expressive vocabulary development between 3 and 5 years. Two different comparisons were generated. Firstly, a comparison was made between the two groups who were delayed at 3 years, that is the resolving delay group (delayed at 3 years only) and the persisting delay group (delayed at 3 and 5 years). Model one outlines the risk factors associated with change between both groups. Secondly, a comparison was made between the two groups who showed typical development at 3 years, that is the late onset group (delayed at 5 years only) and the no delay group (no delay at 3 and 5 years). Model two outlines the risk factors associated with change between both groups.

5.4.1 Model one - persisting delay group vs. resolving group.

As outlined above model one illustrates the comparison made between the two groups which were delayed at 3 years. Please refer to Table 14 for the results of this model.

Table 14.

Bivariate logistic regression results: Resolving vs Persisting group.

Characteristic	Resolving Reference (232)	Persisting (189)	OR (95% CI)	p-value
Gender				
- Male	62.9%	61.4%	.993 (.628-1.39)	.732
- Female	37.1%	38.6%		
Early communication 12 months				
- Fail	36.7%	29.2%	.736 (.487-1.11)	.147
- Pass	63.3%	70.2%		
Birth weight				
- Low birth weight (<2500g)	7.5%	6.9%	.966 (.457-2.04)	.927
- Typical	92.5%	93.1%		
Gestational age at birth				
- Premature (<36 weeks)	4.7%	3.7%	.719 (.269-1.925)	.512
- Typical	95.3%	96.3%		
Child behaviour				
- Clinical range	22.0%	19.7%	.876 (.545-1.41)	.584
- Typical	78.0%	80.3%		
English as an additional language				
- Yes	80.2%	47.6%	3.73 (2.42-5.75)	**.000**
- No	19.8%	52.4%		
Lone parent household				
- Yes	23.7%	21.7%	.890 (.563-1.41)	
- No	76.3%	78.3%		.619
Primary caregiver education				
- Incomplete secondary or less	20.3%	23.1%	.859 (.537-1.37)	.527
- Second level or higher	79.7%	76.9%		
Hours spent watching TV				
- 3 hour or more	31.0%	29.6%	.931 (.613-1.41)	.736
- Less than 3 hours	69.0%	70.4%		
TV/Computer in child's bedroom				
- Yes	31.2%	31.4%	1.008 (.666-1.53)	.969
- No	68.8%	68.6%		
Rules regarding TV viewing				
- No	19.8%	22.2%	1.16 (.720-1.85)	.550
- Yes	80.2%	77.8%		
Number of children's books				
- 0-10	26.7%	25.0%	.960 (.568-1.62)	.879
- 11- 30	45.3%	47.3%	1.06 (.667-1.68)	.810
- More than 30	28.0%	27.7%		
Frequency of book reading				
- 0-2 days per week	21.9%	26.1%	1.28 (.784-2.08)	.327
- 3-5 days per week	32.6%	30.9%	1.01 (.643-1.58)	.978
- 6-7 days per week	45.5%	43.1%		
Frequency of home learning activities				
- Low (20% of sample)	30.6%	33.3%	1.32 (.753-2.33)	.330
- Medium (60% of sample)	49.1%	49.7%	1.23 (.729-2.09)	.434
- High (20% of sample)	20.3%	16.0%		

Note. OR = odds ratio, CI = confidence interval, p-value < 0.10 are in boldface

As seen in Table 14 only one predictor differentiated change in expressive vocabulary development between children with resolving and persisting delays. This was based on the effect size criterion of an odds ratio cut-off of 2.0. English as an additional language (OR = 3.73) increased the risk of presenting with a persisting expressive vocabulary delay at 5 years. As only one predictor variable was significant no further analyses were conducted between the resolving group and the persistently delayed group.

5.4.2 Model two - no delay group vs. late onset delay group.

Next a comparison was made between the two groups with typical expressive vocabulary development at 3 years, that is the no delay group and the late onset delay group (delayed at 5 years only). Please refer to Table 15.

Table 15

Bivariate logistic regression result: No delay vs. Late onset delay group

Characteristic	No delay Reference (7431)	Late onset delay (414)	OR (95% CI)	p-value
Gender				
- Male	50.0%	57.9%	1.37 (1.13-1.68)	**.002**
- Female	50.0%	42.1%		
Early communication 12 months				
- Fail	28.9%	26.7%	1.30 (1.04-1.63)	**.021**
- Pass	78.1%	73.3%		
Birth weight				
- Low birth weight (<2500g)	5.6%	7.4%	1.35 (.921-1.98)	.125
- Typical	94.4%	92.6%		
Gestational age at birth				
- Premature (<36 weeks)	3.9%	5.4%	1.37 (.874-2.15)	.170
- Typical	96.1%	94.6%		
Child behaviour				
- Clinical range	7.4%	11.4%	1.59 (1.16-2.19)	**.004**
- Typical	92.6%	88.6%		
English as an additional language				
- Yes	1.9%	15.7%	9.80 (7.16-13.41)	**.000**
- No	98.1%	84.3%		
Lone parent household				
- No	86.6%	79.2%	1.69 (1.32-2.16)	.000
- Yes	13.4%	20.8%		
Primary caregiver education				
- Incomplete secondary or less	12.9%	25%	2.26 (1.79-2.85)	.000
- Second level or higher	87.1%	75%		
Hours spent watching TV				
- 3 hours or more	20.1%	26.6%	1.43 (1.14-1.80)	**.002**
- Less than 3 hours	79.8%	73.4%		
TV/Computer in child's bedroom				
- Yes	14.6%	23.5%	1.80 (1.42-2.28)	**.000**
- No	85.4%	76.5%		
Rules regarding TV viewing				
- No	14.4%	19.9%	1.47 (1.15-1.90)	**.002**
- Yes	85.6%	80.1%		
Number of children's books				
- 0-10	5.6%	11.1%	2.81 (1.99-3.96)	**.000**
- 11- 30	37.1%	48.3%	1.84 (1.49-2.27)	**.000**
- More than 30	57.3%	50.6%		
Frequency of book reading				
- 0-2 days	8.6%	17.7%	2.59 (1.96-3.42)	**.000**
- 3-5 days	27.6%	31.7%	1.45 (1.16-1.82)	**.000**
- 6-7 days	63.8%	50.6%		
Frequency of home learning activities				
- Low (20% of sample)	21.0%	32.4%	2.02 (1.31-3.11)	**.001**
- Medium (60% of sample)	57.8%	51.7%	1.09 (.726-1.64)	.675
- High (20% of sample)	21.2%	15.9%		

Note. OR = odds ratio, CI = confidence interval, p-value < 0.10 are in boldface

As seen in Table 15, five of the predictors were above the criterion odds ratio cut-off of 2.0 and thus were selected for multivariate modelling. In order of increasing magnitude of effect size these were, English as an additional language (OR =9.80), fewer than 10 children's books in the home (OR = 2.81), low frequency of book reading (< 2 days per week) (OR =2.59), low level of primary caregiver education (incomplete secondary education or less) (OR = 2.26) and low frequency of home learning activities (lowest 20% of the sample) (OR = 2.02). The five predictors meeting the initial cut-off criterion in the unadjusted analyses were then included in the multivariate model, please refer to Table 16.

Table 16

Multivariate logistic regression results: No delay vs. late onset delay group

Predictor Variables	**Block 1**		**Block 2**		**Block 3**	
	OR (95%CI)	**Sig**	**OR (95%CI)**	**Sig**	**OR (95%CI)**	**Sig**
Number of books						
< 10 books	2.10 (1.46-3.02)	**.000**	1.82 (1.26-2.64)	**.001**	1.64 (1.13-2.38)	**.002**
11-30 books						
> 30 books						
Frequency of reading						
0-2 days per week	1.76 (1.30-2.39)	**.000**	1.66 (1.22-2.26)	**.001**	1.61 (1.17-2.20)	**.003**
3-5 days per week						
6-7 days per week						
Frequency of HLA						
Low (20%)	1.59 (1.16-2.19)	**.004**	1.65 (1.20-2.27)	**.002**	1.70 (1.29-2.45)	**.001**
Medium (60%)						
High (20%)						
PCE						
< second level			1.82 (1.43-2.32)	**.000**	2.0 (1.56-2.56)	**.000**
≥ second level						
EAL						
Yes					9.87 (7.14-13.65)	**.000**
No						

Note. OR = odds ratio, CI = confidence interval, Sig = significant level or p-value. All p-value < 0.10 are in boldface. HLA =Home Learning Activities, PCE =Primary Caregiver Education, EAL = English as an additional language.

There was no evidence of multicollinearity between the five factors (VIF < 5). The variables were organised into functional sets which were entered consecutively into the analysis. Block 1 included mutable-proximal factors, in block 2 mutable-distal factors were added, low-mutable factors were added in block 3. The final model generated five risk factors

which remained significant at the level of $p < .10$. In the final multivariate model one predictor exhibited a substantial effect size, English as an additional language One predictor exhibited a substantial effect size, English as an additional language (adjusted OR= 9.87). Using the guidelines provided by Rosenthal (1996) this may be categorised as a large effect size. Small effect sizes were observed for all other predictors, primary caregiver education (adjusted OR=2.00), low frequency of home learning activities (adjusted OR=1.70), few children's books in the home (adjusted OR=1.64) and low frequency of book reading (adjusted OR=1.61).

5.5 Summary of the Main Findings

- In total 5.1% of Irish children captured by the GUI data had an expressive vocabulary delay at 3 years, while 7.3% of children had an expressive vocabulary delay at 5 years. These figures include a subset of children who were learning English as an additional language.
- A high degree of variability in expressive vocabulary development between 3 and 5 years was observed. In total, 89.9% (7,431) of children had no expressive vocabulary delay at 3 and 5 years, 2.3% (189) had a persistent expressive vocabulary delay, 2.8% (230) of children were delayed at 3 years only (resolving delay) and 5.0% (414) were delayed at 5 years only (late onset delay).
- Delay status at 3 years, learning English as an additional language, parent education level, and environmental factors (number of children's books in the home, frequency of book reading and frequency of home learning activities) were all significant in predicting age 5 expressive vocabulary outcomes.
- Learning English as an additional language was the only risk factor which differentiated the resolving delay group from the persisting delay group at 3 years.

Children learning English as an additional language were at an increased risk of presenting with a persisting vocabulary delay between 3 and 5 years.

- Learning English as an additional language, parent education levels, the number of children's books in the home, frequency of book reading and frequency of home learning activities were all significant in differentiating the late onset group from the no delay group at 3 years.

Chapter 6 – Discussion

The study identified both stable and unstable patterns of expressive vocabulary growth between 3 and 5 years in an Irish population of children. This result adds to the current literature, providing further evidence of both stable and unstable patterns of language development during the preschool years (Law et al., 2012; Zambrana et al., 2014). The study also provides preliminary evidence in identifying risk factors that are associated with change in expressive vocabulary abilities between 3 and 5 years. The following chapter will provide a detailed discussion of the findings reported in chapter five. Each of the key findings will be discussed in the format of the research question asked.

6.1 Prevalence of Expressive Vocabulary Delay at 3 and 5 years

As discussed in chapter two, there is limited information regarding the prevalence of expressive vocabulary delay between 3 and 5 years. Furthermore, there is limited information regarding the prevalence of expressive vocabulary delay in an Irish population of children. This information is important for both education and health professionals in order to plan for service provision. The current study has added to the evidence by providing an estimate of the prevalence of expressive vocabulary delay at 3 and 5 years in an Irish population of children. Using the naming vocabulary subtest of the BAS the current study found that 5.1% of children had an expressive vocabulary delay at 3 years and 7.3% of children had a delay at 5 years. These figures are lower than the percentages reported by Zambrana et al. (2014), who calculated the prevalence of language delay at 3 and 5 years using the ASQ, a parent report tool. Zambrana et al. (2014) examined general language skills and found that 8.0% of children had a delay at 3 years and 9.5% had a delay at 5 years. A more direct comparison can be made with the estimates provided by Law et al. (2012), who also measured expressive vocabulary abilities at 3 and 5 years using the naming vocabulary

subtest of the BAS. Using a large representative sample (13,016) Law et al. (2012) found that 5.9% of children were delayed at 3 years and 2.9% of children were delayed at 5 years. These percentages are different from those reported in the current study, with a significantly smaller representation of children delayed at 5 years. The reason for this finding is unknown, however, several hypotheses can be considered.

Firstly, the current study calculated mean and standard deviation values using the Growing up in Ireland (GUI) sample. At 5 years, the GUI sample had a higher mean performance score on the naming vocabulary subtest of the BAS compared to the test mean, which was derived from the standardization of a UK sample. The mean score at 5 years for the GUI sample was 55.98 (SD 11.42), while the test mean was 50 (SD 10). This indicates that Irish children in the GUI study performed superior on the expressive vocabulary assessment at 5 years compared to a UK sample. However, this also indicates that children in the GUI study with low expressive vocabulary abilities were required to achieve a higher score on this assessment to place them within the average range, (t-score between 39 and 73). If the mean of 50 and standard deviation of 10 was applied in the current study, Irish children would have been required to obtain a t-score of 35 to place them in the average range. This change would also have resulted in different prevalence rates. If the mean of 50 was applied in the current study, the prevalence of expressive vocabulary delay would be 6.8% at 3 years and 3.0% at 5 years. These percentages are closer to those reported by Law et al. (2012), 5.9% at 3 years and 2.9% at 5 years. This result is consistent with the hypothesis made in the introduction chapter. In chapter one, section 1.2.4, it was hypothesised that children from different countries and generations may have different expressive vocabulary abilities. The BAS second edition captures the abilities of a UK sample of children who were born prior to 1995. This group of children along with the sample of participants in Law et al. (2012) will have had different cultural and educational experiences compared to the Irish children in the

current study. Other Irish studies have also reported different mean and standard deviation scores for Irish populations compared to the UK normative samples. Ryan, Gibbon and O'Shea (2016) used the Clinical Evaluations of Language Fundamentals Preschool 2nd Edition UK (CELF P2 UK; Semel et al., 2006) to examine the core language skills of preschool children from socially disadvantaged background in Ireland. Ryan et al. (2016) reported a higher expressive vocabulary mean score for Irish children using the CELF P2 UK (10.81) compared to the test mean (10) which was also standardised on a representative sample of children living in the UK. At present, Irish Speech and Language Therapists typically use assessments which have been standardised on UK or other international populations. The findings of the current study, along with previous findings reported by Ryan et al. (2016), indicates that current normative data should be established for Irish children on a range of speech and language assessment tools. In the absence of Irish normative data, test values need to be interpreted with caution and children who score in the borderline range should be monitored over time. Furthermore, this finding highlights the limitation of using standardised assessments in isolation. Speech and Language Therapists rely greatly on standardised assessment tools to identify the presence of language disorder. However performance variables including shyness, poor attention, lack of experience and cultural or linguistic differences can interfere with the accuracy of the results (Law & Camilleri, 2007). There is a need to gather assessment data from a wider range of sources, including data from the home and school environment.

Moreover, the discrepancy between the prevalence reported in the current study and Law et al. (2012) may be partially explained by the participant demographics of each study. The current study demonstrated that learning English as an additional language had a significant impact on expressive vocabulary outcomes between 3 and 5 years. The percentage of children classified as delayed at 3 and 5 years in the current study included a subset of

children who were learning English as an additional language. It is not known if these children also presented with a delay in their primary language. If we consider monolingual children only, 3.6% had an expressive vocabulary delay at 3 years, while 5.6% had a delay at 5 years. These figures are significantly lower than the initial prevalence of 5.1% at 3 years and 7.3% at 5 years. Law et al. (2012) also included a subset of children who were learning English as an additional language, however, the exact percentage of this group is unknown (J. Law, personal communication, March 16, 2018). If there is a higher percentage of children in the current study learning English as an additional language, this may have contributed to the higher percentage of children delayed at 5 years. Furthermore, as discussed in chapter one, section 1.2.4., second generation children in Ireland may present with different demographics, compared to second generation children in the UK. This may also contribute to varying expressive vocabulary abilities.

6.2 Prevalence of Resolving, Persisting and Late onset Expressive Vocabulary Delay between 3 and 5 years

The study identified four patterns of expressive vocabulary growth between 3 and 5 years using the naming vocabulary subtest of the BAS. This is consistent with previous research investigating expressive vocabulary development (Henrichs et al., 2011; Law et al., 2012; Peyre et al., 2014), receptive vocabulary development (Armstrong et al., 2016) and general language development (McKean et al., 2017; Zambrana et al., 2014). Similar to previous studies the current study found both stable and unstable patterns of expressive vocabulary growth between 3 and 5 years. The study found that the overwhelming majority (89.9%) of children showed no delay at both 3 and 5 years, while 2.8% presented with a delay at 3 years only (resolving delay), 5% had a delay at 5 years only (late onset delay) and 2.3% were delayed at both 3 and 5 years (persisting delay). These results can be compared

directly to the findings obtained by Law et al. (2012), who used the same assessment tool at 3 and 5 years. Law et al. (2012) reported that 92.7% had no delay at 3 and 5 years, 4.4% had a resolving delay, 1.4% had a late onset delay and 1.5% had a persisting expressive vocabulary delay. A significantly higher percentage of children in the current study presented with a late onset delay, showing deterioration in expressive vocabulary skills between 3 and 5 years. It is likely that this variation is also associated with the higher mean vocabulary score for the GUI sample of children at 5 years and differences relating to the participant demographics in each study. Both factors have been discussed previously under section 6.1.

The results of the current study support the large body of evidence which suggests that there is significant variability in that language development during early childhood and that patterns of change exist over time. The current study found that 55% of the children classified as delayed at 3 years had recovered by 5 years. This is consistent with previous literature which suggests that between 50 and 80% of children with early language delays will recover before school entry (Law et al., 2012; Zambrana et al., 2014). Moreover, the study found that 68% of the children delayed at 5 years were not detected at 3 years. This finding is also consistent with previous research (Reilly, et al., 2014) which indicated that a high percentage of children who demonstrate typical language development initially can fall behind their peers at a later point in development. There is significant variability in language development between 3 and 5 years and is one of the key challenges for service providers. The high degree of variability between 3 and 5 years may be associated with the developing language system, however, it may also be linked with the interaction of risk and protective factors in a child's environment. The following section will examine more closely the specific profiles of the resolving delay, late onset and persisting delay groups.

6.2.1 Resolving delay group.

The current study includes a group of 230 children who demonstrated recovery in their expressive vocabulary abilities between 3 and 5 years. The resolving delay represent 55% of children who were delayed at 3 years in the current study. As seen in Figure 2 (section 5.2) the mean vocabulary score for this group at 3 years was 26.85. This score is significantly below the mean of the total sample (50.92) and the typical language group (52.81), but similar to the mean vocabulary score of the persisting delay group (25.33). These results are comparable to that of Law et al. (2012) who found similar mean vocabulary scores for both the resolving delay (29.78) and persisting delay (27.15) groups at 3 years. This finding indicates that it is not possible to differentiate between children who will show resolving patterns of development or children who will present with a persisting delay at 3 years using expressive vocabulary scores alone. This result shows that the severity of the initial delay is not a reliable predictor of later expressive vocabulary outcomes.

At 5 years, the resolving delay group had recovered and were scoring within the average range on the formal expressive vocabulary assessment. Figure 3 (section 5.2) illustrates that the mean score at 5 years for this group is 50.23. This score is above the cut-off point 38.84, but below the mean score of the total sample (55.98) and the typical language group (57.98). These results are also consistent with previous research which indicates that children with resolving language delays will improve overtime and score within the average range on standardised tests, however their language scores will continue to lag behind their typical language peers (Dale et al., 2014; Rescorla, 2009). According to Scarborough and Dobrich (1990) and Kuhn, Sachse and Suchodletz (2015) children with resolving delays who continue to score in the low average on standardised assessments may show some residual weaknesses in aspects of oral language and are at risk for later literacy and academic challenges. However, contrasting results reported by Snowling et al. (2016) indicated that

children with early language delays who catch up before the formal school years are not at risk of later literacy impairments. These inconsistent findings indicate that children with resolving delays who continue to score in the low average range on standardised measures at 5 years should be monitored and supported accordingly. Section 6.4 will discuss the risk and protective factors associated with resolving delays

6.2.2 Late onset delay group.

The study also includes a group of 414 children who demonstrated deterioration in their expressive vocabulary ability between 3 and 5 years. A late onset delay group has also been reported in previous research which demonstrates that despite typical language development during the early years, some children are at risk of later language difficulties (Armstrong et al., 2016, Law et al., 2012; Poll, et al., 2010). At 3 years the late onset delay group presented with expressive vocabulary abilities within the average range. Figure 2 (section 5.2), illustrates that the mean vocabulary score for this group at 3 years is 42.07. This score is above the cut-off point of 32.11, but it is significantly below the mean vocabulary score of the total sample (50.92) and the mean vocabulary score of the typical language group (52.81). These results are comparable to Law et al. (2012) who reported similar differences between the mean scores of the late onset delay group (43.53) and the typical language group (52.32) at 3 years. These figures suggest that children who score just above the cut-off point on a standardised vocabulary measures may be at risk of presenting with a late onset delay and thus their performance should also be monitored. The interaction between low-average expressive vocabulary scores at 3 years and environmental risk factors may place this group of children in the delay category at 5 years. The risk factors associated with change in expressive vocabulary development between 3 and 5 years will be further discussed in section 6.4.

At 5 years the late onset delay group were classified with an expressive vocabulary delay. As seen in Figure 3 (section 5.2) the mean vocabulary score at 5 years for this group is 31.92, which is only marginally higher than the mean score for the persisting delay group (29.65). This finding demonstrates that children with a late onset expressive vocabulary delay may present with expressive vocabulary weaknesses which are as severe as children with persisting delays.

6.2.3 Persisting delay group.

Finally, the study also highlighted a group of 189 children who demonstrated consistently low expressive vocabulary abilities between 3 and 5 years. In line with previous research this group were classified as the persisting delay group. This group constituted the smallest group in the study accounting for only 2.3% of the overall sample. This is consistent with previous population-based studies which showed a relatively low percentage (1.5%-4.0%) of children resenting with persisting language difficulties during early childhood (Henrichs et al., 2011; Law et al., 2012; McKean et al., 2017; Zambrana et al., 2014). Previous literature has suggested that children with persisting language difficulties may be most at risk of poor language and academic outcomes and has hypothesised that this group of children may present with a more 'severe' initial delay (Bishop & Edmundson, 1987). In the current study, the persisting delay group had a mean vocabulary score of 25.33 at 3 years. This score is significantly below the mean of the total sample (50.92), but only marginally below the mean score of the late resolving delay group (26.85). Similarly, at 5 years the persisting delay group showed comparable mean vocabulary scores to the late onset group. These findings suggest that the severity of the expressive vocabulary delay does not predict the trajectory of development. Overall, these findings agree with Law et al. (2012) who suggested 'there remains a strong case for the population monitoring of risk groups before the

school years' (p. 136). Moreover, the findings support the need to develop a greater understanding of the different risk and protective factors which are contributing to changeable patterns of expressive vocabulary development between 3 and 5 years. Section 6.3 will discuss the risk factors associated with delayed expressive vocabulary development at 5 years, while section 6.4 will describe the risk factors associated with change in expressive vocabulary development between 3 and 5 years.

6.3 Risk Factors Associated with Delayed Expressive Vocabulary Development at 5 years.

The current study found that 7.3% of the representative sample of Irish children had an expressive vocabulary delay at 5 years. This delay was associated with a number of risk factors including, delayed expressive vocabulary development at 3 years, learning English as an additional language, low parent education levels, few children's books in the home, low frequency of shared book reading and low frequency of home learning activities. In chapter three, these factors were classified as mutable-distal or mutable-proximal, indicating that there is scope to modify these factors through direct intervention or provide support at a policy level in order to alleviate the risk they impose. Previous research has highlighted that language abilities during the early years (e.g., between 18 months and 3 years) are primarily influenced by low-mutable factors (Reilly et al., 2007; Zubrick et al., 2007), while mutable-proximal factors such as the home learning environment become increasingly important over time (Reilly et al., 2010). The results of the current study are in line with previous research and largely positive as they suggest that expressive vocabulary delays can be prevented or alleviated to some extent between 3 and 5 years. The following section will examine each of the risk factors independently in order to evaluate their level of contribution and consider how each factor can be targeted to support children's expressive vocabulary growth between

3 and 5 years. This information is relevant for policy makers and practitioners concerned with expressive vocabulary development during early childhood.

6.3.1 Learning English as an additional language.

Learning English as an additional language was a significant risk factor associated with expressive vocabulary delay status at 5 years. The study reported a large effect size of (OR 7.19). This finding is consistent with the results of the Effective Provision of Pre-school Education (EPPE) project who reported that children learning English as an additional language perform better than their monolingual speaking peers on code-related skill, but significantly worse on oral language skills between 3 and 5 years (Sylva, Melhuish, Sammons, Siraj-Blatchford, Taggart, & Elliott, 2004). It is important to note that only expressive vocabulary abilities in English were measured in the current study and so their vocabulary knowledge in their additional language(s) was not considered. It is not known if these children also presented with a delay in their primary language. There are a number of conclusions which can be drawn from this finding. Firstly, children learning English as an additional language may be over represented in the delay category, as only their ability to name English words was assessed. The percentage of children classified as delayed in the current study may include a subset of children who are delayed in English only and not their primary language. As discussed in chapter three (section 3.2.1), bilingual language learners typically show slower rates of single language growth during the early years (Conboy & Thal, 2006; Hoff et al., 2012; Marchmann & Martinez-Sussmann, 2002). Recent studies have aimed to identify the age at which bilingual children close the gap with their monolingual peers. McKean et al. (2015) found that children learning English as an additional language were delayed on general language measure at 4 years, however, a fast rate of progress during the early school years was observed and by the age of 7 years this group had caught up with

their monolingual English-speaking peers. Moreover, Gathercole and Thomas (2009) reported that Welsh-English bilingual children caught up with their monolingual peers on measures of expressive language between the ages of 9 and 11 years. Goldberg, Paradis and Crago (2008) explored the English second language development of 19 children from various first language backgrounds. This study found that the children came close to achieving age appropriate receptive vocabulary scores in their second language on standardised tests with less than 3 years exposure to the language. Progress was influenced by several individual factors including socioeconomic status and community contexts. In light of individual differences, children take somewhere between 3 and 6 years to catch up with their monolingual peers on measures of receptive and expressive vocabulary. Previous research suggests that it is typical for bilingual children to lag behind their peers on measures of expressive vocabulary during the preschool period and early school years. Considering this information, it is highly likely that the percentage of children classified as delayed at 5 years in the current study represents a subset of children who do not have a language disorder, but rather are delayed in their English vocabulary skills as a result of limited exposure to the language. To test this hypothesis, future research should follow-up with this group of children again at 7 and 9 years.

Furthermore, as discussed in chapter one, section 1.2.4., many children learning English as an additional language come from immigrant families who are more likely to experience lower socioeconomic status. The GUI dataset measured household income in five quintile brackets. Frequency calculations revealed that 59.4% of children learning English as an additional language fell within the bottom two income brackets, compared to a significantly lower 37.9% of children of whom English was their primary language. Previous research has also highlighted that children from low-income language minority homes score lower that their monolingual peers on measures of expressive language (Castro et al., 2011).

This language difference reflects the effects of both low socioeconomic status and bilingual language learning. Research has also suggested that socioeconomic status and bilingualism contribute independently to children's language development (Calvo & Bialystok, 2014). It is possible that both factors are contributing to the delay status of bilingual children at 5 years in the current study.

Overall, comparing bilingual learner's expressive vocabulary ability in one of their languages to monolingual children's total expressive vocabulary knowledge is not recommended at any age. Nevertheless, this is exactly the comparison that is made when bilingual children enter school and the curriculum is provided in English only. Delayed expressive vocabulary abilities may place this group of children at risk of later literacy and academic challenges. Children learning English as an additional language require additional support in primary school. This has been recognised in Ireland, as the General Allocation Model was expanded to also include a general provision for English as an Additional Language support as set out in DES Circular 0007/2012 (Department of Education and Skills, 2012). At present support during the preschool years is less established and according to Murphy (2017) there is an urgent need to develop greater understanding of the linguistic needs of preschool children learning English as an additional language. According to Murphy (2017) appropriate training and support for staff working within early education settings is required. Research has begun to explore possible interventions to support the oral language skills of bilingual children during the preschool years (Dockrell, Stuart & King, 2010; Fricke & Millard, 2016). While preliminary research has indicated that it is possible to improve bilingual children's expressive vocabulary skills through innovative teaching methods, further research is required in order to determine the effectiveness of such interventions with large samples of participants. It is important that early educators encourage and support families to speak their first language at home as this has been linked with higher levels of

long-term achievements in English. Appropriate training of preschool staff is recommended and this may be facilitated through the 'In-School Therapy Support Project' launched by the National Council for Special Education (NCSE) on the 14th of May 2018. This pilot initiative will provide speech and language therapy support to 75 preschool settings for the 2018/2019 school year.

6.3.2 Low parent education levels.

Low parent education levels, classified as 'incomplete secondary school education or less' also impacted the expressive vocabulary outcomes of children at 5 years of age. Previous research has indicated that socioeconomic factors impact vocabulary development in children as young as 18 months (Fernald, Marchman & Weisleder, 2013). The current study illustrates that the gap continues to exist at 5 years, a time when children are preparing to start formal education. The current study reported a small effect size (OR 1.81) for low parent education levels when all other risk factors were accounted for. Larger effect sizes have been documented in previous research papers (Bradshaw et al., 2011; Law et al., 2012). One conclusion which can be drawn from this finding is that the negative effects of low parent education levels are being reduced by current supports or policies put in place by the Irish Government to support child developmental outcomes. Initiatives to reduce the effects of disadvantage have become a priority of government policy both in Ireland and other European countries.

Firstly, there are a number of targeted programmes in disadvantaged areas in Ireland, which focus on speech and language development. One such programme is the Childhood Developmental Initiative (CDI) in West Tallaght, Dublin. This programme provides speech and language therapy to a disadvantaged population through a three-tier model (Smith, 2016). Firstly, direct intervention is provided on-site, whereby Speech and

Language therapists attend Early Year's services and primary schools. Secondly, the service recognises that parents have a key role in language development and provide indirect intervention through parent training and information sessions. Finally, training is also provided to staff in preschool and school settings who also work closely with the children on a weekly basis. An evaluation of the CDI programme in 2012 demonstrated a positive impact on preschool speech and language outcomes (Hayes, Keegan & Goulding, 2012). However, these results should be interpreted with caution given some of the limitations of the methodological design. There was no control group used in this evaluation and the study did not capture the potential long-term benefits of the programme. Similar initiatives exist across Ireland, in areas of social deprivation, including Happy Talk in Cork City. While there is value in providing such initiatives, it must also be recognised that targeting only according to social risks can be problematic, as focusing solely on the most disadvantaged may waste resources on many children who do not require the additional support.

In chapter three (section 3.3.3), the Early Childhood Care and Education (ECCE) free Pre-School Year was discussed. This initiative was introduced in Ireland in 2010 and has broadened access to early education services. Under the new criteria children are eligible for the free preschool year at 2 years 8 months and are entitled to two full academic years or 76 weeks (Early Childhood Ireland, 2018). In the current study over 96% of the sample availed of the free preschool year between 3 and 5 years. For some children this may have reduced or compensated for the impact of low SES factors. Furthermore, early start programmes are in existence in Ireland. These programmes provide a one-year intervention scheme to meet the needs of children who are most at risk of not reaching their potential within the school system. There are now 40 early start programmes in designated areas of urban disadvantage in Ireland. The Education Research Centre (ERC) undertook evaluations of the early start programme between 1998 and 2003 (Department of Education and Skills, 2004). This

research assessed the cognitive, language and motor skills achievements of children in junior infants and compared these achievements to a control group who did not participate in the project. No differences in cognitive, language and motor skills were noted using 'early screening profiles', however, the class teacher reported better school readiness for children who attended the early start programme. To make more effective changes in language and motor development, greater collaboration and linkages between school staff and specialised therapists may be required. This is a current aim of the 'In-School Therapy Support Project' discussed previously in section 6.3.1.

Research has indicated that preschool education can help close the gap in the vocabulary differences between children from high and low socioeconomic backgrounds. Becker (2011) found that preschool attendance positively influenced the expressive vocabularies of children with lower educated parents, suggesting that preschool education and early start programmes may have a compensatory impact, i.e., compensating for the lack of language stimulation in the home. While preschool attendance is certainly beneficial for expressive vocabulary development, it is important to recognise that the quality of the preschool setting is also an important factor. Sylva et al. (2004) reported that disadvantaged children, particularly boys, benefited from high quality preschool experiences. Moreover, centres which included children from mixed social backgrounds were considered more beneficial than centres with a high population of children from disadvantaged areas. Therefore, children from disadvantaged areas with delayed expressive vocabulary development may require a high-quality preschool to reduce impact of socioeconomic factors on expressive vocabulary development.

Parent education levels have consistently shown to impact expressive vocabulary outcomes during the preschool years, suggesting that there is value in providing preventative intervention services in disadvantaged areas. Furthermore, it should also be recognised that

children from low socioeconomic backgrounds may be at a disadvantage on formal expressive vocabulary assessments, as standardised assessments may not be sensitive to discriminate between the impairment and the effects of an impoverished environment. In chapter three (section 3.2.3) it was discussed that, for some children raised in areas of disadvantage, the low scores obtained on standardised assessments may not reflect a language disorder. According to Roy and Chiat (2012) low scores may represent unfamiliarity with the testing context or difficulties with attention and listening skills. It is important that Speech and Language therapists do not rely solely on standardised assessments when assessing the expressive vocabulary abilities of children from low socioeconomic backgrounds. Camilleri and Law (2012) recommend using dynamic assessment with socially disadvantaged children. This type of assessment measures a child's learning potential.

6.3.3 Home learning environment.

The child's home learning environment at 3 years was also found to impact expressive vocabulary outcomes at 5 years. Specifically, a limited number of children's books in the home, low frequency of shared book reading and low frequency of additional home learning activities were associated with delayed expressive vocabulary development. This finding is consistent with previous research which has demonstrated that the home learning environment during the preschool years has a significant impact on later language outcomes (Bradshaw, 2011; Bromley, 2009; McKean et al., 2015; Sylva et al., 2004). Overall, the effect sizes reported in the current study were small. The following odd ratios were highlighted in chapter five (section 5.3), low frequency of home learning activities (OR=1.71), low frequency of book reading (OR=1.49) and few children's books in the home (OR=1.37). It is important to recognise that these elements of the home environment capture only a small part of the broader picture. Each factor represents parent-child engagement

which is important for expressive vocabulary growth, however, the current study does not address the quantity and quality of verbal input during each of these activities.

Previous research has aimed to describe the optimal contexts for expressive vocabulary learning. Firstly, the quantity of input is important, with research showing that children whose parents talk frequently to them experience faster vocabulary growth (Cartmill et al., 2013; Hart & Risley, 1995; Huttenlocher et al., 1991). Huttenlocher et al. (1991) found that the frequency of parental language predicted the rate of vocabulary growth between 14 and 26 months. Moreover, Hart and Risely (1995) examined the differences in the quantity of verbal stimulation between high and low socioeconomic status (SES) backgrounds and found that the average child from a high SES background was exposed to 215,000 words in a 100-hour week, compared to just 62,000 words for the average child from low SES background. While the quantity of verbal input is certainly relevant, recent evidence suggests that input quality may be more important, particularly during the preschool years (Rowe, 2012). Quality of input relates to factors such as using a diversity of words and word types, tuning into the child's interests, connecting new words to meaningful contexts and using decontextualized language. Rowe (2012) has suggested that quantity of input is most significant during the child's second year of life, but quality including diversity and sophistication of language is more important at 3 years. The reasoning behind this may be that at 30 months children have had frequent exposure to high frequency words in the home environment and have built up a vocabulary base to draw from. After 30 months children require exposure to more sophisticated language to expand their expressive vocabulary further. Furthermore, recent research conducted by Romeo et al. (2018) found that children's conversational experiences impacted neural language processing. Children who experienced more conversational turns during adult-child interaction showed greater activation of the Broca's area, an important region of the brain for language processing. In the current study, additional information

regarding the quantity and quality of verbal input during home learning activities may have provided larger effect sizes. Nevertheless, the findings add to the current body of literature which indicates that a child's home learning environment is a critical component of expressive vocabulary development. The findings demonstrate that the quality of the home learning environment at 3 years can have lasting implications for expressive vocabulary outcomes at 5 years. The following section discusses elements of the home learning environment in more detail.

6.3.3.1 Home literacy environment.

The value of the home literacy environment has been highlighted in the current study through the frequency of book reading and the number of children's books in the home. Firstly, low frequency of book reading was associated with delayed expressive vocabulary outcomes at 5 years (OR = 1.49). In the current study over 70% of primary caregivers reported reading to their child a minimum of five days a week at 3 years. However, 10% of the sample reported reading to their child two or less days a week at 3 years. The American Academy of Pediatrics (2008) recommends reading aloud to children from birth and continuing with this practice most days a week during the preschool years. The study also found that fewer than 10 children's books in the home at 3 years correlated with delayed vocabulary outcomes at 5 years (OR = 1.37). In the current study 55% of primary caregivers reported that there were 30 or more children's books in their home at 3 years. In contrast, 25% of the sample had less than 20 children's books and 7% had less than 10 children's books in the home.

There is a consistent link between the home literacy environment and expressive vocabulary development and there are a number of explanations for this. Firstly, book reading gives children the opportunity to learn novel words from the books, but also through

the use of decontextualized language (Dickinson & Snow, 1987). As previously mentioned, the quality of verbal input is significantly important for expressive vocabulary development during the preschool years (Rowe, 2012). Children's books have been identified as an excellent source to provide this quality of input, as book reading exposes children to new and more complex vocabulary. Previous research has indicated that the language used in children's books is often more complex than the language parents use when playing games with their children (Sénéchal, LeFevre, Hudson, & Lawson 1996) and engaging in everyday conversations with their children (Duursma, Augustyn, & Zuckerman, 2008). The current study adds to the growing body of evidence which highlights the benefit of promoting home literacy practices. This may be done at a policy level or through direct interventions with the family and child.

To date several studies have explored the impact of both direct and indirect book reading interventions. Using data from Growing up in Scotland, Bradshaw, King, Knudsen, Law and Sharp (2016) evaluated two indirect book reading interventions, 'Bookbug' and 'Play Talk Read'. Both interventions were introduced universally in Scotland at a policy level. Bookbug is a book gifting programme in which children's books are distributed and to families when the child is born. Play Talk Read is a campaign which offers advice to parents of children under 3 years on promoting fun and meaningful engagement with their children. Research found that higher educated parents were more likely to use their Bookbug resources and access the Play Talk Read website (Bradshaw et al., 2016).

Studies have also explored more direct book reading interventions and a positive impact on expressive vocabulary outcomes has been found. A number of studies have examined dialogic book reading interventions, where parents are shown how to use an interactive book reading style with their children. A meta-analysis by Mol and Bus (2011) found that these interventions improved expressive language outcomes for children aged

between 2 and 3 years. These results were however restricted to families classified as not ‘at risk’ in terms of their socioeconomic status. Overall, the findings of the current study indicate that parent-child book reading in the home environment has a positive impact on expressive vocabulary outcomes between 3 and 5 years. Book reading is a mutable-proximal factor and so can be modified through direct interventions with the family or child. Previous research indicates that book reading interventions may need to be targeted towards those who need it most rather than universally applied.

6.3.3.2 Additional home learning activities.

The current study also found that additional home learning activities at 3 years contributed to expressive vocabulary outcomes at 5 years. Consistent with previous research, the practices of helping the infant to learn the alphabet, counting, singing, playing board games, active games and art and craft activities were found to collectively contribute to a home setting that actively promotes learning and is thus an optimal environment for expressive vocabulary growth (Hartas, 2011). The findings of the current study extend on previous research which demonstrated that home learning activities at 10 months positively impact expressive vocabulary outcomes at 3 years (Melhuish, 2010). This study concluded that while parent’s education and socioeconomic status are important, home learning activities apply a greater influence on children’s expressive vocabulary development (Melhuish, 2010). Evidently, the home learning environment appears to be an effective platform for nurturing expressive vocabulary development during early childhood and this should be capitalised on through parent focused interventions. The increasing effects of shared book reading, books in the home and home learning activities highlight the value in promoting of a set of parenting behaviours which could strengthen language development. Intervention may also focus on improving the quality of the parent-child interaction during

home learning activities. Recent research has indicated that maternal responsiveness is a good prognostic factor for language development in slow to talk toddlers. Maternal responsiveness is described as parenting that is 'prompt, contingent and appropriate' (Bornstein & Tamis-LeMonda 1989, p. 50). A range of maternal responsive behaviours appear to be of particular importance in promoting language development. Levickis, Reilly, Girolametto, Ukomunne and Wake (2014) explored the impact of six maternal responsive behaviours on language development at 24 and 36 months. This study found that expansions, imitations and responsive questions were associated with better language outcomes. Hudson, Levickis, Down, Nicholls and Wake further demonstrated that maternal responsiveness during the early years continues to impact language development at 3 and 4 years. This preliminary evidence indicates that interventions focusing on parental responsiveness may support the development of expressive vocabulary growth throughout the preschool period.

6.4 Risk Factors Associated with Resolving, Persisting and Late onset Expressive Vocabulary Delays between 3 and 5 years.

The following section discusses the risk factors which are associated with positive and negative changes in expressive vocabulary development between 3 and 5 years. This section will refer to model one and model two which were presented in chapter five (sections 5.4.1 and 5.4.2).

6.4.1 Model one – persisting delay group vs. resolving delay group.

Firstly, we will look at the result of model one, presented in chapter five (section 5.4.1). This model compared the two groups which were delayed at 3 years, the late resolving delay group (delayed at 3 years only) and the persisting delay group (delayed at 3 and 5 years). The resolving delay group experienced a positive change in their expressive

vocabulary skills between 3 and 5 years. While the persisting delay group remained stable, showing a continued delay between 3 and 5 years. The current study found that learning English as an additional language was the only factor which differentiated between the two groups at 3 years. Children who were learning English as an additional language were more likely to present with a persisting expressive vocabulary delay at 5 years. A medium to large effect size was reported (OR 3.73). This finding is in line with the previous literature which reported that children learning an additional language are likely to be categorised as delayed when only their expressive vocabulary in a single language is measured (Conboy & Thal, 2006; Hoff et al., 2012; Marchmann & Martinez-Sussmann, 2002). As discussed previously in section 6.3.1, children may take somewhere between 3 and 6 years to catch up with their monolingual peers on measures of expressive vocabulary and progress is often dependent on individual differences (Goldberg et al., 2008). It is likely that a subset of children in the persisting delay group will demonstrate progress at a later period, following increased exposure to the English language in the school environment.

No other risk factors examined in the current study differentiated between the resolving delay group and the persisting delay group at 3 years. Using a similar research design, Law et al. (2012) found that maternal education differentiated between the two groups at 3 years. Law et al. (2012) reported that low maternal education was associated with persisting expressive vocabulary difficulties between 3 and 5 years. This finding was not replicated in the current study. This may be explained by external factors which were not included in the current study. For example, it is possible that the free preschool year initiative introduced in Ireland in 2010 reduced some of the risks associated with low socioeconomic factors. As previously discussed in chapter three, high quality preschool education, supports expressive vocabulary growth for children from disadvantaged backgrounds (Becker, 2011).

The findings reported in the current study are, however, consistent with the results of

a recent study conducted by Armstrong et al. (2016). This study measured receptive vocabulary change from early childhood to adulthood and investigated the role of a similar set of risk factors. Both studies suggest that it is a challenging task to differentiate between children who will spontaneously recover and children who will go on to have persisting language difficulties. It must be considered that risk factors which were not included in the current study may have played a large part in differentiating between the two groups. Previous research has indicated that persisting language difficulties may indicate a more severe problem which is impacted by biological and inherited factors. Such factors include poor language comprehension, low non-verbal IQ, and a family history of speech, language or literacy difficulties (Clarke et al., 2007; McKean et al., 2017; Rice & Hoffman, 2015; Zambrana et al., 2014). Unfortunately, none of these factors were addressed in the GUI dataset and thus could not be included in the study's analysis.

6.4.2 Model two – no delay group vs. late onset delay group.

Secondly, the results of model two will be discussed, this model is presented in chapter five (section 5.4.2). This model compared the two groups that presented with typical expressive vocabularies at 3 years, the no delay group (no delay at 3 and 5 years) and the late onset group (delayed at 5 years only). The late onset group experienced a relative reduction in expressive vocabulary scores between 3 and 5 years, while the no delay group demonstrated age appropriate expressive vocabulary development. The current study found that there were a number of mutable factors in a child's early life which made them vulnerable for later vocabulary impairment. These risk factors include learning English as additional language, low parent education levels, a limited number of children's books in the home, low frequency of book reading and low frequency of home learning activities. These results indicate that a late onset vocabulary delay is primarily associated with mutable-proximal factors relating to

the child's environment. Previous research findings have reported a consistent link between low maternal and paternal education levels and late onset language difficulties (Armstrong et al., 2016; Law et al., 2012; Zambrana et al., 2014). The home learning environment has been researched to a lesser degree, however, studies have hypothesised that the relationship between parent education levels and child language outcomes is mediated through the quality of the home learning environment. In contrast to the findings of the current study, Snowling et al. (2016) found that late onset language difficulties were more biologically driven. As discussed in chapter two, Snowling et al. (2016) reported a strong association between a family history of dyslexia and a late onset language delay. There is a possible link between the biologically driven results reported by Snowling et al. (2016) and the strong environmental influences acknowledged in the current study. It is possible that a family history of dyslexia may impact both the quality and quantity of home literacy activities. This hypothesis does however require further investigation.

An unexpected finding of the current study was that learning English as an additional language also placed children at risk of a late onset language delay. This finding is in contrast with previous research (McKean et al., 2017) which has found that learning English as an additional language was associated with an increasing profile. McKean et al. (2017) found that although bilingual language learners were subject to early language delays, they often caught up rapidly during the early school years. The reason for this finding is unknown, however, a hypothesis can be made. The current study differs from the findings McKean et al. (2017) in that it measures a single language component, expressive vocabulary. It may be hypothesised that children learning English as an additional language were able to perform adequately at 3 years with basic vocabulary, but as the test got harder, they fell below the average range at 5 years. This may relate to the BICS/CALP theory introduced by Cummins (1979). Cummins made the distinction between two types of language proficiency. BICS are

the Basic Interpersonal Communication Skills, these are “surface” of listening and speaking which are acquired by children within two years of immersion in the target language. CALP are the Cognitive Academic Language Proficiency skills, higher level linguistic skills, which take between five and seven years to acquire. The children learning English as an additional language in the current study may have been able to use their BICS language proficiency in completing the vocabulary assessment at 3 years, however, the 5 year assessment maybe have placed a greater demand on their CALP skills. To further test this hypothesis, follow up with this group of children at age 7 and 9 years is required. Another significant difference between the current study and McKean et al (2017) is the age range of the participants included. McKean et al. (2017) investigated language growth from 4 to 11 years. This group of children had prolonged educational exposure across the preschool and formal school years. The study found that by 7 years almost all of the bilingual children with low language scores at 4 years had caught up. In contrast, the current study investigated expressive vocabulary development between 3 and 5 years. This is significantly different stage in a child’s educational exposure and the majority of the current study’s sample attended preschool only. This finding suggests that bilingual children require prolonged exposure to their second language during both preschool and school to strengthen their skills in both languages.

Overall, the current study has gleaned important information regarding expressive vocabulary growth between 3 and 5 years. This information has implications for both clinical practice and future research, both of which will be discussed in detail in the final chapter.

Chapter 7 – Conclusion

This study is one of a small number that have used large-scale population data to examine patterns of expressive vocabulary growth over time. The study identified four patterns of expressive vocabulary development between 3 and 5 years, providing 'further evidence of both resilience and vulnerability in language development' (Armstrong et al., 2016, p. 86). Most of the participants in the current study demonstrated stable patterns of development with 89.9% of children showing typical expressive vocabulary growth and 2.3% of children demonstrating a persisting expressive vocabulary delay between 3 and 5 years. However, changing patterns of development were also observed with 2.8% of children recovering between 3 and 5 years (resolving delay) and 5% presenting with a late onset delay.

In order to identify at 3 years which children are in need early intervention services it is important to identify risk factors associated with changing patterns of development between 3 and 5 years. The current study found that a late onset delay at 5 years was associated with learning English as an additional language, low levels of parent education, low frequency of book reading and home learning activities and few children's books in the home. Furthermore, children who presented with a late onset delay at 5 years were likely to score in the low average range in the vocabulary assessment at 3 years, indicating that there is a need to monitor children who score just above the cut-off point.

The current study also investigated risk factors associated with patterns of recovery between 3 and 5 years, however, irrespective of the large set of predictors investigated the study found that learning English as an additional language was the only risk factor which differentiated between children who improved over time (resolving delay) and children who presented with a persisting vocabulary delay. The study found that many of the children who improved over time continued to score below their typical language peers at 5 years

suggesting that this group of children may also benefit from early intervention services or monitoring.

7.1 Strengths and Limitations of the Study

There are a number of strengths in the current study. Firstly, the study was carried out using data from the Irish longitudinal study, Growing up in Ireland (GUI). This dataset allowed access to a large sample of participants (8,266) who were followed up over time, during a critical period in language development. Although previous cohort studies have investigated language development between 3 and 5 years, this study is the first to do so with an Irish population of children. The participants of the current study were born between the 1st of December 2007 and the 30th of June 2008, therefore, the results of the study represent Irish children growing up in Ireland today sand therefore can be used to influence the practices of current Speech and Language Therapists, early educators and other professionals working with children between 3 and 5 years in Ireland.

A further strength of the current study is the use of a direct standardised assessment tool to measure outcomes at 3 and 5 years. The study focused on expressive vocabulary development and this was measured using the naming vocabulary subtest of the British Abilities Scales (BAS; Elliott et al., 1997). This standardised assessment tool has demonstrated construct validity and high test-retest reliability (Elliott et al., 1997). The current study devised mean and standard deviation scores based on the participants of the study. Therefore, the mean and standard deviations represent the participants of the study and the wider population of which the study is to be generalised. The study also included a broad range of potential risk factors, some of which had been examined previously through large population-based research and other variables which had only been addressed in small scale studies. An important focus of the current study was the role of mutable-proximal or

environmental factors which could be modified through direct intervention with the family or child. Previous population-based studies provided limited information regarding the role of mutable-proximal factors between 3 and 5 years.

Moreover, it is important to address the limitations of the current study and these should be used to shape future research is this area. Although there many advantages of using a large dataset, it also imposes some restrictions on the researcher. The study was limited by the set of variables that had been included in the GUI data. Thus, there may have been additional risk factors not included as part of the analysis which may have influenced expressive vocabulary categories. The current study found that a limited number of predictors differentiated between the resolving delay group and the persisting delay group. Previous research has indicated that persisting language difficulties may indicate a more severe problem which is impacted by biological and inherited factors. Such factors include poor language comprehension, low non-verbal IQ, and a family history of literacy difficulties (Clarke et al., 2007; McKean et al., 2017; Rice & Hoffman, 2015). Unfortunately, none of these factors were addressed in the GUI dataset and therefore could not be included in the study's analysis. The study was also restricted by the questions asked in the GUI study. For example, the GUI study addressed television viewing at 3 and 5 years. The primary caregiver was asked to record in minutes how much television their child watched per day. While this is interesting, further information regarding the quality of the programmes watched and whether co-viewing with an adult took place would have been valuable from a language perspective. Similarly, the GUI study addressed the child's language background at 3 and 5 years. The primary caregiver was asked to identify the child's primary language by indicating English, Irish or other. For those who indicated 'Irish' or 'other', further information regarding the child's exposure to the English language and their expressive vocabulary ability in their primary language would have been beneficial.

Moreover, the current study used a categorical approach to define expressive vocabulary delay at 3 and 5 years. The study assigned children to either a delay or typical group using definitive cut-off points in language scores. There are some limitations to this approach. Firstly, measurement errors can arise as some children can switch group by just moving above and below a cut-off point. Furthermore, with only two data points the slope or rate of change cannot be measured. A more advanced analytical approach is latent class analysis, which was used by McKean et al. (2017). The results of this approach classify cases into their most likely latent class which is not based on a distinct cut off point. This approach minimises measurement errors which can lead to instability in group membership for children who score marginally above or below the cut-off points. Although this approach is advantageous it is not suitable for all studies, particularly when there are only two assessment points. This approach requires a large-scale dataset consisting of longitudinal measures of variables at a minimum of three points in time (Jung & Wickrama, 2008).

7.2 Implications for Clinical Practice and Social Policy

The results of the study raise a number of important implications for clinical practice. Firstly, the current study has highlighted the limitations of using assessment tools which are standardised on different geographic populations. The findings indicate that normative data should be established for Irish children on a range of speech and language assessment tools. In the absence of Irish normative data, test values need to be interpreted with caution and children who score in the borderline range should be monitored over time. Furthermore, there is a need to gather assessment data from a wider range of sources e.g., data from the home and school environment and use of dynamic assessment, which encompasses a range of methods to assess the potential for learning rather than a static level of achievement. (Law & Camilleri, 2007).

Secondly, the study addresses the clinical issue of profiling children who are most at risk for persisting language weaknesses. Previous research has identified the need for early detection and intervention for children who demonstrate persisting language difficulties. To date a reliable set of predictors for persisting language difficulties has not been identified. The current study has highlighted that it is particularly difficult to differentiate at 3 years between children who will show persisting expressive vocabulary difficulties and children who will recover spontaneously. In the current study a large set of predictors did not differentiate between both groups at 3 years and the severity of the delay at 3 years was also not associated with expressive vocabulary outcomes at 5 years. There is a lack of concrete evidence regarding predictors, therefore some researchers advise that interventions should not commence until it is identified that a child has persistent difficulties (Norbury, 2015). In contrast others believe that without early intervention, environmental influences will continue to impact language development and may result in long term consequences for language and literacy outcomes during the school years (Fernald et al., 2013; Hoff, 2003). An important finding of the current study indicates that while a significant percentage of children recover, they continue to score below typical language peers on standardised assessments. This finding implies that all children with an expressive vocabulary delay at 3 years may benefit from some level of early intervention to ensure that environments are conducive to learning language. This is in line with the model of "stepped interventions" (Hambridge, Phibbs, Chandramouli, Fairclough, & Steiner, 2009), where all children "at risk" receive the first intervention and additional interventions are offered only to those who continue to experience language difficulties. Intervention must be cost effective, evidence-based and accessible to all communities. As discussed in section 6.3.3.2, parent focused interventions which incorporate home learning activities and promote parent responsiveness may be most appropriate in developing children's expressive vocabulary skills. Following this initial intervention, it may

be possible to differentiate between the resolving delay group and persisting delay group by examining their rate of progress at a review assessment. This is consistent with dynamic assessment procedures. A child's rate of progress is recognised as a significant predictor of recovery, therefore, re-assessment of the child's expressive language abilities after 6 months may differentiate the resolving delay group from the persisting delay group.

The study also highlighted a group of children whose expressive vocabulary skills were within the average range at 3 years but later deteriorated. Overall, this group of children (late onset delay group) primarily scored within the low average range at 3 years, but fell within the delay category at 5 years. This pattern was associated with several risk factors including learning English as an additional language, low parent education levels, low frequency of book reading and home learning activities and few children's books in the home. This finding supports the need to monitor children who score in the low average range and present with additional risk factors at 3 years. The current study has highlighted two groups of children who may be at risk of presenting with late onset language difficulties. Firstly, the results highlighted that learning English as an additional language (EAL) was the most significant predictor of a late onset vocabulary delay. This group of children may benefit from early advice or additional support during the preschool years to strengthen their expressive vocabulary skills in both languages. Research has shown that children who have strong foundations in their home language more easily learn a second language and acquire high levels of English educational skills (King & Fogle, 2006). Speech and Language Therapists may collaborate with public health nurses and early year's educators in providing bilingual families with advice on early language development. This advice may include information regarding parent child book reading as the results of the current study highlight the benefit of a wide range of books in the home and frequent book reading with the child.

Secondly, the study highlighted that children from families with low parent education

levels and/or families who engage in limited home learning activities are also at risk of developing late onset language difficulties. This finding indicates that a stimulating home environment may be particularly important for children who score in the low average range on standardised language assessments at 3 years. This group of children may benefit from high quality early years' provision and parenting intervention programmes. As discussed previously in chapter 6, section 6.3.2, there are several programmes delivering universal interventions in targeted areas of disadvantage across Ireland. These programmes include Happy Talk in Cork City and the Child Development Initiative (CDI) in Tallaght, a large suburb of Dublin City. Both programmes work with children under 6 years and seek to improve the language and literacy skills of children identified as 'high risk' for speech, language and communication needs (SLCN). The Speech and Language Therapists work collaboratively with schools, preschools, crèches, libraries, and other health care professionals including public health nurses.

The results of the current study suggest that interventions which involve the promotion of shared book reading and home learning activities may be particularly important. In a recent meta-analysis, Law et al. (2017) examined the effectiveness of language interventions for preschool aged children. Positive treatment effects were found for parent focused interventions and interventions focusing on expressive vocabulary development, however, limited information regarding the long-term gains of these interventions has been reported to date. This should be addressed in future research. In line with the recommendations of McKean et al. (2016) the current study promotes secondary prevention, wherein 'at risk' groups are identified early and offered intervention to reduce the risks. How this would be implemented would vary from one context to another, depending on the services available. It is important to identify key services and professional groups who could

deliver universal intervention to ‘at risk’ populations. Speech and Language Therapists would have a key role in this approach.

7.3 Implications for future research

The results of the current study also raise implications for future research. The current study examined patterns of expressive vocabulary between 3 and 5 years. The data used was obtained from the Irish longitudinal study Growing up in Ireland (GUI). The GUI study offered access to participant data at 9 months, 3 years and 5 years which guided the timeline of the current study. The GUI study will continue to follow up with the children in the current study at 7 years and again at 9 years. This new data offers opportunities for further research. Firstly, it offers the opportunity to further investigate expressive vocabulary categories at 7 years. This information would allow us to determine if expressive vocabulary development increases in stability between 5 and 7 years. Moreover, it would allow us to evaluate the percentage of children learning English as an additional language who catch up with their monolingual peers during this time. The new data also provides the opportunities to research the social and educational outcomes of children presenting with early vocabulary delays. Comparing the social and educational outcomes of the resolving, late onset and persisting delay groups would further inform clinical practices regarding the need for early detection and intervention.

Future research should continue to investigate methods to determine a child’s level of risk of presenting with persisting or late-onset language difficulties. There is a need to replicate the results of the current study using a broader set of risk and protective factors. As discussed previously, the current study was limited by the set of variables that had were included in the GUI data. Thus, there may be other risk factors not included in the analysis

which also impact expressive vocabulary categories. These include receptive language difficulties, low non-verbal IQ and a family history of speech and language difficulties.

Finally, future research should evaluate the cost-saving methods of delivering early preventative interventions. The current study discussed using a stepped intervention model (Hambridge et al., 2009), where all children "at risk" receive the first intervention and additional interventions are given only to children who continue to have persisting language difficulties. The use of parent focused interventions which incorporate home learning activities and promote parent responsiveness was also suggested. Future research should continue to evaluate the effectiveness of parent focused interventions and the long-term gains of these approaches.

References

Allen, J., & Le, H. (2008). An additional measure of overall effect size for logistic regression models. *Journal of Educational and Behavioral Statistics, 33*(4), 416–41. doi: 10.3102/1076998607306081

American Academy of Pediatrics. (2008). School readiness. *Pediatrics, 121*(4), 1008-1015. doi: 10.1542/peds.2008-0079

American Academy of Pediatrics (2016). *American Academy of Pediatrics announces new recommendations for children's media use*. Retrieved from https://www.aap.org/en-us/about-the-aap/aap-press-room/Pages/American-Academy-of-Pediatrics-Announces-New-Recommendations-for-Childrens-Media-Use.aspx

Armstrong, R., Scott, J., Copland, D., McMahon, K., Khan, A.,Najman, J.M., . . . Arnott, W. (2016). Predicting receptive vocabulary change from childhood to adulthood: A birth cohort study. *Journal of Communication Disorders, 64*, 78–90. doi: 10.1016/j.jcomdis.2016.10.002

Armstrong, R., Scott, J. G., Whitehouse, A. J. O., Copland, D. A., Mcmahon, K. L., & Arnott, W. (2017). Late talkers and later language outcomes: Predicting the different language trajectories. *International Journal of Speech-Language Pathology, 19*(3), 237-250. doi: 10.1080/17549507.2017.1296191

Baldwin, D. A. (1995). Understanding the link between joint attention and language. In C. Moore & P. J. Dunham (Eds.), *Joint attention: Its origins and role in development* (pp. 131-158). Hillsdale, NJ: Lawrence Erlbaum.

Basit, T. N., Hughes, A., Iqbal, Z. & Cooper, J. (2015). The influence of socio-economic status and ethnicity on speech and language development. *International Journal of Early Years Education, 23*(1), 115–33. doi: 10.1080/09669760.2014.973838

Bates, E., Bretherton, I., & Synder, L. (1998). *From first words to grammar: Individual*

differences and dissociable mechanisms. New York: Cambridge University Press.

Bates, E., Marchman, V., Thal, D., Fenson, L., Dale, P., Reznick, J. S., … Hartung, J. (1994). Developmental and stylistic variation in the composition of early vocabulary. *Journal of Child Language, 21*(1), 85-123. doi: 10.1017/S0305000900008680

Beck, I. L., McKeown, M. G., & Kucan, L. (2002). *Bringing words to life: Robust Vocabulary Instruction.* New York: Guilford Press.

Becker, B. (2011). Social disparities in children's vocabulary in early childhood. Does pre-school education help to close the gap? *The British Journal of Sociology*, *62*(1), 69-88. doi: 10.1111/j.1468-4446.2010.01345.x

Beitchman, J. H., Brownlie, E. B., Inglis, A., Wild, J., Matthews, R., Schachter, D., … Lancee, W. (1994). Seven-year follow up of speech/language-impaired and control children: Speech/Language stability and outcome. *Journal of the American Academy of Child and Adolescent Psychiatry, 33*(9), 1322–1330. doi: 10.1111/j.1469-7610.1996.tb01493.x

Beitchman, J. H., Jiang, H., Koyama, E., Johnson, C. J., Escobar, M., Atkinson, L.,…Vida, R. (2008). Models and determinants of vocabulary growth from kindergarten to adulthood. *Journal of Child Psychology and Psychiatry and Allied Disciplines 4*(6), 626–634. doi: 10.1111/j.1469-7610.2008.01878.x

Beitchman J., Wilson B., Brownlie E.B., Walters H., & Lancee W. (1996). Long-term consistency in speech/language profiles: I. Developmental and academic outcomes. *Journal of the American Academy of Child and Adolescent* Psychiatry, 35(6), 804–814. doi: 10.1097/00004583-199606000-00021

Bercow, J. (2008). The Bercow Report: A review of services for children and young people (0-19) with speech, language and communication needs. Department for Children, Schools and Families (DCSF), corp creator.

Berglund, E., Eriksson, M., & Westerlund, M. (2005). Communicative skills in relation to gender, birth order, childcare and socioeconomic status in 18-month-old children. *Scandinavian Journal of Psychology, 46*(6), 485-491. doi: 10.1111/j.1467-9450.2005.00480.x

Berkman, N. D., Wallace, I., Watson, L., Coyne-Beasley, T., Cullen, K., Wood, C, & Lohr, K. N. (2015). *Screening for speech and language delays and disorders in children age 5 Years or younger. A systematic review for the U.S. preventive services task force. Evidence synthesis No. 120.* Rockville, MD: Agency for Healthcare Research and Quality.

Beuker, K. T., Rommelse, N. N., Donders, R., & Buitelaar, J. K. (2013). Development of early communication skills in the first two years of life. *Infant Behavior & Development, 36*(1), 71-83. doi: 10.1016/j.infbeh.2012.11.001

Bishop, D. V. M., & Adams, C. (1990). A prospective study of the relationship between specific language impairment, phonological disorders and reading retardation. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 1*(7), 1027-50. doi: 10.111/j.1469-7610.1990.tb00844.x

Bishop, D. V. M., & Edmundson, A. (1987). Language-impaired 4-year-olds: Distinguishing transient from persistent impairment. *Journal of Speech and Hearing Disorders, 52*(2), 156–173. doi: 10.1044/jshd.5201.156

Bishop, D. V. M., Snowling, M. J., Thompson, P. A., Greenhalgh, T., & The CATALISE Consortium (2016). CATALISE: A multinational and multidisciplinary Delphi consensus study. Identifying language impairments in children. *PLoS ONE, 11*(7). e0168066. doi; 10.1371/journal.pone.0158753

Bishop, D. V. M., Snowling, M. J., Thompson, P. A., Greenhalgh, T., & The CATALISE

Consortium (2017). CATALISE: A multinational and multidisciplinary Delphi consensus study of problems with language development: Terminology. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 58*(10), 1068–1080. doi: 10.1111/jcpp.12721

Blanden, J., & Machin, S. (2010). *Changes in inequality and intergenerational mobility in early years assessments.* In K. Hansen, H. Joshi, & S. Dex (eds). Children of the 21st Century (Volume 2): The first five years. Bristol: The Policy Press.

Bornstein, M. H., & Cote, L. R. (2005). Expressive vocabulary in language learners from two ecological settings in three language communities. *Infancy, 7*(3), 299-316. doi: 10.1207/s15327078in0703_5

Bornstein, M. H., Hahn, C. S., & Haynes, O. M. (2004). Specific and general language performance across early childhood: Stability and gender considerations. *First Language, 24*(3), 267–304. doi: 10.1177/0142723704045681

Bornstein, M., Leach, D., & Haynes, O.M. (2004). Vocabulary competence in first- and second born siblings of the same chronological age. *Journal of Child Language, 31*(4), 855–873. doi: 10.1017/S0305000904006518

Bornstein, M. H., Hahn, C. S., & Putnick, D. L. (2016). Long-term stability of core language skill in children with contrasting language skills. *Developmental Psychology, 52*(5), 704-16. doi: 10.1037/dev0000111

Bornstein, M. H., & Tamis-LeMonda, C. S. (1989). Maternal responsiveness and cognitive development in children. *New Directions for Child and Adolescent Development, 43,* 49-61. doi: 10.1002/cd.23219894306

Bradley, R. H., & Caldwell, B. M. (1982). The consistency of the home environment and its relation to child development. *International Journal of Behavioral Development, 5*(4), 445– 465. doi: 10.1177/016502548200500404

Bradshaw, P. (2011). *Growing Up in Scotland: Changes in child cognitive ability in the preschool years.* Edinburgh: Scottish Government. Retrieved from http://www.gov.scot/Publications/2011/05/31085122/0

Bradshaw, P., King, T., Knudsen, L., Law, J., & Sharp, C. (2016). *Language development And enjoyment of reading: Impact of early parent-child activities in two growing up in Scotland cohorts*. Edinburgh: Scottish Government. Retrieved from http://www.gov.scot/Publications/2016/06/2715

Bradshaw, P., Knudsen, L., & Mabelis, J. (2015). *Growing Up in Scotland: The circumstances and experiences of 3-year-old children living in Scotland in 2007/08 and 2013.* Edinburgh: Scottish Government. Retrieved from http://www.gov.scot/Resource/0048/00486729.pdf

Bromley, C. (2009). *Growing up in Scotland: The impact of children's early activities on cognitive development.* Edinburgh: Scottish Government. Retrieved from http://www.gov.scot/Publications/2009/03/16101519/0

Bus, A. G., van Ijezendoorn, M. H., & Pellegrine, A. D. (1995). Joint book reading makes for success in learning to read: A meta-analysis on intergenerational transmission of literacy. *Review of Educational Research, 65*(1), 1-21. doi: 10.3102/00346543065001001

Byrne, J., Ellsworth, C., Bowering, E., & Vincer, M. (1993). Language development in low birth weight infants: the first two years of life. *Journal of Developmental & Behavioral Pediatrics, 14*(1), 21-27. doi: 10.3109/13682828309012241

Calvo A., & Bialystok, E. (2014). Independent effects of bilingualism and socioeconomic status on language ability and executive functioning. *Cognition, 130*(3), 278–288. doi: 10.106/j.cognition.2013.11.015

Camilleri, B., & Law, J. (2014). Dynamic assessment of word learning skills of pre-school

children with primary language impairment. *International Journal of Speech-Language Pathology, 16*(5), 507-516. doi: 10.3109/17549507.2013.847497

Cartmill, E. A., Armstrong, B. F., Gleitman, L. R., Goldin-Meadow, S., Medina, T. N., & Trueswell, J. C. (2013). Quality of early parent input predicts child vocabulary 3 years later. *Proceedings of the National Academy of Sciences of the United States of America, 110*(28), 11278-83. doi: 10.1073/pnas.1309518110

Castro, D. C., Páez, M. M., Dickinson, D. K., & Frede, E. (2011). Promoting language and literacy in young dual language learners: Research, practice and policy. *Child Development Perspectives, 5(1),* 15–21. doi: 10.1111/j.1750-8606.2010.00142.x

Catts H.W., Fey M.E., Tomblin J.B., & Zhang X. (2002). A longitudinal investigation of reading outcomes in children with language impairments. *Journal of Speech, Language and Hearing Research, 45*(6), 1142–1157. doi: 10.1044/1092-4388(2002/093)

Central Statistics Office (CSO). (2014). *Quarterly National Household Survey: Parent involvement in children's education in the second quarter (April-June) of 2012*. Retrieved from https://www.cso.ie/en/media/csoie/releasespublications/documents/labourmarket/2012/QNHSparentalinvolvementchildrenseducationq22012.pdf

Central Statistics Office (CSO). (2016). *Census 2016 summary results – Part 1*. Retrieved from https://www.cso.ie/en/csolatestnews/presspages/2017/census2016summaryresults-part1/

Christensen, D., Zubrick, S., Lawrence, D., Mitrou, F., & Taylor, C. (2014). Risk factors for

low receptive vocabulary abilities in the preschool and early school years in the Longitudinal Study of Australian Children. *PLoS ONE, 9*(7), e101476. doi: 10.1371/journal.pone.0101476

Christakis, D. A., Ebel, B. E., Rivara, F. P., & Zimmerman, F. J. (2004). Television, video, and computer game usage in children under 11 years of age. *The Journal of pediatrics, 145(5),* 652-656. doi: 10.1016/j.peds.2004.06.078

Clark, A., O'Hare, A., Watson, J., Cohen, W., Cowie, H., Elton, R., ... Seckl, J. (2007). Severe receptive language disorder in childhood-familial aspects and long-term outcomes: Results from a Scottish study. *Archives of Disease in Childhood, 92*(7), 614–619. doi: 10.1136/adc.2006.101758

Coates, S., & Messer, D. (1996). The influence of parity on children's speech. *Early Child Development and Care, 117,* 29-43. doi: 1080/0300443961170103

Colonnesi, C., Stams, G. J., Koster, I., & Noom, M. J. (2010). The relation between pointing and language development: A meta-analysis. *Developmental Review, 30*(4), 352-366. doi: 10.1016/j.dr.2010.10.001

Conboy, B. T., & Thal, D. J. (2006). Ties between the lexicon and grammar: Cross-sectional and longitudinal studies of bilingual toddlers. *Child Development, 77*(3), 712–35. doi: 10.1111/j.1467-8624.2006.00899.x

Cummins, J. (1979). Cognitive/academic language proficiency, linguistic interdependence, the optimum age acquisition and some other matters. *Working Papers on Bilingualism, 19,* 121-129.

Currie, J. (2001). Early childhood education programs. *Journal of Economic Perspectives, 15*(2), 213-238. doi: 10.1257/jep.15.2.213

Dale, P. S., McMillan, A. J., Hayiou-Thomas, M. E., & Plomin, R. (2014). Illusory Recovery:

Are recovered children with early language delay at continuing elevated risk? *American Journal of Speech-Language Pathology, 23*(3), 437–447. doi 10.1044/2014_AJSLP-13-0116

Dale, P. S., Price, T. S., Bishop, D. V. M., & Plomin, R., (2003). Outcomes of early Language delay: I. Predicting persistent and transient language difficulties at 3 and 4 years. *Journal of Speech, Language, and Hearing Research, 46*(3), 544–560. doi: 10.1044/1092-4388(2003/045)

De Agostini, M., Metz-Lutz, M. N., Van Hout, A., Chavance, M., Deloche, G., Pavou-Martins, I., & Dellatolas, G. (1998). Batterie d'´evaluation du langage oral de l'enfant aphasique (ELOLA): standardisation francaise (4-12 ans). *Revue de neuropyschologie, 8*(3) 139-367.

Department of Education and Skills. (2004). Focused policy assessment early start programme. Retrieved from https://www.education.ie/en/Publications/Education-Reports/Focussed-Policy-Assessment-Early-Start-Programme-Early-Years-Education-Policy-Unit.pdf

Department of Education and Skills. (2012). Primary Circular 0007/2012. Retrieved from https://www.ippn.ie/index.php?option=com_mtree&task=att_download&link_id=3852&cf_id=24

Dickinson, D. K., & Snow, C. (1987). Interrelationships among prereading and oral language skills in kindergartners from two social classes. *Early Childhood Research Quarterly, 2*(1), 1- 25. doi: 10.1016/0885-2006(87)90010-X

Dickinson, D. K., & Tabors, P. O. (1991). Early literacy: Linkages between home, school and literacy achievement at age five. *Journal of Research in Child Education, 6*(1), 30-46. doi: 10.1080/02568549109594820

Dockrell, J. E. (2001). Assessing language skills in preschool children. *Child Psychology &*

Psychiatry Review, 6(2), 74–82. doi: 10.1017/S1360641701002532

Dockrell, J. E., Stuart, M., & King, D. (2010). Supporting early oral language skills for English language learners in inner city preschool provision. *British Journal of Educational Psychology*, *80*(4), 497–515. doi: 10.1348/000709910X493080

Duff, F. J., Reen, G., Plunkett, K., & Nation, K. (2015). Do infant vocabulary skills predict school-age language and literacy outcomes? *Journal of Child Psychology and Psychiatry, 56(8),* 848–856. doi: 10.1111/jcpp.12378

Dunn, L., Beach, S. A., & Kontos, S. (1994). Quality of the literacy environment in day care and children's development. *Journal of Research in Childhood Education, 9*(1), 24-34. doi: 10.1080/02568549409594950

Dunn, L. M., & Dunn, L. (1981). *Peabody Picture Vocabulary Test-Revised*. Circle Pines: American Guidance Service.

Duursma, E., Augustyn, M., & Zuckerman, B. (2008). Reading aloud to children: The evidence. *Archives of Disease in Childhood 93*(7), 554-557. doi: 10.1136/adc.2006.106336

Early Childhood Ireland. (2018). *The EECE Scheme.* Retrieved from https://www.earlychildhoodireland.ie/work/information-parents/choosing-childcare/ecce-free-preschool-year/

Elliott, C., Smith, P., & McCulloch, K. (1997). *British Ability Scales. 2nd ed.* London, UK: NFER Nelson.

Ellis, E. M., & Thal, D.J. (2008). Early language delay and risk for language impairment. *Perspectives on Language Learning and Education, 15*(3), 93–100. doi: 10.1044/lle15.3.93

Ellis Weismer, S. (2007). Typical talkers, late talkers, and children with specific language

impairment: A language endowment spectrum? In R. Paul (Ed.*). The influence of developmental perspectives on research and practice in communication disorders: A Festschrift for Robin S. Chapman* (pp. 83-102). Mahwah, NJ: Erbaum.

Eriksson, M., Marschik, P. B., Tulviste, T., Almgren, M., Perez Pereira, M., Wehberg, S.,…Gallego, C. (2012). Differences between girls and boys in emerging language skills: Evidence from 10 language communities. *British Journal of Developmental Psychology 30*(2), 326–343. doi: 10.1111/j.2044-835X.2011.02042.x

Farrant, B. M., & Zubrick, S. R. (2013). Parent–child book reading across early childhood and child vocabulary in the early school years: Findings from the longitudinal study of Australian children. *First Language, 33*(3), 280–293. doi: 10.1177/0142723713487617

Fenson, L., Dale, P. S., Reznick, J. S., Bates, E., Thal, D. J., & Pethick, S. J. (1994). Variability in early communicative development. *Monographs of the Society for Research in Child Development. 59*(5), 1-173. doi: 10.2307/1166093Fenson, L., Marchman, V. A., Thal, D. J., Dale, P., Reznick, J. S., & Bates, E. (2007). *MacArthur Communicative Developmental Inventories: User guide and technical manual (2nd ed).* Baltimore, MD: Brookes.

Feldman, H. M., Dale, P. S., Campbell, T. F., Colborn, D. K., Kurs-Lasky, M., Rockette, H. E., et al. (2005). Concurrent and predictive validity of parent reports of child language at ages 2 and 3 years. *Child Development, 76*(4), 856-868.

Feldman, H. M., Dollaghan, C. A., Campbell, T. F., Kurs-Lasky, M., Janosky, J. E., & Paradise, J. L. (2000). Measurement properties of the MacArthur Communicative Development Inventories at ages 1 and 2 years. *Child Development, 71*(2), 310–322. doi: 10.1111/1467-8624.00146

Fernald, A., Marchman, V. A., & Weisleder, A. (2013). SES differences in language

processing skill and vocabulary are evident at 18 months. *Developmental Science, 16*(2), 234–48. doi: 10.1111/desc.12019

Fricke, S. & Millard, G. (2016). A setting-based oral language intervention for nursery-aged children with English as an additional language. In V. A. Murphy & M. Evangelou (Eds.), *Early childhood education in English for speakers of other languages* (pp. 171-186). British Council: London.

Gathercole, V. C. M., & Thomas, E. M. (2009). Bilingual first-language development: Dominant language takeover, threatened minority language take-up. *Bilingualism: Language and Cognition, 12*(2), 213–37. doi: 10.1017/S1366728909004015

Ghassabian, A., Rescorla, L., Henrichs, J., Jaddoe, V.W., Verhulst, F.C., & Tiemeier, H. (2014). Early lexical development and risk of verbal and nonverbal cognitive delay at school-age. *Acta Paediatrica, 103*(1), 70–80. doi: 10.1111/apa.12449

Gibson T., Oller, D., Jarmulowicz, L., & Ethington C. (2012). The receptive–expressive gap in the vocabulary of young second-language learners: Robustness and possible mechanisms. *Bilingualism (Cambridge, England), 15*(1), 102–116. doi: 10.1017/S1366728910000490

Goodman, R. (1997). The Strengths and Difficulties Questionnaire: A Research Note. *Journal of Child Psychology and Psychiatry, 38*(5), 581-586. doi: 10.1111/j.1469-7610.1997.tb01545.x

Goldberg, H., Paradis, J., & Crago, M. (2008). Lexical acquisition over time in minority first language children leaning English as a second language. *Applied Psycholinguistics, 29*, 41-65. doi: 10.1017/S011427640808003X

Guarini, A., Sansavini, A., Fabbri, C., Alessandroni, R., Faldella, G., & Karmiloff-Smith, A. (2009). Reconsidering the impact of preterm birth on language outcome. *Early Human Development, 85*(10), 639-645. doi: 10.1016/j.earlhumdev.2009.08.061

Haddock, C. K., Rindskopf, D., Shadish, W. R. (1998). Using odds ratios as effect sizes for meta-analysis of dichotomous data: A primer on methods and issues. *Psychological Methods. 3*(3), 339–53. doi: 10.1037/1082-989X.3.3.339

Hambridge, S. J., Phibbs, S. L., Chandramoulie, V., Fairolough, D., & Steiner, J. F. (2009). A stepped intervention increases well-child care and immunization rates in a disadvantaged population. *Pediatrics 124*(2), 455-464. doi: 10.1542/peds.2008-0446

Harrison, L. J., & McLeod, S. (2010). Risk and protective factors associated with speech and language impairment in a nationally representative sample of 4- to 5-year-old children. *Journal of Speech, Language and Hearing Research, 53*(2), 508-529. doi: 10.1044/1092-4388(2009/08-0086)

Hart, B., & Risley, T. R. (1995). *Meaningful differences in the everyday experiences of young American children.* Baltimore: Brookes Publishing Co.

Hartas, D. (2011). Families' social backgrounds matter: Socio-economic factors, home learning and young children's language, literacy and social outcomes. *British Educational Research Journal, 37*(6), 893-914. doi: 10.1080/01411926.2010.506945

Hayes, N., Keegan, S., & Goulding, E. (2012). *Evaluation of the speech and language therapy service of Tallaght west Childhood Development Initiative*. Dublin: Childhood Development Initiative (CDI). Retrieved from https://arrow.dit.ie/cgi/viewcontent.cgi?article=1035&context=cserrep

Heckman, J., & Wax, A. (2004, January 23). Home Alone. *Wall Street Journal.* Retrieved from https://www.wsj.com/articles/SB107481818393409637

Henrichs, J., Rescorla, L., Schenk, J. J., Schmidt, H. G., Jaddoe, V. W. V., Hofman, A., … Tiemeier, H. (2011). Examining continuity of early expressive vocabulary development: The generation R study. *Journal of Speech Language and Hearing Research, 54*(3), 854–869. doi: 10.1044/1092-4388(2010/09-0255)

Hoff, E. (2003). The specificity of environmental influence: Socioeconomic status affects early vocabulary development via maternal speech. *Child Development, 74*(5), 1,368–1,378. doi: 10.1111/1467-8624.00612

Hoff, E., Core, C., Place, S., Rumiche, R., Senor, M. & Parra, M. (2012). Dual language exposure and early bilingual development. *Journal of Child Language*, *39*(1), 1-27. doi: 10.1017/S0305000910000759

Hourigan, S. (2015). *Influence of the home learning environment on expressive language ability age 3* (Unpublished master's thesis). Trinity College Dublin, Dublin, Ireland.

Hudson, S., Levickis, P., Down, K., Nicholls, R. & Wake, M. (2015). Maternal responsiveness predicts child language at ages 3 and 4 in a community-based sample of slow-to-talk toddlers. *International Journal of Language & Communication Disorders, 50*(1), 136-142. doi: 10.1111/1460-6984.12129

Hulme, C., Nash, H. M., Gooch, D., Lervag, A., & Snowling, M. J. (2015). The foundations of literacy development in children at familial risk of dyslexia. *Psychological Science, 26*(12), 1877-86.doi: 10.1177/0956797615603702

Huttenlocher, J., Haight, W., Bryk, A., Seltzer, M. & Lyons, T. (1991). Early vocabulary growth: Relation to language input and gender. *Developmental Psychology, 27*(2), 236-248. doi: 10.1037/0012-1649.27.2.236

Huttenlocher, J., Waterfall, H., Vasilyeva, M., Vevea J., & Hedges, L.V. (2010). Sources of variability in children's language growth. *Cognitive Pyschology, 61*(4), 343-65.doi: 10.1016/j.cogpsych.2010.08.002

Johnson, C. J., Beitchman, J. H., & Brownlie, E. B. (2010). Twenty-year follow-up of children with and without speech-language impairments: Family, educational, occupational, and quality of life outcomes. *American Journal of Speech-Language Pathology, 19*(1), 51–65. doi: 10.1044/1058-0360(2009/08-0083)

Jung, T. & Wickrama, K. A. S., (2008). An introduction to latent class growth analysis and growth mixture modeling. *Social and Personality Psychology Compass 2*(1), 302–317. doi: 10.1111/j.1751-9004.2007.00054.x

Kelly, L. (2008). *Lone parent families with young children: findings from the Growing up in Scotland study.* Edinburgh: Scottish Government. Retrieved from https://growingupinscotland.org.uk/wp-content/uploads/2013/04/Lone-parents.pdf

Kern, S. (2003). *Le compte-rendu parental au service de l´´evaluation de la production lexicale des enfants franc¸ais entre 16 et 30 mois*. Paris, France: Union nationale pour le d´eveloppement de la recherche et de l'information en orthophonie.

King, K., & Fogle, L. (2006). *Raising bilingual children: Common parental concerns and current research.* Washington DC; Centre for Applied Linguistics.

King, T., McKean, C., Rush, R., Westrupp, E. M., Mensah, F. K., Reilly, S., & Law, J. (2017). Acquisition of maternal education and its relation to single-word reading in middle childhood: An analysis of the Millennium Cohort Study. *Merrill-Palmer Quarterly, 63*(2), 181-209.

Krcmar, M. Grela, B., & Lin, K. (2007). Can toddlers learn vocabulary from television? An experimental approach. *Media Psychology, 10*(1) 41-63. doi: 10.1080/15213260701300931

Kühn, P., Sachse, S., & Suchodoletz, W. (2015). Language delay: what is the prognosis of late bloomers? *Klinische Pädiatrie, 227*(4), 213-218. doi: 10.1055/s-0035-1547310

Language and Reading Research Consortium (2015). The dimensionality of language ability in young children. *Child Development, 86*(6), 1948–1965. doi 10.1111/cdev.12450

Law, J. (2018, March 16). Email.

Law, J. & Camilleri, B. (2007). Assessing children referred to speech and language therapy: Static and dynamic assessment of receptive vocabulary. *Advances in Speech Language Pathology, 9*(4), 312-322. doi: 10.1080/14417040701624474

Law, J., Charlton, J., Dockrell, J., Gascoigne, M., McKean, C., & Theakston, A. (2017).

Early language development: Needs, provision, and intervention for preschool children from socioeconomically disadvantaged backgrounds. A report for the Education Endowment Foundation. Retrieved from https://educationendowmentfoundation.org.uk/public/files/Law_et_al_Early_Language_Development_final.pdf

Law, J., McBean, K., & Rush, R. (2011). Communication skills in a population of primary school- aged children raised in an area of pronounced social disadvantage. *International Journal of Language and Communication Disorders, 46*(6), 657–664.doi: 10.1111/j.1460-6984.2011.00036.x

Law, J., Rush, R., Anandan, C., Cox, M. & Wood, R. (2012). Predicting language change between 3 and 5 years and its implications for early identification. *Pediatrics 130*(1), 132–137. doi: 10.1542/peds.2011-1673

Law, J., Rush, R., Schoon, I., & Parsons, S. (2009). Modelling developmental language difficulties from school entry into adulthood: Literacy, mental health, and employment outcomes. *Journal of Speech, Language and Hearing Research, 52*(6), 1401-1416. doi: 10.1044/109204388(2009/08-0142).

Law, J., Todd, L., Clark, J., Mroz, M. & Carr, J. (2013). *Early language delays in the UK.* London: Save the Children. Retrieved from https://resourcecentre.savethechildren.net/sites/default/files/documents/early_language_delays.pdf

Layte, R. & McCrory, C. (2011). Growing up in Ireland: overweight and obesity among 9 year olds. Retrieved from https://www.growingup.ie/pubs/BKMNEXT211.pdf

Lee, J. (2011). Size matters: Early vocabulary as a predictor of language and literacy competence. *Applied Psycholinguistics, 32*(1), 69–92.doi: 10.1017/S0142716410000299

Levickis, P., Reilly, S., Girolametto, L., Ukoumunne, O. C., & Wake, M. (2014). Maternal behaviours promoting language acquisition in slow-to-talk toddlers: Prospective community based study. *Journal of Developmental and Behavioural Pediatrics 35*(4), 274-281. doi: 10.1097/DBP.0000000000000056

Linebarger, D. L., Kosanic, A., Greenwood, C. R., & Doku, N. S. (2004). Effects of viewing the television programBetween the Lionson theemergent literacy skills of young children. J*ournal of Educational Psychology, 96*(2), 297–308. doi:10.1037/0022-0663.96.2.297

Lüke C., Ritterfeld, U., Grimminger A., Liszkowski U., & Rohlfing K. J. (2017). Development of pointing gestures in children with typical and delayed language acquisition. *Journal of Speech, Language and Hearing Research, 60*(11), 185-3197. doi: 10.1044/2017_JSLHR-L-16-0129

Lyytinen, P., Eklund, K., & Lyytinen, H. (2005). Language development and literacy skills in late-talking toddlers with and without familial risk for dyslexia. *Annals of Dyslexia, 55*(2), 166–192. doi: 10.1007/s11881-005-0010-y

Marchman, V. A., Fernald, A., & Hurtado, N. (2010). How vocabulary size in two languages relates to efficiency in spoken word recognition by young Spanish–English bilinguals. *Journal of Child Language. 37*(4), 817–840. doi: 10.1017/S0305000909990055

Marchman, V. A., Martínez-Sussmann, D. (2002). Concurrent validity of caregiver/parent report measure of language for children who are learning both English and Spanish. *Journal of Speech, Language, and Hearing Research, 45*(5), 983–997. doi: 10.1044/1092-4388(2002/080)

McCrory, C., Williams, J., Murray, A., Quail, A. & Thornton, M. (2013). Design,

instrumentation and procedures for the infant cohort at wave two (3 years). Dublin, Ireland: The Economic and Social Research Institute. Retrieved from https://www.esri.ie/pubs/BKMNEXT253.pdf

McGinnity, F., Russell, H., & Murray, A. (2015). *Growing up in Ireland: Non-parental childcare and child cognitive outcomes at age 5*. Infant Cohort Report No. 6. Dublin, Ireland: The Economic and Social Research Institute. Retrieved from https://www.esri.ie/pubs/BKMNEXT300.pdf

McKean, C., Law, J. Mensah, F. K., Cini, E., Eadie, P., Frazer, K., & Reilly, S. (2016). Predicting meaningful differences in school-entry language skills from child and family factors measured at 12 months of age. *International Journal of Early Childhood, 48*(3), 329-351.

McKean, C., Mensah, F. K., Eadie, P., Bavin, E. L., Bretherton, L., Cini, E., & Reilly, S. (2015). Levers for language growth: Characteristics and predictors of language trajectories between 4 and 7 years. PLoS ONE, 10(8) e0134251. doi: 10.1371/journal.pone.0134251

McKean, C., Wraith, D., Eadie, P., Cook, F., Mensah, F., & Reilly, S. (2017). Subgroups in language trajectories from 4 to11 years: The nature and predictors of stable, improving and decreasing language trajectory groups. *Journal of Child Psychology and Psychiatry, 58*(10), 1081–1091. doi: 10.1111/jcpp.12790

Melhuish, E. (2010). *Impact of the home learning environment on child cognitive development*: *Secondary Analysis of Data from Growing Up in Scotland.* Edinburgh: Scottish Government. Retrieved from http://www.gov.scot/Resource/Doc/310722/0098010.pdf

Menard, S. (1995). *Applied Logistic Regression Analysis: Sage University Series on Quantitative Applications in the Social Sciences*. Thousand Oaks, CA: Sage.

Mol, S. E. & Bus, A. G., (2011). To read or not to read: A meta-analysis of print exposure from infancy to early adulthood. *Psychological Bulletin, 137*(2), 267–296. doi: 10.1037/a0021890

Mol, S. E., Bus, A. G., de Jong, M. T., & Smeets, D. J. H. (2008). Added value of dialogic parent-child book readings: A meta-analysis. *Early Education and Development, 19*(1), 7–26. doi: 10.1080/10409280701838603

Morales, M., Mundy, P., Delgado, C. E. F., Yale, M., Messinger, D., Neal, R., & Schwartz, H. K. (2000). Responding to joint attention across the 6-through 24-month age period and early language acquisition. *Journal of Applied Developmental Psychology, 21*(3), 283–298.doi: 10.1016/S0193-3973(99)00040-4

Murphy, V. A. (2017). English as an additional language the early years. Presentation, Multilingualism in the Early Years, Dublin Institute of Technology. Retrieved from https://www.dit.ie/media/reyll/documents/Professor%20Victoria%20Murphy%20English%20as%20an%20additional%20language%20the%20early%20years.pdf

Murray, A., McCrory, C., & William, J. (2014). *Report on the pre-pilot, pilot and dress rehearsal exercise for wave 2 of the infant cohort at age three years*. Dublin, Ireland: The Economic and Social Research Institute. Retrieved from https://www.esri.ie/pubs/BKMNEXT312.pdf

National Council for Special Education (NCSE). (2018, March 14). *NCSE welcomes launch of In-School Therapy Support Project* [Press release]. Retrieved from http://ncse.ie/wp-content/uploads/2018/05/In-school-therapy-service-launch-statement-for-upload.pdf

Norbury, C. F. (2015). Editorial: Early intervention in response to language delays - is there a danger of putting too many eggs in the wrong basket? *Journal of Child Psychology and Psychiatry 56*(8), 835-836. doi: 10.1111/jcpp.12446

Norbury, C. F., Gooch, D., Baird, G., Charman, T., Siminoff, E., & Pickles, A. (2016). Younger children experience lower levels of language competence and academic progress in the first year of school: Evidence from a population study. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 57*(1), 65–73. doi: 10.1111/jcpp.12431

Paul, R. (1996). Clinical implications of the natural history of slow expressive language development. *American Journal of Speech-Language Pathology. 5*(2), 5–21. doi: 10.1044/1058-0360.0502.05

Pence, K. L. & Justice, L. M. (2008). *Language development from theory to practice*. Upper Saddle River, NJ: Pearson.

Peyre, H., Bernard, J., Forhan, A., Charles, M., De Agostini, M., Heude, B. & Ramus, F. (2014). Predicting changes in language skills between 2 and 3 years in the EDEN mother–child cohort. *PeerJ, 2*, e335, doi; 10.7717/peerj.335

Poll, G. H., Betz, S. K., Miller, C. A. (2010). Identification of clinical markers of specific language impairment in adults. *Journal of Speech, Language and Hearing Research, 53*(2), 414-429. doi: 10.1044/1092-4388(2009/08-0016)

Preston, J. L., Frost, S. J., Mencl, W. E., Fulbright, R. K., Landi, N., Grigorenko, E. … Pugh, J. R. (2010). Early and late talkers: School-age language, literacy and neurolinguistic differences. *Brain, 133*(8), 2185–2195. doi: 10.1093/brain/awq163

Reilly, S., McKean, C., & Levickis, P. (2014). *Late talking: Can it predict later language difficulties?* Parkville: Centre for Research Excellence in Child Language, Research Snapshot 2. Retrieved from: https://www.mcri.edu.au/sites/default/files/media/documents/crec_rs2_late-talkers-1_design_v0.1_0.pdf

Reilly, S., Wake, M., Bavin, E. L., Prior, M., Williams, J., Bretherton, L., . . . Ukoumunne, O.

C. (2007). Predicting language at 2 years of age: A prospective community study. *Pediatrics, 120*(6), 1441–1449. doi: 10.1542/peds.2007-0045

Reilly, S., Wake, M., Ukoumunne, O.C., Bavin, E., Prior, M., Cini, E., …Bretherton, L. (2010). Predicting language outcomes at 4 years of age: Findings from the Early Language in Victoria Study. *Pediatrics, 126*(6), 1530–1537. doi: 10.1542/peds.2010-0254

Rescorla L. (1989). The Language Development Survey: A screening tool for delayed language in toddlers. *Journal of Speech and Hearing Disorders, 54*(4), 587–599.doi: 10.1044/jshd.5404.587

Rescorla L. (2002). Language and reading outcomes to age 9 in late-talking toddlers. *Journal of Speech, Language, and Hearing Research, 45*(2), 360–371. doi: 10.1044/1092-4388(2002/028)

Rescorla L. (2005). Age 13 language and reading outcomes in late-talking toddlers. *Journal of Speech, Language, and Hearing Research, 48*(2), 459–472. doi: 10.1044/1092-4388(2005/031)

Rescorla, L. (2009). Age 17 language and reading outcomes in late talking toddlers: support for a dimensional perspective on language delay. *Journal of Speech, Language, and Hearing Research, 52*(1), 16-30. doi: 10.1044/1092-4388(2008/07-0171)

Rescorla, L. (2011). Late talkers: Do good predictors of outcome exist? *Developmental Disabilities Research Reviews, 17*(2), 141–150. doi: 10.1002/ddrr.1108.

Rescorla, L., & Achenbach, T. M. (2002). Use of the language development survey (LDS) in a national probability sample of children 18 to 35 months old. *Journal of Speech, Language, and Hearing Research, 45*(4), 733–743. doi: 10.1044/1092-4388(2002/059)

Rescorla, L., & Alley A. (1991). Validation of the language development survey (LDS): a

parent report tool for identifying language delay in toddlers. *Journal of Speech, Language and Hearing Sciences, 44*(2) 434-45. doi: 10.1044/1092-4388(2001/035)

Rice M.L., & Hoffman, L. (2015). Predicting vocabulary growth in children with and without Specific Language Impairment: A longitudinal study from 2;6 to 21 years of age. *Journal of Speech, Language and Hearing Research, 58*(2), 345–359. doi: 10.1044/2015_JSLHR-L-14-0150

Rice, M. L., Huston, A. C., Truglio, R., & Wright, J. C. (1990). Words from "Sesame Street": Learning vocabulary while viewing. *Developmental Psychology, 26*(3), 421-428. doi: 10.1037/0012-1649.26.3.421

Rice, M., Taylor, C. & Zubrick., S. (2008). Language outcomes of 7-year-old children with or without a history of late language emergence at 24 months. *Journal of Speech, Language, and Hearing Research, 51*(2), 394–407. doi: 10.1044/1092-4388(2008/029)

Roberts, J. E., Burchinal, M., & Durham, M. (1999). Parents' report of vocabulary and grammatical development of african american pre-schoolers: Child and environmental associations. *Child Development, 70*(1), 92-106. doi: 10.1111/1467-8624.00008

Roberts, G., Bellinger, D., & McCormick, M. C. (2007). A cumulative risk factor model for early identification of academic difficulties in premature and low birth weight infants. *Maternal and Child Health Journal, 11*(2), 161-172. doi: 10.1007/s10995-006-0158-z

Roberts, M. & Kaiser, A. P. (2011). The effectiveness of parent-implemented language interventions: A meta-analysis. *American Journal of Speech-Language Pathology 20*(3), 180-99. doi: 10.1044/1058-0360(2011/10-0055)

Robinson, B. F., & Mervis, C. B. (1999). Comparing productive vocabulary measures from the CDI and a systematic diary study. *Journal of Child Language, 26*(10, 177–185 doi 10.1017/S0305000998003663.

Rodriguez, E. T. & Tamis-Le Monda, C. S (2011). Trajectories of the home learning environment across the first 5 years: Associations with children's vocabulary and literacy skills at prekindergarten. *Child Development, 82*(4), 1058-1075. doi: 10.1111/j.1467-8624.2011.01614.x

Romeo, R. R., Leonard, J. A., Robinson, S. T., West, M. R., Mackey, A. P., Rowe, M. L.,…Gabrieli, J. D. E. (2018). Beyond the 30-million-word gap: Children's conversational exposure is associated with language related brain function. *Psychological Science, 29*(5), 700-710. doi: 10.1177/0956797617742725

Roos, E. M., & Ellis Weismer, S. (2008). Language outcomes of late talking toddlers at preschool and beyond. *Perspectives on Language Learning Education, 15*(3), 119–126. doi: 10.1044/lle15.3.119

Rosenthal, J.A. (1996). Qualitative descriptors of strength of association and effect size. *Journal of Social Service Research, 21*(4), 37-59. doi: 10.1300/J079v21n04_02

Roulstone, S., Law, J., Rush, R., Clegg, J., & Peters, T. (2011). *Investigating the role of language in children's early educational outcomes: An analysis of data from the Avon Longitudinal Study of Parents and Children (ALSPAC).* Nottingham: Department for Education. Retrieved from http://www.education.gov.uk/publications/eOrderingDownload/ DFE-RR134.pdf

Rowe, M. (2012). A Longitudinal investigation of the role of quantity and quality of child-directed speech in vocabulary development. *Child Development, 83*(5), 1762-1774. doi: 10.1111/j.1467-8624.2012.01805.x

Rowe, M. L., & Goldin-Meadow, S. (2009). Early gesture selectively predicts later language learning. *Developmental Science, 12*(1), 182-187. doi: 10.1111/j.1467-7687.2008.00764.x

Rowe, M. L., Raudenbush, S. W., & Goldin-Meadow, S. (2012). The pace of vocabulary

growth helps predict later vocabulary skill. *Child Development. 83*(2): 508–525. doi: 10.1111/j.1467-8624.2011.01710.x

Roy, P., & Chiat, S. (2013). Teasing apart disadvantage from disorder: The case of poor language. In: C. R. Marshall (Ed.). *Current Issues in Developmental Disorders* (pp. 125-150). Hove: Psychology Press.

Roy, P., & Chiat, S. (2014). Developmental pathways of language and social communication problems in 9–11 year olds: Unpicking the heterogeneity. *Research in Developmental Disabilities, 35*(10), 2534–2546. doi: 10.1016/j.ridd.2014.06.014

Rudolph, J.M., & Leonard, L.B. (2016). Early language mile-stones and Specific Language Impairment. *Journal of Early Intervention, 38*(1), 41–58. doi: 10.1177/1053815116633861

Scarborough, H. S., & Dobrich, W. (1990). Development of children with early language delay. *Journal of Speech and Hearing Research, 33*(1), 70-83. doi: 10.1044/jshr.3301.70

Semel, E., Wiig, E. H., & Secord, W. A. (2006). *Clinical Evaluation of Language Fundamentals second edition (CELF Preschool-2).* London: The Psychological Corporation.

Sénéchal, M., LeFevre, J. A., Hudson, E., & Lawson, E. P., (1996). Knowledge of storybooks as a predictor of young children's vocabulary. *Journal of Educational Psychology, 88*(3), 520-536. doi: 10.1037/0022-0663.88.3.520

Sénéchal, M., Pagan, S., Lever, R., & Ouellette, G. P. (2008). Relations among the frequency of shared reading and 4-year-old children's vocabulary, morphological and syntax comprehension, and narrative skills. *Early Education and Development, 19*(1), 27-44. doi: 10.1080/10409280701838710

Simonsen, H. G., Kristoffersen, K. E., Bleses, D., Wehberg, S., Jørgensen, R. N., (2014). The Norwegian Communicative Development Inventories: reliability, main developmental trends and gender differences. *First Language. 34*(1), 3-23. doi: 10.1177/0142723713510997

Sisson, S. B., Broyles, S. T., Newton, R. L., Baker, B. L., & Chernausek, S. D. (2011). Tvs in the bedrooms of children: does it impact health and behaviour? *Preventive Medicine, 52*(2), 104-108. doi: 10.1016/j.ypmed.2010.11.019

Smith, G. (2016). *Chit Chat Implementation Guide: An Early Intervention Speech and Language Therapy Model, Childhood Development Initiative.* Retrieved from https://www.twcdi.ie/wp-content/uploads/2016/11/CDISLT_Chit_Chat_Implementation_Guide_17.06_web.pdf

Snowling, M. J., Duff, F. J., Nash, H. M., & Hulme, C. (2016). Language profiles and literacy outcomes of children with resolving, emerging, or persisting language impairments. *Journal of Child Psychology and Psychiatry, 57*(12), 1360– 1369.doi; 10.1111/jcpp.12497

Son, S. H., & Morrison, F. J. (2010). The nature and impact of changes in home learning environment on development of language and academic skills in preschool children. *Developmental Psychology, 46*(5), 1103-1118. doi: 10.1037/a0020065

Squires, J., Potter, L., & Bricker, D. (1999). The ASQ User's Guide for the Ages and Stages Questionnaire (2nd Ed.). Baltimore: Paul H. Brookes Publishing

Stokes, S. F., & Klee, T. (2009). Factors that influence vocabulary development in two-year-old children. *Journal of Child Psychology and Psychiatry, 50*(4), 498-505. doi: 10.1111/j.1469-7610.2008.01991.x

Stone, L. L., Otten, R., Engels, R. C., Vermulst, A. A., & Janssens, J. M. (2010). Psychometric properties of the parent and teacher versions of the strengths and difficulties questionnaire for 4- to 12-year-olds: A review. *Clinical Child and Family Psychology Review, 13*(3), 254-274.doi: 10.1007/s10567-010-0071-2

Swanson, H., Rosston, K., Gerber, M., Solari, E. (2008). Influence of oral language and phonological awareness on children's bilingual reading. *Journal of School Psychology, 46(*4) 413–429. doi: 10.1016/j.jsp.2007.07.002

Sylva, K., Melhuish, E. C., Sammons, P., Siraj-Blatchford, I., & Taggart, B. (2004). *The effective provision of pre-school education (EPPE) project.* Technical Report 12. London: DfES / Institute of Education, University of London. Retrieved from http://discovery.ucla.ac.ik/10005308/

Szklo, M. (1998). Population-based cohort studies. *Epidemiologic Reviews, 20*(1), 81-90. doi: 10.1093/oxfordjournals.epirev.a017974

Tamis- Le Monda, C. S., Shannon, J. D., Cabrera, N. J. &, Lamb, M. E. (2004). Fathers and mothers at play with their 2- and 3-year-olds: contributions to language and cognitive development. *Child Development, 75*(6), 1806-20.doi: 10.1111/j.1467-8624.2004.00818.x

Taylor, C. L., Christensen, D., Lawrence, D., Mitrou, F., & Zubrick, S .R. (2013). Risk factors for children's receptive vocabulary development from four to eight years in the longitudinal study of Australian children. *PLoS ONE, 8*(11) e73046. doi: 10.1371/journal.pone.0073046

Thordardottir, E., Rothenberg, A., Rivard, M., Naves, R. (2006). Bilingual assessment: Can

overall proficiency be estimated from separate measurement of two languages? *Journal of Multilingual Communication Disorders. 4(*1), 1–21.doi: 10.1080/14769670500215647

Tomblin, J. B., Records, N. L., Buckwalter, P., Zhang, X., Smith, E., & O'Brien, M. (1997). Prevalence of specific language impairment in kindergarten children. *Journal of Speech, Language and Hearing Research, 40*(6), 1245-60. doi: 10.1044/jslhr.4006.1245

Tomblin, J. B., Hardy, J. C., & Hein, H. A. (1991). Predicting poor-communication status in preschool children using risk factors present at birth. *Journal of Speech and Hearing Research, 34*(5), 1096-105. doi: 10.1044/jshr.3405.1096

Tomblin, J. B., & Zhang, X. (2006). The dimensionality of language ability in school-age children. *Journal of Speech, Language, and Hearing Research, 49*(6), 1193-1208. doi 10.1044/1092-4388(2006/086)

Tomblin, J. B., Zhang, X., Buckwalter, P., & O'Brien, M. (2003). The stability of primary language disorder: four years after kindergarten diagnosis. *Journal of Speech, Language, and Hearing Research, 46(*6), 1283-96.doi: 10.1044/1092-4388(2003/100)

Tomopoulos, S., Dreyer, B. P., Tamis-LeMonda, C., Flynn, V., Rovira, I., Tineo, W., & Mendelsohn, A. L. (2006). Books, toys, parent-child interaction, and development in young Latino children. *Ambulatory Pediatrics, 6*(2) 72-78.doi: 10.1016/j.ambp.2005.10.001

Tripepi, G., Jager, K. J., Dekker, F. W. & Zoccali, C. (2010). Selection bias and information bias in clinical research. *Nephron Clinical Practice, 115*(2), 94-99. doi: 10.1159/000312871

Valentine, J. C., & Cooper, H. (2003). *Effect size substantive interpretation guidelines: Issues in the interpretation of effect sizes*. Washington, DC: What Works Clearinghouse.

Wake, M., Levickis, P., Tobin, S., Gold, L., Ukoumunne, O. C., Goldfeld, S., …Reilly, S.

(2015). Two-year outcomes of a population-based intervention for preschool language delay: An RCT. *Pediatrics, 136*(4), 838-847. doi:10.1542/peds.2015-1337

Wake, M., Tobin, S., Girolametto, L., Ukomunne, O. C., Gold, L., Levickis, P., …& Reilly, S. (2011). Outcomes of population based language promotion for slow to talk toddlers at ages 2 and 3 years: Let's Learn Language cluster randomised control trial. *British Medical Journal, 343*, 1-10. doi: 10.1136/bmj.d4741

Webb, S., & Rodgers, M. P. H. (2009). Vocabulary demands of television programs. *Language Learning, 59*(2), 335-366. doi: 10.1111/j.1467-9922.2009.00509.x

Weizman, Z. O., & Snow, C. E. (2001). Lexical input as related to children's vocabulary acquisition: Effects of sophisticated exposure and support for meaning. *Developmenral Psychology, 37*(2), 265-79.doi: 10.1037/0012-1649.37.2.265

Westby. C. (1988). Test of Language Development - 2 Primary; Test of Language Development - 2 Intermediate. *The Reading Teacher, 42*(3), 236-237.

William, K. T. (2007). *Expressive Vocabulary Test, Second Edition (EVT-2).* San Antonio, Texas: Pearson.

Williams, J., Murray, A., McCrory, C., & McNally, S. (2013). Growing up in Ireland: Development from birth to three years. Infant cohort report. Retrieved from https://www.esri.ie/pubs/BKMNEXT243.pdf

Willinger, U., Brunner, E., Diendorfer-Radner, G., Sams, J., Sirsch, U., & Eisenwort, B. (2003). Behaviour in children with language developmental disorders. *Canadian Journal of Psychiatry, 48*(9), 607-614. doi: 10.1177/070674370304800907

World Health Organisation (WHO) (2014). *Global nutrition targets 2025: low birth weight policy brief (WHO/NMH/NHD/14.5).* Retrieved from http://apps.who.int/iris/bitstream/handle/10665/149020/WHO_NMH_NHD_14.5_eng.pdf;jsessionid=38502451E472881CACF1D48A1129B133?sequence=2

World Health Organisation (WHO) (2018). *Preterm birth*. Retrieved from http://www.who.int/en/news-room/fact-sheets/detail/preterm-birth

Zambrana, I. M., Pons, F., Eadie, P., & Ystrom, E. (2014). Trajectories of language delay from age 3 to 5: Persistence, recovery and late onset. *International Journal of Language and Communication Disorders, 49*(3), 304–316. doi: 10.1111/1460-6984.12073

Zimmerman, F. J., Christakis, D. A., & Meltzoff, A. N. (2007). Television and DVD/video viewing in children younger than 2 years. *Archives of pediatrics & adolescent medicine, 161*(5), 473-479. doi:10.1001/archpedi.161.5.473

Zimmerman, I. L., Steiner, V. G., & Pond, R. E. (1992*). Preschool Language Scale—Third Edition.* San Antonio, TX: The Psychological Corporation.

Zink, I., & Lejaegere, M. (2003). N-CDIs*: Korte vormen, aanpassing en hernormering van de MacArthur Short Form Vocabulary Checklists van Fenson et al. [N-CDIs: Short forms, adaptations and norms of the Dutch version of the short form of the MacArthur Vocabulary Checklists of Fenson et al.]*. Leuven: Acco.

Zubrick, S. R., Taylor, C. L., & Christensen, D. (2015). Patterns and predictors of language and literacy abilities 4-10 years in the longitudinal study of Australian children. *PLoS ONE, 10*(9), 1-29. doi: 10.1371/journal.pone.0135612

Zubrick, S. R., Taylor, C. L., Rice, M. L., & Slegers, D. W. (2007). Late language emergence at 24 months: An epidemiological study of prevalence, predictors, and covariates. *Journal of Speech-Language-Hearing Research, 50*(6), 1562-92.doi: 10.1044/1092-4388(2007/106)