Deloitte Access Economics

Evaluation of the KidsXpress program

KidsXpress Limited

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Deloitte.

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Glossary

ABS	Australian Bureau of Statistics
ADD	Attention Deficit Disorder
ADHD	Attention Deficit Hyperactivity Disorder
AIHW	Australian Institute of Health and Welfare
BCR	benefit-cost ratio
BTOS	broad type of service
CPI	consumer price index
DALY	disability-adjusted life year
DMT	dance/movement therapy
DOH	Department of Health
DPMQ	dispensed price for maximum quantity
GP	general practitioner
ICD-10	International Statistical Classification of Diseases and Related Health Problems, 10th revision
IHPA	Independent Hospital Pricing Authority
KTI	Key Transformation Indicator
MBS	Medicare Benefits Schedule
NCTSN	National Child Traumatic Stress Network
NHCDC	National Hospital Cost Data Collection
NSW	New South Wales
OCD	obsessive compulsive disorder
ODD	oppositional defiant disorder
OOP	out-of-pocket
PBS	Pharmaceutical Benefits Scheme
PTSD	post-traumatic stress disorder
RSE	relative standard error
SDQ	Strengths and Difficulties Questionnaire
SE	standard error
TGA	Therapeutic Goods Administration
VSL	value of a statistical life
VSLY	value of a statistical life year
WTP	willingness to pay

Executive Summary

Deloitte Access Economics was commissioned to conduct a research project aimed at assessing the economic impact of the KidsXpress program (via a cost-benefit analysis), and childhood stress and trauma in general.

KidsXpress is a **dynamic expressive therapy program** for children aged 4-14 years that offers a non-threatening and creative environment to children. Its expressive therapy program uniquely interfaces music, art, drama and play therapies. **These have been demonstrated to be effective in reducing the impact of trauma.**

> Expressive therapy has been defined as the use of drama, painting, music and literature for psychotherapy purposes which include improving and enhancing the physical, emotional and cognitive functions of individuals, resolution of conflicts and stress reduction (Pearson, 2008).

The aim of the KidsXpress program is to reduce the personal, social and financial burdens of the childhood experiences of trauma; and by doing so, to contribute to the long-term development of stronger, more loving and compassionate communities.

This report:

- presents findings from the academic literature around childhood stressors and traumas and their impact on children, and the effect of expressive therapy on alleviating these impacts; and
- conducts a cost-benefit analysis of the KidsXpress program for 2015.

Childhood stressors and trauma

Childhood trauma has a profound effect in the Australian community. The long term effects of childhood trauma are often the most visible – broken relationships and families, violence, abuse and neglect, homelessness, drug and alcohol dependence, mental illness, and unemployment. These effects can often be linked back to the impacts of unresolved childhood trauma.

Childhood stress and trauma occurs "**when children and adolescents are exposed to traumatic events or traumatic situations that overwhelm their ability to cope**" (National Child Traumatic Stress Network, 2010). These events and traumatic situations can include domestic violence, abuse and neglect, divorce of parents, mental health conditions and psychological distress in the household, substance abuse in the household, grief and loss, substantial accidents or injuries, bullying, and developmental or chronic conditions of the child. **The prevalence of these triggers are as high as 47.3% (bullying), 24.5% (chronic and developmental conditions) and 20.8% (divorce of parents) in Australian children.**

As a result of these triggers, stress (defined as exhibiting signs of psychological distress on the Kessler 10 Psychological Distress Scale), is prevalent in 53.9% of Australian children, with **17.0% of Australian children experiencing high levels of psychological distress.**

The effect of expressive therapy

Expressive therapy gives children the experience of doing, making, and creating – to help energise, redirect attention and focus and alleviate emotional stress (Pearson and Wilson, 2008). Expressive therapies promote active participation, and are sensory in nature – helping children to engage their imagination, mind and their body, rather than simply engaging their cognitive abilities, which can suffer as a result of traumatic experiences (Perry, 2009). By augmenting creative and imaginative thinking, expressive therapies help to generate self-expression, experimentation, and subsequent verbal reflection.

KidsXpress' approach to expressive therapy has been developed based on the knowledge of **attachment theory, trauma theory, neurodevelopmental theory, developmental neuroscience and theory surrounding expressive therapies** (an overview of these areas is provided in Chapter 3).

> Expressive therapies can include therapy involving music, art, drama, play, dance or movement, poetry, and sandplay. KidsXpress focusses on the similarities between modalities, rather than focusing on the differences. This type of approach involves multiple expressive therapies and can be more successful than one type of therapy alone in encouraging emotional growth, and enhancing relationships with others (Malchiodi, 2005).

Findings from the literature reviewed for this report show that **expressive therapies are effective, possibly more so than conventional methods, in treating children who have experienced traumatic or stressful experiences.** Play therapy in particular has been shown to improve psychological and wellbeing outcomes for children when compared to other conventional therapies. Other types of expressive therapy – beyond art, music, drama and play therapy – can also be effective treatments for children who have suffered from childhood trauma or stress.

This report highlights a gap in the evidence base for expressive therapies – while expressive therapies have been demonstrated to be effective in improving wellbeing in children who have suffered childhood stress or trauma, no studies were located which established the economic benefits of expressive therapies. As such, this report contributes new insights.

Cost-benefit analysis

Deloitte Access Economics undertook cost-benefit analysis of the KidsXpress program for 2015. As part of this analysis, surveys were undertaken of the parents and carers of KidsXpress children, as well as the referrers who had referred the children to KidsXpress.

The cost-benefit analysis defined **the costs of the KidsXpress program to include all funding that is provided to KidsXpress in 2015**. As the KidsXpress program intervenes to reduce the negative consequences of childhood trauma, **the benefits of the program are represented by costs that would otherwise have been incurred in the absence of the KidsXpress program**. These include health system costs, productivity losses to parents and carers of children with childhood trauma, and quality of life impacts on children who have mental health conditions.

The **health system costs** incurred as a result of childhood trauma include the costs of visits to medical practitioners (general practitioners (GPs), specialists, hospitals and community health services) and medications. The **productivity losses** arise through the additional care that parents and carers need to provide to their children. The **quality of life losses** occur as a result of the pain and suffering due to childhood trauma.

As this report has been finalised before the end of 2015, care has been taken to ensure that all estimates for parameters in 2015 are based on reliable historical data and projections.

> The results of the cost-benefit analysis show that KidsXpress decreased the number of visits to GPs, psychologists and psychiatrists – this resulted in cost decreases of 42.6%, 36.8% and 36.6%, respectively. In addition, KidsXpress reduced the use (and therefore cost) of medications in the target cohort by 3%, and improved quality of life in each child by an average of 49.6%.

Survey results for the other impacts assessed through the cost-benefit analysis (hospital costs, community health service costs, and care provided by parents and carers) also showed a decrease. However, statistical analysis showed that these decreases were not statistically significant[1] (at the 5% level), and so in order to present a conservative analysis of the KidsXpress program these results were not included in the analysis.

Overall, in 2015 KidsXpress is estimated to deliver net benefits of $2.0 million, and generate a benefit-cost ratio (BCR) of 2.76. This means that every $1 invested in the KidsXpress program generates $2.76 of benefits to society in 2015[2] (see Table i).

Table i: Cost-benefit results

Costs	$1,112,805
Benefits	$3,066,146
Net benefits	$1,953,341
BCR	2.76

Source: Deloitte Access Economics calculations.
Note: Costs are the annual costs of KidsXpress. Benefits are the avoided costs due to KidsXpress in 2015. Net benefits are calculated by subtracting costs from benefits. The BCR is calculated by dividing benefits by costs.

The largest contributor to the net benefit is the improvements in quality of life (94.07%), followed by health practitioner costs (5.90%). Reductions in pharmaceutical costs represent a very small amount (0.04%) of the cost reductions.

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[1] Statistical significance refers to whether the observed change is significantly different to zero (that is, no change). Testing at the 5% level provides strong evidence that the observed change is significantly different to zero. Further explanation is provided in Appendix C.

[2] This cost-benefit analysis has not established a causal link between KidsXpress and the cost savings included in the analysis. While statistically significant reductions in the economic costs of children and parents/carers have been established, it is possible that some of this reduction would have occurred even in the absence of KidsXpress (for example, children may also be attending additional therapy programs, which would contribute to the cost reductions). The requisite regression analysis necessary to ascribe the portion of the benefits attributable to KidsXpress is beyond the scope of this analysis, since a matched control group was not available.

1 Background

Deloitte Access Economics was commissioned to conduct a research project aimed at assessing the economic impact of the KidsXpress program (via a cost-benefit analysis), and childhood stress and trauma in general.

1.1 Overview of KidsXpress

KidsXpress was established in 2006 to provide a dynamic expressive therapy program that most appropriately responds to the developmental needs and capabilities of children impacted by emotional trauma.. Its expressive therapy program uniquely interfaces music, art, drama and play therapies.

> Expressive therapy has been defined as the use of drama, painting, music and literature for psychotherapy purposes which include improving and enhancing the physical, emotional and cognitive functions of individuals, resolution of conflicts and stress reduction (Pearson, 2008).

KidsXpress works with children aged from 4-14 years referred through professional pathways[3]. The children referred can display common symptoms of stress, including lack of concentration at school, disturbance of others, and symptoms of anxiety and/or other mental illnesses. Further, the children have also suffered traumatic episodes which can include grief and loss, parental separation, chronic neglect and abuse, domestic violence, social isolation and the consequences of substance abuse.

In the short and medium-term, participants in the KidsXpress program have been shown to demonstrate improved participation in family, school and local communities. These changes also reduce parental and family stress, and the associated burdens on those outside the family who are engaging with the KidsXpress children.

KidsXpress is not a crisis service or diagnostic centre. It provides structured, early intervention therapy programs that are informed by children's caregiving networks (including parents and carers, professional referrers, and educators) to best understand children's needs and thus deliver most effective therapeutic intervention. KidsXpress works in partnership with community organisations and government programs that also work with the children and their families. KidsXpress can serve as both a complement to, and in some cases a substitute for, more traditional therapy methods.

[3] Common sources of referrals come from school teachers/principals/counsellors, psychologists and psychiatrists, GPs, paediatricians, and social workers.

1.2 Structure of report

This report has been structured in the following manner:

- **Chapter 2** provides some background information on the extent of childhood stress in Australia. It begins by defining the various types of stress and their prevalence in Australia, and concludes by discussing the potential impacts of stress on the child, the family, the community and the broader economy.
- **Chapter 3** summarises literature pertaining to expressive therapy, and provides an overview of its efficacy in treating the effects of childhood stress and trauma.
- **Chapter 4** outlines the framework which was used to conduct a cost-benefit analysis of the KidsXpress program, and provides an explanation of key economic terms.
- **Chapter 5** presents the data and parameters which were used in the cost-benefit analysis.
- **Chapter 6** contains the results of the cost-benefit analysis and provides some concluding remarks.

A note on terminology

Throughout this report, the terms childhood stress and childhood trauma are used inter-changeably. In reality, though they are obviously closely related, stress and trauma are not necessarily the same thing – some stress may not be caused by trauma, and similarly some trauma may not be caused by stress.

2 Childhood stressors and trauma

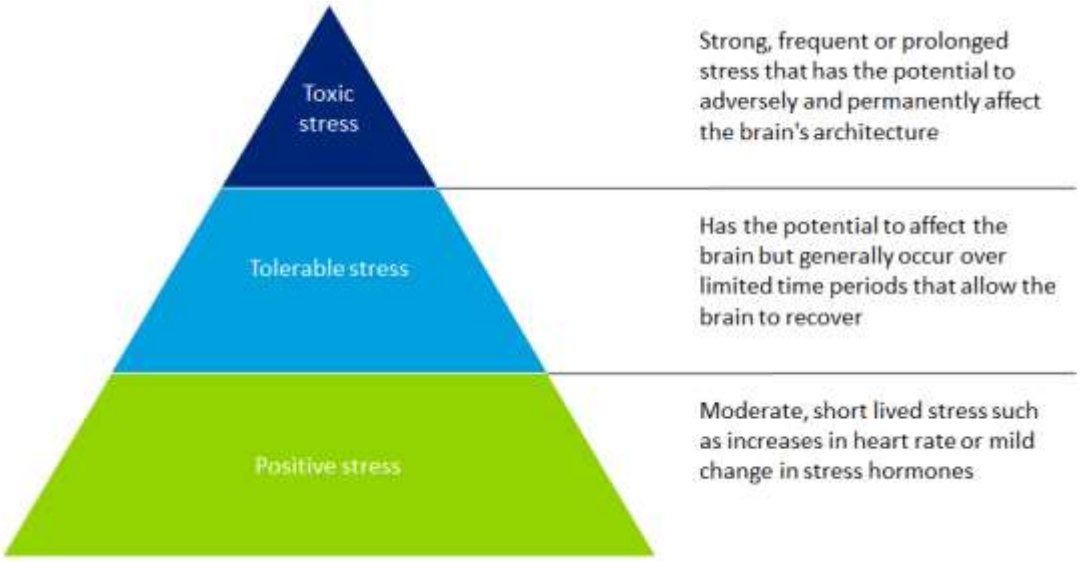
This section defines the scope and impact of childhood stressors and trauma in Australia.

2.1 Definition of stress

There is no concrete definition of stress. One of the most commonly accepted definitions comes from the United States' National Child Traumatic Stress Network (NCTSN), which defines childhood stress and trauma as occurring "when children and adolescents are exposed to traumatic events or traumatic situations that overwhelm their ability to cope" (NCTSN, 2010).

However, it is important to recognise that not all stress is bad, as shown in Figure 2.1. Some stress is a natural part of life and is in fact healthy, such as the metabolic stress that exercise places on a person's heart rate. Some stress is negative but is tolerable by the body; this is generally stress that occurs in isolated, one off events. The worst type of stress is toxic stress – this refers to strong and prolonged stress which increases the risk of stress related illness in later life.

Figure 2.1: Types of stress



Source: Adapted from National Scientific Council on the Developing Child (2014).

It is clear that the NCTSN's definition of stress is referring to toxic stress. Indeed, for the remainder of this report, unless explicitly stated to the contrary, references to stress are referring to toxic stress.

The distinction is important, however, because often the line between tolerable and toxic stress can be blurred. Further, what may be tolerable stress for one child may be toxic stress for another child, depending on the support networks available.

In considering the impact of a sudden death of a loved one, for example, the National Scientific Council on the Developing Child (2014) notes that the presence of supportive adults who create safe environments that help children learn to cope with and recover from major adverse experiences is one of the critical ingredients that make serious stressful events such as these tolerable.

In the context of KidsXpress, the distinction between tolerable and toxic stress is particularly prescient. On the one hand, an argument could be made that KidsXpress is better off targeting those children with 'toxic' stress – that is, those children for which there is virtually no chance of an improvement in the absence of therapeutic intervention.

On the other hand, an argument could equally be made that the provision of expressive therapies helps ensure that a particular child's stress remains at the tolerable level and does not develop into 'toxic' stress.

2.2 Causes of stress

Stress can be caused by a multitude of factors, from family breakdowns, to social problems, to domestic violence. While there is no set definition of precisely what causes stress, both the NCTSN (2010) and the American Psychological Association (2008) have independently identified a similar list of the most common causes of childhood stress, as shown in Table 2.1.

Table 2.1: Causes of childhood stress

NCTSN	American Psychological Association
Sexual abuse	Physical abuse
Physical abuse	Sexual abuse
Domestic violence	Domestic violence
Community and school violence	Community violence
Medical trauma	Medical trauma
Motor vehicle accidents	Early childhood trauma
Terrorism	Terrorism
Natural and human made disaster	Natural disasters
Suicide	Neglect
Other traumatic loss	Traumatic grief

Source: NCTSN (2010) and American Psychological Association (2008).

All of these causes might present themselves in different ways, and in and of themselves might have different effects on the child. Further, different drivers of child stress might generate different psychosomatic responses in the child, and ultimately different effects on the family, community and the economy.

For example, a child who is a victim of domestic violence might be more likely to abuse their own children in future, or might be more likely to embark on a life of crime, than children who are not victims of domestic violence. But this effect may be less of a concern for children who are stressed because of, say, the death of a loved one.

2.2.1 Prevalence of situations that contribute to childhood stress

To estimate the number of children who are subject to situations that may cause stress, a number of sources are used, including survey data and literature. This includes the Australian Bureau of Statistics (ABS) and the Australian Institute of Health and Welfare (AIHW). Both of these organisations report on a number of key characteristics that can lead to childhood stress such as the prevalence of domestic violence and divorce, which are considered risk factors for developing stress.

- **Domestic violence**: based on self-reported data, Mills et al (2011) reports that as many as 10.1% of Australians have witnessed serious physical fights at home as a child. This was slightly higher in females than in males, with 11.5% of females and 8.7% of males having witnessed serious physical fights at home as a child.
- **Abuse and neglect**: one of the most comprehensive analyses of child maltreatment in Australia to date is the study by Moore et al (2015). This study collected data from self-reported and official sources to establish child maltreatment in Australia. This includes emotional abuse, physical abuse, neglect and sexual abuse. It was reported that 9.9% of children between 5-14 years of age have been subjected to some form of child maltreatment in Australia.
- **Divorce of parents**: Jacobs et al (2012) report on data from the Longitudinal Study of Australian Children. This survey is a nationally representative sample of the majority of Australian children, following two cohorts of children and collecting and reporting data on these children every two years. Jacobs et al (2012) report on the cohorts between the ages 0-1 and 8-9 years of age, and aimed to identify the prevalence of potential life difficulties in children, noting that this does not necessarily lead to reduced wellbeing outcomes. Over a period of 4 years, approximately 20.8% of children aged between 8-9 years (in 2012) had experienced the separation or divorce of their parents (Jacobs et al, 2012).
- **Mental health conditions in the household**: Australian data from Lawrence et al (2013) show that mental health conditions are present in approximately 18.7% of couple families with dependent children, and 33.8% of single parent families with dependent children. Lawrence et al (2013) also showed that the household composition was distributed with 33.4% of couples with dependent children, and 4.7% as single parent families with dependent children. This would indicate that approximately 7.8%[4] of households with dependent children also experience a mental health condition each year – providing this rate has not changed substantially since the survey was conducted. Over the lifetime of the child, the chance of them being subjected to mental health conditions in the household may increase.
- **Psychological distress in the household**: as another measure of mental health conditions, Jacobs et al (2012) reported that 2.4% of children aged 8-9 years old had at least one parent that had psychological distress over a 4 year period. Psychological distress is strongly correlated with the presence of a mental health condition.
- **Substance abuse in the household**: data from the Longitudinal Study of Australian Children showed that approximately 5.9% of children aged between 8-9 years (in 2012) had been subjected to substance abuse in the household over a 4 year period (Jacobs et

[4] This is calculated as 33.4% couple parents with dependent children * 18.7% with mental health conditions in the last 12 months + 4.7% single parent with dependent children * 33.8% with mental health conditions in the last 12 months.

al, 2012). Between the ages of 4-14 years, more children are likely to have experienced substance abuse in the household.

- **Grief and loss**: data from the Longitudinal Study of Australian Children showed that approximately 8.0% of children aged between 8-9 years (in 2012) had experienced the death of a loved one over a 4 year period (Jacobs et al, 2012).
- **Substantial accidents or injuries**: for children aged between 8-9 years, approximately 2.6% had been reported to have been frequently hurt or injured or involved in accidents (Jacobs et al, 2012).
- **Bullying at school**: by the time children have reached 8-9 years of age, 47.3% had reportedly been bullied at school. While the definition of bullying was very broad – asking parents if the child had been bullied at school in the past 12 months – it is plausible that a substantial proportion of this may still result in childhood stress (Jacobs et al, 2012).
- **Developmental or chronic conditions of the child**: 24.5% of children aged 8-9 years had a chronic or developmental condition (Jacobs et al, 2012).

Overall, it is clear that there are a number of situations that may contribute to childhood stress. It is likely that a number of these situations will co-occur, and group in certain subtypes of the Australian population. There are two issues with aggregating data across these situations. The extent to which these situations co-occur is not clear, and the link between these situations and childhood stress is also not clear in many instances. As a guide, Qu et al (2012) asked parents in the Longitudinal Study of Australian children to estimate how many life events (such as health concerns or death of someone close, the family and household characteristics (including financial and social matters), and residential matters) had occurred over a 12 month period. The study found that **almost 70% of parents, and therefore children, had experienced 1 or more life events over a 12 month period**.

Table 2.2 presents a summary of certain situations that may lead to childhood stress.

Table 2.2: Prevalence of situations that may impact childhood stress

Cause of childhood stress	Prevalence (%)	Source
Domestic violence	10.1	Mills et al (2011)
Abuse and neglect	9.9	Moore et al (2015)
Separation or divorce	20.8	Jacobs et al (2012)
Mental health condition in the household	7.8	Lawrence et al (2013)
Psychological distress	2.4	Jacobs et al (2012)
Substance abuse in the household	5.9	Jacobs et al (2012)
Grief or loss	8.0	Jacobs et al (2012)
Frequent accident/injury	2.6	Jacobs et al (2012)
Bullied at school	47.3	Jacobs et al (2012)
Chronic/developmental condition	24.5	Jacobs et al (2012)

Source: As noted in table.

2.3 Prevalence of stress

As there is not an absolute definition of stress, the concept of 'psychological distress' has been used to estimate prevalence. Drapeau et al (2012) define psychological distress as a state of emotional suffering characterised by symptoms of depression, and this can be related to somatic symptoms. To date, the most recent data that considers psychological distress is from the 2013-14 Australian Child and Adolescent Survey of Mental Health and Wellbeing, *Young Minds Matter* (results from this survey are published in Lawrence et al, 2015).

Young Minds Matter is the second national household survey of the mental health and wellbeing of Australian children and adolescents. The survey received responses from approximately 6,000 households, including parents, carers and children. The survey was designed to provide current information about the mental health and wellbeing of children and adolescents in Australia and the extent to which they use health and education services to obtain help with problems. Analysis of those sampled has shown the results to be statistically representative of the Australian children in this age range (Lawrence et al, 2015).

The *Young Minds Matter* survey used a number of questionnaires to assess the level of mental health problems in Australian children. This included the Kessler 10 Psychological Distress Scale questionnaire and the Strengths and Difficulties Questionnaire (SDQ).

The Kessler 10 Psychological Distress Scale, which is a tool used to screen for levels of distress and evaluate outcomes post treatment, was used to assess the prevalence of psychological distress in children aged 11 to 17 years[5]. A score of 'very high' from the questionnaire is a strong indicator of mental health problems or distress (Lawrence et al, 2015).

Table 2.3: Level of psychological distress in children aged 11-15 years, Australia

	Level of psychological distress (%)			
Gender	**Low**	**Moderate**	**High**	**Very high**
Male	57.6	29.2	9.9	3.3
Female	49.8	28.9	14.7	6.6
Person	53.9	29.1	12.2	4.8

Source: Lawrence et al (2015)

Table 2.3 shows that **17.0% of Australian children aged 11-15 experience at least high levels of psychological distress**, while 46.1% of these children experience at least moderate levels of psychological distress.

The *Young Minds Matter* survey also used the SDQ. A score of 'abnormal' on the SDQ indicates a substantial risk of clinically significant problems and mental health problems or

[5] Before this age, the survey is unlikely to be meaningful as children may be unable to express their feelings appropriately for the survey. A parent or carer may be able to fill the survey out, but again this relies on subjective thoughts about the child, and may be inaccurate.

distress (Lawrence et al, 2015). While this questionnaire is designed to have approximately 10% of children fall into the abnormal range, other aspects of the SDQ provide a clear indication of the number of children who may be subject to high levels of stress. In children aged between 11-15 years old, approximately:

- 8.8% have scores in the abnormal range for emotional problems;
- 9.3% have scores in the abnormal range for conduct problems;
- 13.0% have scores in the abnormal range for hyperactivity; and
- 4.3% have scores in the abnormal range for peer problems.

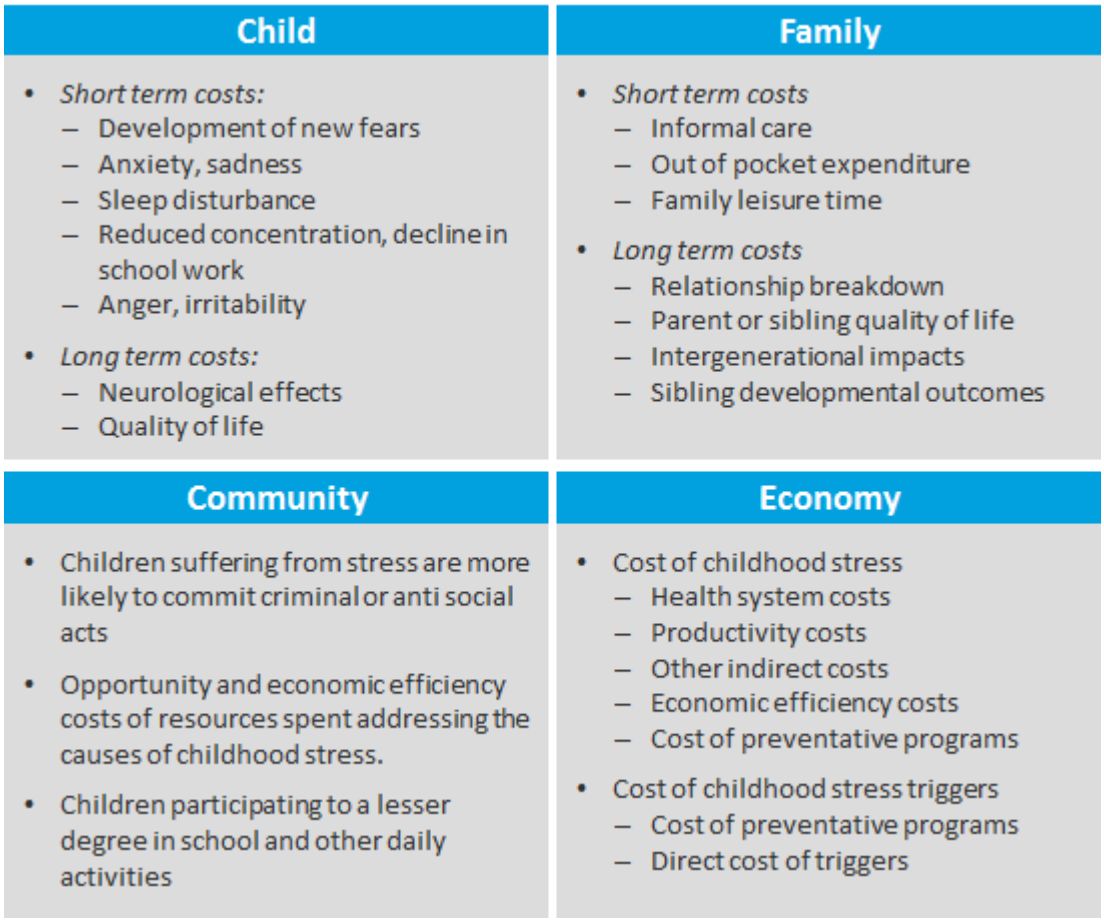
Further, the impact scale component of the SDQ – which measures interference in life due to emotional and behavioural problems in the domains of home life, friendships, classroom learning and leisure activities – **found that 17.1% of children score were considered 'abnormal'**. These two measures from the SDQ questionnaire indicate differing levels of stress in children.

As an example of the validity of the Kessler 10 Psychological Distress Scale, data from an adult population have been shown to correlate strongly with mental disorders. Slade et al (2011) reported that for adults that scored 'high' or 'very high' on the Kessler 10 Psychological Distress Scale, approximately 57% and 80% had a mental disorder, respectively.

2.4 Impacts of stress

For this report, Deloitte Access Economics has identified impacts across four broad perspectives: the child, the family, the community and the economy. This list is not intended to be exhaustive, but rather a high level indication of the types of impacts that exist in relation to childhood trauma and its underlying triggers. A summary of these impacts is provided in Figure 2.2.

Figure 2.2: Impacts of stress



Source: Deloitte Access Economics.

2.4.1 Impact on children

The impacts of stress on children can be both short term and long term.

Short term effects

The short term effects of childhood stress predominately manifest themselves through a disruption in a child's normal activities. For example, the American Psychological Association (2008) lists the following common symptoms of childhood stress:

- The development of new fears
- Separation anxiety (particularly in young children)
- Sleep disturbance, nightmares
- Sadness
- Loss of interest in normal activities
- Reduced concentration
- Decline in schoolwork
- Anger

- Somatic complaints
- Irritability

These symptoms closely correspond with the typical referral reasons of children who attend KidsXpress: abuse and neglect, anxiety and depression, domestic violence, grief and loss, and substance or alcohol abuse in the household. It is important to note that these symptoms are commonly seen in response to any traumatic event, be it a long term ingrained issue or a one off unexpected event (such as loss of a loved one).

In that regard, the presentation of such symptoms does not necessarily imply a need for immediate medical or psychological intervention. Rather, as will be discussed below, it is only those children whose brains are not able to appropriately respond to, and recover from, a traumatic event that are likely to display longer term developmental and physical effects.

Long term effects

The longer term effects of childhood stressors and trauma stem from their impact on the child's brain. This effect has been known for many years; for example, in 1995 Perry et al explained that:

> *"The organizing, sensitive brain of an infant or young child is more malleable to experience than a mature brain. Although experience may alter the behaviour of an adult, experience literally provides the organizing framework for an infant and child. Because the brain is most plastic (receptive to environmental input) in early childhood, the child is most vulnerable to variance of experience during this time." (pg. 276)*

Given that the brain is at its most malleable in the formative years of childhood, this is when it is most susceptible to adverse stress events. Put simply, stress generates a range of neuro-hormonal responses in the human brain which are essential to an individual's ability to cope with stressful events.

Early activation of the brain's stress control mechanism – say, in a child whose brain has not fully developed – can interfere with the brain's normal pattern of neurodevelopment. The negative implications of this are that over the longer term, that child's ability to cope with stressful events has lessened, and the risk of individual stressors turning into toxic rather than tolerable stress events has been heightened (Perry et al 2009; National Scientific Council on the Developing Child, 2014).

Again though, the distinction between tolerable and toxic stress is important. The American Psychological Association (2008) notes that:

> *"The majority of children and adolescents manifest resilience in the aftermath of traumatic experiences. This is especially true of single-incident exposure. Youths who have been exposed to multiple traumas, have a past history of anxiety problems, or have experienced family adversity are likely to be at higher risk of showing symptoms of posttraumatic stress. Despite exposure to traumatic events and experiencing short-term distress, most children and*

adolescents return to their previous levels of functioning after several weeks or months and resume a normal developmental course."(pg. 2)

In other words, for the majority of children, stress manifests itself in the form of tolerable rather than toxic stress. However, the likelihood of that stress transitioning to toxic stress is heightened when the child has a history of anxiety and family adversity. The importance of a supportive and stable relationship between children and parents or caregivers in the mediation of neuro-biological stress impacts is also well documented (Perry et al 2009; NCTSN 2010; National Scientific Council on the Developing Child, 2014).

Given the neurological effects described above, it is perhaps unsurprising that stress or trauma in children are a major risk factor for serious physical and mental illness in later life. Reviewing the linkages between child maltreatment and stress, Moore et al (2015) estimated the extent to which common mental health disorders in adults are caused by child maltreatment:

- 23.5% of male and 33% of female instances of self-harm;
- 20.9% of male and 30.6% of female instances of anxiety disorders; and
- 15.7% of male and 22.8% of female instances of depressive disorders.

Weighting these proportions based on data from the 2007 National Survey of Mental Health and Wellbeing in Australian adults (Slade et al, 2009), it is estimated that child maltreatment is responsible for approximately 24.9% of all mental health conditions in adults. Similarly, Kezelman et al (2015) estimated that 28% of mental illness in adults can be linked to unresolved childhood trauma.

2.4.2 Impact on family

Parents and other immediate family members are important resources in dealing with children with high levels of stress. To the extent that a child with high levels of stress requires greater than usual amounts of care, it is clear that the impact of childhood stress on the immediate family would be considerable. Indeed, the World Health Organization (2003, p.11) states:

"The extent of the burden of mental disorders on family members is difficult to assess and quantify, and is consequently often ignored. However, it does have a significant impact on the family's quality of life."

The line between these short term effects and long term effects is likely to be blurred, but again these impacts are not typically quantified due to limitations with identifying the causal impact.

Short term effects

Quantifiable short term impacts of childhood stress include the value of time spent either away from work or ordinary leisure activities as a result of the child's stress. This may be due to parent or caregiver attendance at medical appointments, or the provision of additional care as a result of the child's condition. This time requirement is generally known as informal care. Other short term effects can include out-of-pocket (OOP) payments for any medical expenses or other expenses associated with a child's condition

that is a result of the child's stress. Typically, the value of informal care is quantified in terms of a particular condition, such as for mental health conditions in children, and no research was identified that specifically considered the value for childhood stress.

Other less quantifiable impacts include the extent to which a family misses out on leisure activities as a result of the child's stress, the extent to which the parent's time is diverted towards the child at the expense of other siblings – which can result in reduced developmental outcomes for the sibling (a long term impact). The effect on siblings may be short term and include reduced quality of life while the stress is present in their sibling.

Long term effects

There are a number of long term effects for the family associated with childhood stress. These can include relationship breakdown and quality of life impacts, both for parents or caregivers and for siblings (World Health Organization, 2003).

It is not possible to quantify the extent to which relationship breakdown and quality of life impacts occur for family members. The World Health Organization (2003) reports that anguish, isolation and stigma are likely to be impacts on the family of mental health conditions in the family.

Intergenerational impacts of the family are also substantial. A number of studies have looked at family impacts as a result of costs and consequences of child maltreatment. While this does not necessarily directly result from childhood stress, the impacts may be similar. Research has shown that the children of people who experience maltreatment during their childhood are more likely to also experience maltreatment (Meadows et al, 2011). It is difficult to quantify the increased risk, and few studies have done so. One cohort of children up to the age of 13 months found that maltreatment rates in children whose parents had been maltreated was substantially higher than parents who had not been maltreated – 6.7% compared with 0.4%, respectively (Meadows et al, 2011).

This does not necessarily imply that the parent is more likely to abuse their child; rather, maltreatment during childhood appears to lead to an increase in risk factors that are likely to lead to maltreatment within families later in life (Meadows et al, 2011).

Similar to the short term effects, it is possible that time off work may lead to decreased productivity in parents or caregivers over time. It is plausible that as a result of increased time off work, that a parent or caregiver will progress more slowly in a career than they otherwise would have.

2.4.3 Impact on community

The potential impacts on the community of childhood stress are broad reaching. In this section, Deloitte Access Economics considers three of what are arguably the most pressing impacts:

- the heightened propensity of those children suffering from toxic stress or mental illness to go on to commit anti-social or criminal acts;

- the opportunity cost of the money spent by governments of all levels in dealing with the effects (and causes) of mental illness – noting that not all childhood stress results in mental illness; and
- the impacts on peers as a result of anti-social activities and lack of attention at school or other activities.

The **first impact** is the criminal aspect. Children suffering from toxic stress or mental illnesses are more likely to commit criminal or anti-social acts (Australian Institute of Family Studies, 2014).

The National Institute of Justice (2011), for example, notes that "being abused or neglected as a child increases the likelihood of arrest as a juvenile by 5%, as an adult by 28%, and for a violent crime by 30%". Further, the AIHW (2013) reports that 38% of non-Indigenous prison entrants reported high to very high levels of psychological distress[6], compared to just 11% in the general population.

The **second impact** is the amount of resources (financial, physical, and time related) that go into addressing these issues. Access Economics (2009) estimated that around $1.4 billion of expenditure was associated with health system expenditure for 12-25 year olds with mental conditions in 2009.

In 2012-13 overall government spending on mental conditions (including local, State/Territory and Federal Governments) totalled $7.3 billion. If it is assumed that a quarter of adult mental conditions are caused by mental conditions present since childhood[7], then it could (very loosely) be said that around $1.8 billion ($7.3 billion x 25%) was spent on youth related mental illness in 2012-13.

The precise figure is unimportant for these purposes. The point is simply that a considerable amount of financial resources are spent as a direct result of childhood stress, which in turn causes a number of mental conditions. The alleviation of this stress would enable such funds to be diverted to other uses.

It is also worth noting that all of this government spending creates a reduction in economic efficiency – known as a deadweight loss – because the money spent on these conditions has to be raised through taxation, which itself creates distortions in overall economic activity.

The **final impact** relates to the effects of stressed children participating to a lesser degree in schools and other activities, and also the extent to which they monopolise the time of their teachers (and other non-parent carers); time which could be spent on other children.

While difficult to quantify, it is clear that many of the short term symptoms of childhood stress described above could have broader ramifications for the community in general. Not only do teachers have to spend more time dealing with stressed children relative to other children, but to the extent that the stressed child behaves in an anti-social manner towards his or her peers, that would also have implications for their peers' broader development. In

[6] On the Kessler 10 Psychological Distress Scale.

[7] Kezzelman et al suggested the figure is 28%

other words, the effects of one child's stress could have broader ramifications for the development of other children.

2.4.4 Economic impact

This section summarises the results of a selection of Australian studies which have examined the economic impacts of childhood stress, trauma and associated mental conditions. The majority of studies focus on the causes of childhood stresses though a few explicitly quantify the effect of childhood stress itself; most notably, Access Economics (2008) and, to a lesser extent, Kezelman et al (2015).

In considering the overall cost of childhood stress there are two broad populations to consider: the children themselves, and the adults whose unresolved childhood stress have caused further issues in adulthood. Access Economics (2008) focussed on the former, while Kezelman et al (2015) focussed on the latter.

Following the Access Economics approach, the financial costs can be considered in terms of

- direct health system expenditure;
- productivity lost due to lower employment, absenteeism and premature death of young people with mental illness;
- other indirect costs comprising informal carer costs and the bring-forward of funeral costs; and
- the economic efficiency (deadweight) loss arising from transfers including welfare payments and taxation forgone.

A further cost considered in the Access Economics report is the value of lost wellbeing through disability and premature death[8].

[8] The costs of premature death are based on forecasted premature deaths that occur in future years as a result of child abuse.

3 Effects of expressive therapy on childhood stress and trauma

Expressive therapy can effectively improve outcomes for children who have experienced trauma or stress. A summary of evidence and introduction to expressive therapies and the theories relevant to childhood psychology are presented in this chapter. Where possible, the efficacy and effectiveness are constrained to children and interventions that are similar to KidsXpress, although this was not always possible.

3.1 Introduction to expressive therapies

Childhood trauma has a profound effect in the Australian community. The long term effects of childhood trauma are often the most visible – broken relationships and families, violence, abuse and neglect, homelessness, drug and alcohol dependence, mental illness, and unemployment. These effects can often be linked back to the impacts of unresolved childhood trauma.

Expressive therapy has been defined as the use of drama, painting, music and literature for psychotherapy purposes which include improving and enhancing the physical, emotional and cognitive functions of individuals, resolution of conflicts and stress reduction (Pearson, 2008). More standard therapies such as talking and cognitively oriented therapies are thought to be unsuitable in children due to a reduced complex cognitive capacity in childhood (Gaskill and Perry, 2014). As such, treatment models that use expressive therapies are becoming increasingly more recognised, and more common, as a therapeutic tool for children with unresolved childhood trauma.

The importance of play has been recognised for centuries as developmentally important for children (Gaskill and Perry, 2014). Play therapy has been used around the world and has been recognised to be important for social, emotional, physical, intellectual and psychological development. Australian models of applying creative arts therapies have been in use in Australia since before the 1990s. In 1991, Pearson and Nolan referred to expressive therapies as emotional release counselling, which was important for working with youth exhibiting persistent negative and anti-social behaviour (Pearson, 2008). Over the past two decades, expressive therapies methods and frameworks have evolved substantially (Gaskill and Perry, 2014). There has been positive refinement in the practical application of methods and broader understanding of the theory.

Expressive therapy gives children the experience of doing, making, and creating – to help energise, redirect attention and focus and alleviate emotional stress (Pearson and Wilson, 2008). Expressive therapies promote active participation, and are sensory in nature – helping children to engage their imagination, mind and their body, rather than simply engaging their cognitive abilities. By augmenting creative and imaginative thinking, expressive therapies help to generate self-expression, experimentation, and subsequent verbal reflection.

Creative pursuits and the arts are essential aspects of human experience. They can assist in explaining and understanding experiences, responding and interacting with the world, and with others. Further, the creative pursuits and the arts engage imagination enhance experience, build empathy, and assist in trying new approaches. This can assist in healing, particularly in children whose lives have been impacted by trauma.

Expressive therapies give children the experience of doing, making and creating to help energise, redirect attention and focus and alleviate emotional stress. For children with limited language skills and vocabularies, and particularly for children impacted by trauma who may be unable to put complex ideas and feelings into speech, expression through art, music, play, or movement empowers them to express themselves without the boundaries imposed by words (Pearson and Wilson, 2008). Ferguson et al (2014) also note that young children often lack the skills to adequately describe traumatic experiences, and lack developmental maturity to process traumatic experiences. This requires other treatment methods such as expressive therapy, which do not require the child to describe or discuss the experience.

The methods and frameworks associated with expressive therapies underpinned the KidsXpress program design and development. KidsXpress has been developed based on the knowledge of attachment theory, trauma theory, neurodevelopmental theory, developmental neuroscience and theory surrounding expressive therapies. Briefly, these theories can be summarised as follows:

- **Attachment theory**: early relationships are important for developing children, and serve as the foundation for other developmental competencies. Attachment is a fundamental need of all people – as a result of facilitating a caring response, it is has been theorised that attachment has aided in the survival of the species and to have been selected through evolutionary processes as a universal aspect of human activity (Pearce, 2010). As a result of primary care that is accessible, understanding and responsive to their needs, children develop secure attachments through which they perceive the world, and people within it as safe (Pearce, 2010). Insecure attachments may develop in children who are maltreated or where their environments expose them to high stress without a source of reliable comfort soothing. Insecure patterns of relating lead to increased risk of lifelong stress dysregulation, and poorer assistance seeking skills. Children with insecure attachments view the world as unsafe, or may not trust the world, and can lack the ability to interpret or understand social cues (Knoverek et al, 2013).
- **Trauma theory**: trauma can affect the early development of a child – when a child is unable to cope with trauma, the brain then incorporates this trauma, and may adapt to this situation by altering the child's behaviour. Trauma can often occur in the child's caregiving system, and include physical, emotional and educational neglect – which can be broadly considered as child maltreatment (van der Kolk, 2005). However, it is important to note that a traumatic situation which results in altered behaviour in one child (an 'unhealthy' response), may result in a different ('healthy') response in another child – for example, developing resilience. The difference in response can be due to aspects such as a history of previous stressors, the age at which the trauma occurs, the specific nature of the trauma, and the presence of exacerbating factors (for example, the loss of a caregiver, or the caregiver also experiencing the same traumatic situation) (Perry et al, 1995).

- **Neurodevelopmental theory** and **developmental neuroscience**: In children, the brain is still developing and traumatic or stressful experiences can disrupt the normal development of the brain (Perry, 2009). As a result of a traumatic or stressful experience the brain may reset to consider this the normal state. This indicates that the brain is use-dependent and adapts based on cues from the environment, and may be altered by the amount of stress in the environment. Neglecting a child may cause a lack of stimulation in brain development. The developing brain can be altered by extreme levels of stress, whether that stress is caused by neglect, abuse or a plethora of other reasons. This is particularly important during early childhood. Problems can include sensorimotor development, body tone, balance and coordination, limited sensitivity to physical touch or pain, and somatic complaints. Biological development can be corrected through interventions that address the traumatic or stressful experience (Knoverek et al, 2013).

There are several aspects to expressive therapies. These aspects are not considered individually; together they create the expressive therapies, and each modality may be pertinent at a particular point in time. The aspects are (Malchiodi 2005):

- **Music therapy**: Music therapy activities are tailored each week to support the individual and group therapy goals. They are not judged on ability, knowledge or experience. Music therapy uses music to effect positive changes in the psychological, physical, cognitive, or social functioning of individuals with health or educational problems.
- **Art therapy**: use of art to encourage children to develop their thoughts and feelings further by drawing, painting, sculpting and constructing. Created products show reflections of development, abilities, personality, interests, concerns, and conflicts. This is a therapeutic means of reconciling emotional conflicts, fostering self-awareness, developing social skills, managing behaviour, and increasing self-esteem.
- **Drama therapy**: drama therapy is the systemic and intentional use of drama processes, products and associations to achieve the therapeutic goals of symptom relief, emotional and physical integration, and personal growth. It is an active approach that helps the client tell his or her story to solve a problem. Drama therapy offers the potential to creatively explore and express difficult emotions in a safe and contained way. Children are invited to use various creative processes to explore an issue or feeling. This can involve creation of stories, stepping into imaginary worlds, embodying characters, playing with small objects or exploring real-life experiences through dramatic representation.
- **Play therapy**: Play therapy involves participating in structured and unstructured activities that help children to express their thoughts and feelings, explore relationships and share their experiences. This can assist with experiencing and practicing new ways of participating in relationships.
- **Dance/movement therapy (DMT)**: is based on the assumption that body and mind are interrelated and is defined as the psychotherapeutic use of movement as a process that furthers the emotional, cognitive, and physical integration of the individual. DMT can effect change in feelings, cognition and physical functioning and behaviour.
- **Poetry therapy**: refers to the intentional use of poetry for healing and personal growth. Other forms of literature can be used for the same purpose, known as **bibliotherapy**.

- **Sandplay therapy:** is a creative form of psychotherapy that uses a sandbox and a large collection of toys to enable exploration of the deeper layers of the psyche in a different format. Similar to other forms of expressive therapy, creation of art and imagery in sand can help to illustrate and integrate feelings and emotions.

KidsXpress focusses on the similarities and intersections between modalities, rather than focusing on the structural differences. This type of approach involves multiple expressive therapies and can be more successful than one type of therapy alone in encouraging emotional growth, and enhancing relationships with others (Malchiodi, 2005). Intermodal therapy distinguishes itself from its closely allied disciplines of art therapy, music therapy, DMT, and drama therapy by being grounded in the interrelatedness of the arts. It is based on a variety of orientations, including art as therapy, art psychotherapy, and the use of arts for traditional healing (Malchiodi, 2005). The types of expressive therapy that KidsXpress utilises include art therapy, drama therapy, music therapy and play therapy.

3.2 Mental and wellbeing effects of expressive therapy

This section discusses the effect of expressive therapies on improving mental health and wellbeing in children who have suffered from childhood stress and trauma.

3.2.1 Effects of expressive therapy utilised by KidsXpress

This section focuses on the effects of expressive therapy that are specifically utilised by KidsXpress – namely music, art, drama and play therapy. KidsXpress uses an interdisciplinary approach to expressive therapy. This involves the use of all types of expressive therapies, and is responsive to the therapy that most suits the children.

A number of reviews regarding the efficacy and effectiveness of expressive therapies have been published, although the evidence is primarily associated with play therapy and art therapy. This is in contrast to many types of treatment for traumatised children, which the American Psychological Association (2008, p.3) notes “have not been empirically studied”.

Wethington et al (2008) discuss interventions that may reduce the psychological harm from traumatic events among children and adolescents. Traumatic events were defined as one in which a person experiences or witnesses actual or threatened death or serious injury, or a threat to the physical integrity of self or others. This can be single or repeated events which are natural or manmade, and intentional or unintentional (Wethington et al, 2008). This review evaluated the evidence for seven interventions, including cognitive behavioural therapy (either group or individual setting), play therapy, art therapy, psychodynamic theory, and pharmacological therapy for symptomatic children and adolescents. The primary outcomes were related to wellbeing effects. A description of the evidence found for each expressive therapy intervention is summarised briefly below (Wethington et al, 2008):

- **Play therapy**: four studies were identified that used play therapy to reduce psychological harm in children. The review considered three of these studies to be one piece of research as the authors were common across the studies. Wethington et al (2008) concluded that there was insufficient evidence to recommend play therapy as an

intervention to reduce psychological harm in children and adolescents due to high levels of variation across studies. However, **all of the interventions showed reductions in psychological harm in children,** despite the variability in outcomes assessed.

- **Art therapy**: as with play therapy, the review found insufficient evidence to determine the effectiveness of art therapy in reducing psychological harm in children and adolescents. Only one study was identified by the review that discussed the effect of art therapy on psychological harm. The intervention was delivered in children who were hospitalised for a minimum period of 24 hours after a physical trauma. The art therapy was used to express the trauma. Compared to the control group that received standard hospital services, the **art therapy group demonstrated a relative reduction in post-traumatic stress disorder (PTSD) symptoms of 21%, although this was not significant**.
- Outside of expressive therapies, the review by Wethington et al (2008) largely found evidence with regard to **cognitive behavioural therapy** in an individual or group setting, and **psychodynamic therapy**. Both of these interventions are broader in their application of therapy, and include both direct and non-direct approaches to therapy. The more direct approach involves talking with the patient, which as mentioned, is thought to not be as effective in children suffering from stress or trauma due to their reduced developmental capabilities. However, both interventions also include some aspects of expressive therapy, such as interpretive and non-directive sessions for psychodynamic therapies and play and role-play in cognitive behavioural therapy. Cognitive behavioural therapy is recommended as a therapy for children and is associated with reductions in psychological harm. The review found limited evidence for psychodynamic therapy, although it was still useful in reducing PTSD symptoms in children subjected to stress or trauma.

Gaskill and Perry (2014) **identified a number of meta-analytic studies that examine play therapy, and find that play therapy is effective for a variety of problematic issues**. The studies indicate children have improved prosocial behaviour and decreased symptomatic behaviour. Treatment effect sizes ranged between 0.66 and 0.80; while treatment effect sizes are more of a subjective measure, they indicate the relative strength of the intervention. These effect sizes indicate a moderate to large effect of the intervention for the assessed outcomes (Bratton et al, 2005). Gaskill and Perry (2014) found that play therapies appeared to be equally effective regardless of the initial problem that had prompted the need for intervention – for example, behaviour, social adjustment, personality, self-concept, anxiety or fear, developmental conditions, or family functioning or relationships (Bratton et al, 2005). These results indicate that children receiving play therapy interventions performed much better than children who did not receive play therapy, and that play therapy demonstrated a **large effect on children's behaviour, social adjustment, and personality**.

Play therapy is effective across modalities, ages, genders, and theoretical schools of thought (Bratton et al, 2005). It is noted that children participating in play therapy appear to take considerably more time to process information and make effective changes in thinking or behaving, compared to adults in conventional therapies.

Baggerly et al (2010) reviewed literature for play therapy and describe a range of positive effects, including for social adjustment, withdrawn behaviour, Conduct Disorder or aggression, maladaptive school behaviour, emotional maladjustment, anxiety and fear,

autism and schizophrenia, multiculturalism, self-concept, intelligence, reading, physical or learning disability, speech or language problems, sexual abuse and domestic violence, depression, PTSD, attention deficit hyperactivity disorder (ADHD) and locus of control, divorce, and alcohol or drug abuse (Baggerly et al, 2010). The majority of these results are derived from Bratton et al (2005) and earlier meta-analytic studies – discussed below. As is the case with most comprehensive literature reviews, Baggerly et al (2010) observed that not all of this research showed significant improvements for every domain. A number of studies were limited by small sample sizes. However, Baggerly et al (2010) still report that play therapy is effective with a wide range of mental health issues.

Baggerly et al (2010) argue that the **developmental properties of play are responsive to children's maturational needs, allowing them to successfully and meaningfully participate in therapy at a young age**. Baggerly et al (2010) also note that this may prevent more severe and costly mental health problems that may develop over time, although this was not quantified further.

Bratton et al (2005) reviewed literature that included treatment outcomes of play therapy with children. The review included 93 studies, finding an overall treatment effect for play therapy interventions of 0.80 standard deviations above the control group. That is, children were **more likely to have improved psychological outcomes when they participated in play therapy** when compared with children not participating in play therapy. The average age of children was seven years across the studies, and the average patient received almost 17 play therapy sessions. Similar effect sizes (and statistical significance) were observed across intervention settings, intervention providers, age, gender, presenting issues and outcome measures – indicating that play therapy appears to be effective regardless of the specifics of the play therapy intervention when compared to children who do not receive play therapy.

Importantly though, a number of other meta-analytic studies have reported similar effects for the psychological wellbeing of children when compared with children not receiving play therapy. Bratton et al (2005) cites five other studies that all found effect sizes ranging between 0.66 and 0.84, and the results were significant across all of the meta-analyses[9]. This highlights that play therapy, and potentially expressive therapies more generally, are an **effective approach to improving psychological outcomes, and therefore wellbeing, in children who are affected by traumatic and stressful situations**.

Reynolds et al (2000) summarised the results of 17 art therapy intervention studies, which had varying quality levels and study design. For interventions that did not include a control group, **art therapy in children generally resulted in improvements**. The outcomes across studies were not always comparable, but this included improvements in mood, ability to form groups, spatial awareness, self-esteem and social skills. Reynolds et al (2000) concluded that art therapy was effective, although not necessarily more effective than standard therapy. Subsequent reviews by Eaton et al (2007) and Slayton et al (2010) serve to update the review by Reynolds et al (2000).

Eaton et al (2007) reviewed literature surrounding art therapy and its effect on traumatised children in particular. The review found that **art therapy can be used successfully in a**

[9] One study cited did not report the significance level.

variety of settings and formats to improve the wellbeing of children who have been traumatised due to traumatic life experiences. Eaton et al (2007) recommended the need for more empirical attention for art therapy with high quality study design to establish the efficacy of art therapy.

Slayton et al (2010) provided an update to the review conducted by Reynolds et al (2000). This review considered evidence published between 1999 and 2007 that measured outcomes of art therapy effectiveness with all ages of both clinical and nonclinical populations. Slayton et al (2010) concluded that **art therapy as a treatment modality has been shown to be statistically significant in improving a variety of symptoms** in a small number of studies. The majority of studies considered by Slayton et al (2010) were still limited by poor study design with little focus on empirical evidence.

Orr (2007) reviewed a number of sources that worked with children after a disaster, which can contribute to trauma and stress in children. Disaster was defined broadly, and included natural disasters, war, uprising or terrorism and individual or personal events. As mentioned previously, when children experience disaster, the trauma can influence normal developmental issues due to the disaster. Orr (2007) found two research studies and concluded that **semi-structured art interventions work well with children after a disaster**, but that more research and planning was required.

For music therapy, a meta-analysis by Gold et al (2004) reported on the results of 11 studies which had examined the impact of music therapy on treating children and adolescents with mental disorders. Across ten of the studies (one study was excluded as it was considered to be an outlier), **the average effect size was 0.61, which is a medium to large effect using Cohen's (1998) benchmark for effect sizes**. Across the studies, the effect size of music therapy on children and adolescents with developmental or behaviour disorders was larger than for those with emotional disorders.

Whipple (2004) conducted a meta-analysis of music therapy in children and adolescents with autism. Outcome measures across the studies included social behaviour (self-stimulation and attention to tasks), cognitive skills (academic tasks and vocabulary acquisition and communication (incidence of vocalisation, speech, sign and eye contact). Across nine studies, **the average effect size was 0.77, which is a medium to large effect**.

Drama therapy appears to be less researched than play, art and music therapy in children. This therapy may still be effective at reducing psychological symptoms due to stress and trauma.

3.2.2 Effects of other types of expressive therapy

While the focus of KidsXpress is surrounding the expressive therapies related to art, music, drama and play, other types of expressive therapies are also beneficial for children. For example, DMT is believed to be an effective treatment modality for children suffering with various forms of trauma (Anderson et al, 2014).

Two major meta-analytic studies have been published that consider the use of DMT. These reviews were published by Koch et al (2014) and Ritter and Low (1996). Ritter and Low (1996) found that psychological and physical improvements are associated with DMT, and include (Koch et al, 2014):

- resocialisation and integration within society;
- non-verbal creative expression for improved emotional expression;
- enhanced self-esteem through an increased awareness of self;
- greater coordination and movement capabilities; and
- enjoyment as a result of relaxing through DMT.

The benefits of DMT were thought to be associated with children's ability and willingness to be creative and play. The average effect size across the studies included in Ritter and Low (1996) was 0.29, a modest improvement. Ritter and Low (1996) noted that a number of studies included in the review were of low quality, including a lack of control groups, poor sampling techniques, and the use of inadequate measures to assess change at the time of the publication.

The review by Koch et al (2014) examined the effectiveness of DMT across 23 studies with a combined sample size of 1,078. A number of these studies were conducted in adults, although DMT was found to improve quality of life, wellbeing and mood, clinical outcomes, depression, anxiety, and interpersonal outcomes across all ages. For the studies specifically conducted in children:

- DMT was beneficial for children with autism between three and seven years of age, finding that interpersonal outcomes improved by 0.49 standard deviations.
- DMT was beneficial in secondary education as a means of mental health promotion in children 11 to 13 years of age, improving clinical outcomes by 0.65 standard deviations.

Filial therapy – where the parent or caregiver is also involved in expressive therapies with the patient – is also effective for children, and can be more effective than non-filial therapy (Gaskill and Perry, 2014). This method can provide benefits through increased security and attachment for the child. However, this is beyond the scope of services provided by KidsXpress, and is not considered here as a result.

3.2.3 Summary of the effectiveness of expressive therapies for psychological and wellbeing outcomes

Expressive therapies appear to be effective, possibly more so than conventional methods, in treating children who have experience traumatic or stressful experiences. KidsXpress primarily uses play, art, music and drama therapy. Play therapy in particular has been shown to improve psychological and wellbeing outcomes for children when compared to other conventional therapies. This may also be the case for other types of expressive therapies. Other types of expressive therapy – beyond art, music, drama and play therapy – can also be effective treatments for children who have suffered from childhood trauma or stress.

There are substantial differences across studies, in terms of the intervention and study groups, so it is generally difficult to compare each treatment modality. That said, similar results appear to be present regardless of the type of expressive therapy used (Bratton et al, 2005).

3.3 Economic effects of expressive therapies

The effectiveness of expressive therapy in improving psychological and wellbeing outcomes is well documented. As outlined in section 3.2, a number of meta-analytic studies and review papers have identified the efficacy of expressive therapies for a number of outcomes in children. However, in terms of the impact of expressive therapies in improving economic outcomes, **no studies were identified** that quantitatively reviewed outcomes for children related to health system costs, care requirements from parents or caregivers, or reductions in the burden of disease.

> The lack of evidence for the impact of expressive therapies on alleviating economic costs arising from childhood stress and trauma provides additional rationale for Deloitte Access Economics' independent cost-benefit evaluation of the KidsXpress program, which commences in Chapter 4.

4 Analytical approach

This chapter describes the methodology for calculating the economic costs and benefits in the cost-benefit analysis, provides explanations of key economic terms, and presents information on a survey which was used to provide inputs to the analysis.

4.1 Cost-benefit analysis

A cost-benefit analysis involves the estimation of costs and benefits over a number of years, with future benefits and costs discounted to the present using a discount rate. The costs and benefits of a particular intervention program are compared to determine a net benefit (or cost) along with a BCR, which is the 'breakeven point' – anything above this point is a net benefit. The BCR is calculated as the ratio of the sum of a program's benefits, relative to the cost of the program. The breakeven point for the BCR is 1, in that a BCR between 0 and 1 represents a net cost, while a BCR above 1 represents a net benefit.

In this analysis, **the costs and benefits of the KidsXpress program have been estimated for 2015**. While it is acknowledged that this report has been finalised before the end of 2015, care has been taken to ensure that all estimates for cost-benefit parameters in 2015 are based on reliable historical data and projections.

4.2 Estimating economic costs and benefits

The **costs** of KidsXpress are taken as the operating costs of the program based on KidsXpress' 2013-14 annual report[10], and inflated to 2015 using consumer price index (CPI) data from the ABS. The program is operated on a not for profit basis with expenses in any one year being covered by a combination of community and philanthropic donations and retained earnings from previous years.

As the KidsXpress program intervenes to reduce the negative consequences of childhood trauma, **the benefits of the program are represented by costs that would otherwise have been incurred in the absence of the KidsXpress program**. These include health system costs, productivity losses to parents and carers of children with childhood trauma, and quality of life impacts on children who have experienced childhood trauma. These are introduced in the following paragraph, and explored more fully in the following sections.

Medical practitioner costs have been defined to include government costs through the Medicare Benefits Schedule (MBS) and patient OOP costs relating to visits to GPs, specialists, hospitals (both emergency departments and visits which resulted in hospitalisations), and allied health practitioners. Medical practitioner costs arise in the children due to childhood trauma, and also by their parents or caregivers as a result of the physical and mental toll that caring for these children may entail.

[10] The results for 2014/15 were not publicly available at the time this report was published.

Pharmaceutical costs associated with the Pharmaceutical Benefits Scheme (PBS) and patient OOPs for medications, that are prescribed to treat a child's trauma-related mental health condition, are also included.

Informal care costs to parents and carers occur as children suffering the effects of stress and trauma often require additional care relative to children who have not been subjected to childhood stress and trauma. This can reduce participation rates in the workforce, as well as reduce the number of hours worked by parents and carers who remain in the workforce. In addition, additional care may need to be provided outside of working hours. Reduced employment and time at work represents a loss in output to the Australian economy, and additional care outside of work hours represents an additional cost that is borne by the parents and carers.

Children who suffer from childhood trauma also have a **reduced quality of life**, as a result of the pain and suffering that results from trauma. This reduction in quality of life can be captured by using disability-adjusted life years (DALYs).

> The survey results (see Section 4.3) are obtained from parents and carers, and referrers, regarding children who attended KidsXpress programs over 2007-2015. Each of the surveys allowed for an estimate to be made of the costs incurred in the year before, and the year after, the child had attended KidsXpress. Thus, the 'average' value of avoided costs per child in a single year were applied to the population of KidsXpress children in 2015, to estimate the value of avoided costs in 2015. These benefits are estimated for a single year only; it is possible that in subsequent years there may be additional benefits as a result of a child attending KidsXpress. However, due to the uncertainty of costs avoided in future years – these may be greater, or less than, the costs in the first year – these have not been included in the analysis.

4.3 Survey of parents and carers, and referrers

To provide data for the economic evaluation, Deloitte Access Economics developed surveys which were distributed to parents and carers of children who had attended KidsXpress, and also to referrers who had referred children to KidsXpress. Both surveys were open for a period of two weeks in October 2015.

The surveys were developed in SurveyMonkey, and distributed via email. The parent and carer survey was distributed to 455 parents and carers via email, using email addresses which had previously been provided to KidsXpress. Email addresses were available for approximately half of all parents and carers whose children had attended KidsXpress over 2007-2015. From the 455 surveys which were distributed, 68 surveys were completed, which represents a response rate of 14.9%. The referrer survey was distributed to 227 referrers, and 42 surveys were completed, which is a response rate of 18.5%.

The surveys provided data that were used to estimate:

- the prevalence of mental health conditions in the children who attend KidsXpress; and
- the impact that KidsXpress has had on:

- medical practitioner visits among children and their parents or carers, and pharmaceutical usage by children, that had occurred as result of the condition for which the child attended KidsXpress;
- informal care provided by parents and carers as a result of the condition for which the child attended KidsXpress, and was in addition to the usual care that is provided to a child by their parent or carer; and
- the quality of life burden associated with the mental health conditions of children who attended KidsXpress. This was triangulated by using results from both the parent and carer survey, and the referrer survey.

A full list of survey questions and results is available in Appendix A (parent and carer survey) and Appendix B (referrer survey). The results of the surveys are discussed in Chapter 5.

5 Cost-benefit analysis data

This section outlines the data and parameters which were used to conduct the cost-benefit analysis. These were sourced from the available literature, as well as the results of the surveys.

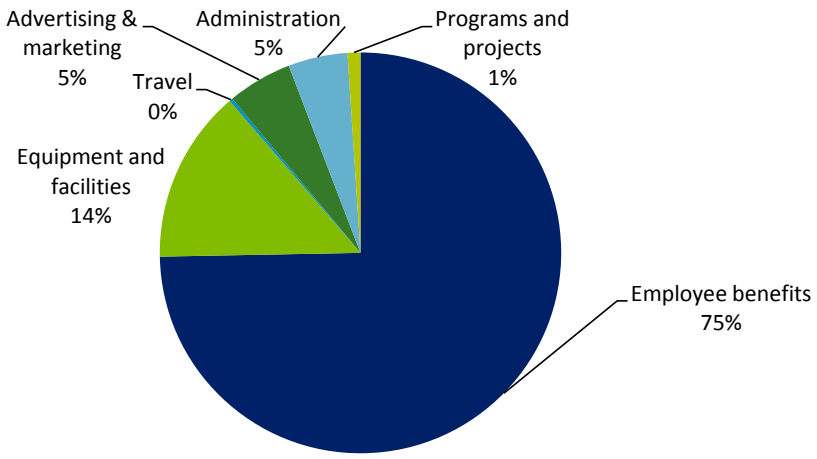
Where possible, statistical analysis (relating to relative standard error (RSE), t-statistics and critical values) of the survey results are presented to assess whether KidsXpress has had a statistically significant impact on reducing economic costs[11]. Explanation of these statistical methods, and a note on sample sizes, is provided in Appendix C.

Summary tables which contain all parameter values, and the results of the statistical analysis, are provided in Section 5.4.

5.1 Costs

In order to evaluate the cost-benefit of the KidsXpress program in 2015, it is necessary to calculate the expenditure that is expected to occur in 2015. The KidsXpress annual report for 2013-14 shows that total expenses were $1,089,172, a breakdown of which is provided in Chart 5.1. Inflating this figure by CPI **gives an estimated cost of operating KidsXpress in 2015 of $1,112,805.**

Chart 5.1: KidsXpress costs, by expense type, 2013-14



Source: KidsXpress Annual Report 2013-14.

[11] Statistical significance was calculated at the 5% level. The ABS (2013c) recommends that sample estimates with an RSE between 25% and 50% be treated with caution, and that sample estimates with RSEs over 50% not be used.

5.2 Benefits

This section outlines the benefits which were used in the cost-benefit analysis. As noted in Chapter 4, benefits are calculated as the costs that are avoided as a result of the KidsXpress program.

5.2.1 Avoided medical practitioner costs

This section outlines the methodology for calculating each of the medical practitioner cost components. For each component, survey respondents were asked to estimate the number of visits to each practitioner (for both the child and the parent/carer) that had taken place in the 12 months prior to, and the 12 months after, KidsXpress.

5.2.1.1 GP consultations

GP consultations were modelled using data from the Department of Health (DOH). Data from DOH (2015a) show that there were 123,317,814 encounters provided by GPs in 2014/15. Of these, 83.0% were bulkbilled. The total MBS benefits paid by the Federal Government were $5,499,030,240, which is an average contribution of $44.66 per encounter. For the 17.0% of patients that were not bulkbilled, the average patient contribution was $31.36 per encounter (DOH, 2015c). This means that the average patient contribution across all GP encounters is $5.33, and **the total expenditure by patients and the government is $49.99/visit.**

From the survey results, both children and parents/carers had **statistically significant** decreases in the mean number of visits to the GP. The mean number of GP visits for children in the 12 months before KidsXpress was 3.79 per child, while the mean number of visits in the 12 months after KidsXpress was 1.82. For parents and carers, the mean number of visits before KidsXpress was 3.09, and the mean number of visits after KidsXpress was 2.14.

5.2.1.2 Psychologists and other allied health workers

Psychologist and other allied health worker consultations were modelled using item 80000[12] from the MBS. It was assumed that patients did not exceed the cap of 10 sessions in a calendar year. Total MBS benefits paid for item 80000 encounters in 2014/15 were $1,107,814, and there were 12,818 encounters provided (DOH, 2015c). This shows that the average Federal Government contribution for each item 80000 encounter was $86.43.

[12] Item 80000 – Professional attendance for the purpose of providing psychological assessment and therapy for a mental disorder by a clinical psychologist registered with Medicare Australia as meeting the credentialing requirements for provision of this service, lasting more than 30 minutes but less than 50 minutes, where the patient is referred by a medical practitioner, as part of a GP Mental Health Treatment Plan; or referred by a medical practitioner (including a GP, but not a specialist or consultant physician) who is managing the patient under a referred psychiatrist assessment and management plan; or referred by a specialist or consultant physician in the practice of his or her field of psychiatry or paediatrics. These therapies are time limited, being deliverable in up to ten planned sessions in a calendar year (including services to which items 2721 to 2727; 80000 to 80015; 80100 to 80115; 80125 to 80140; 80150 to 80165 apply).

Item 80000 falls into the Other Allied Health broad type of service (BTOS). DOH (2015a) does not provide bulkbilling rates or data on government and patient contributions for these services. As such, the Allied Health BTOS category has been used. This shows that 62.9% of 10,137,063 total encounters were bulkbilled in 2014/15, with an average patient OOP of $36.90 (DOH, 2015a). Using these data, Deloitte Access Economics has calculated that the average patient OOP per encounter was $13.69, and **the total expenditure by patients and the government is $100.12 per visit.**

Survey results show that the mean number of psychologist visits showed a **statistically significant decrease** in the 12 months after KidsXpress, for both children and parents/carers. For children, in the 12 months before KidsXpress the mean number of visits was 4.26 per child, while the mean number of visits in the 12 months after KidsXpress was 2.68. For parents and carers, the mean number of visits decreased from 3.31 to 2.11.

5.2.1.3 Psychiatrists and other medical specialists

Psychiatrist consultations were modelled using item 296[13] from the MBS for initial consultations, and item 304[14] for subsequent consultations. It was assumed that patients did not exceed the cap of 50 encounters in a calendar year.

Total MBS benefits paid for item 296 encounters in 2014/15 were $24,966,134, and there were 108,809 encounters provided (DOH, 2015c). This shows that the average Federal Government contribution for each item 296 encounter was $229.45. Total MBS benefits paid for item 304 in 2014/15 were $70,803,422, and there were 569,557 encounters provided. This shows that the average Federal Government contribution for each item 304 encounter was $124.32. A weighted average of costs across item 296 and item 304 gives an average cost per visit of $141.18.

Items 296 and 304 both fall into the Specialist Attendances BTOS, as defined by DOH. DOH (2015a) shows that the average bulkbilling rate for these encounters in 2014/15 was 29.9%, and that the average patient contribution per service for each of the 71.1% of services that was not bulkbilled was $65.73. Across all of the 27,772,577 Specialist Attendances services, this is an average OOP of $46.73 per encounter. Combining the patient and government costs, **the total cost per visit is estimated to be $187.91.**

From the survey results, **the children exhibited a statistically significant decrease in visits to psychiatrists, while the decrease for parents was not significant.** The mean number of psychiatrist visits for children in the 12 months before KidsXpress was 2.29 per child while the mean number of visits in the 12 months after KidsXpress was 1.00. However, for

[13] Item 296 – Consultant Psychiatrist, initial consultation on a new patient, consulting rooms. Professional attendance of more than 45 minutes by a consultant physician in the practice of his or her speciality of psychiatry where a patient is referred to him or her by a referring practitioner, and where the patient is a new patient for this consultant psychiatrist, or is a patient who has not received a professional attendance from this consultant psychiatrist in the preceding 24 months.

[14] Item 304 – Consultant Psychiatrist, referred consultations, consulting rooms. An attendance of more than 30 minutes duration but not more than 45 minutes duration at consulting rooms, where that attendance and any other attendance to which items 296, 300 to 308 and items 353 to 358 or 361 to 370 apply have not exceeded the sum of 50 attendances in a calendar year.

parents the decrease in visits from 1.23 to 0.86 was not significant at 5%. Note that the size of the RSEs indicates that these estimates should be treated with caution.

5.2.1.4 Hospital outpatient services

The most recent data on the costs of hospital outpatient services come from Round 15 of the National Hospital Cost Data Collection (NHCDC), which was published by the Independent Hospital Pricing Authority (IHPA) in 2013. In 2010/11, the average cost of an outpatient psychiatry service was $1,105, while the average cost of an outpatient psychology service was $475. Taking a weighted average of these costs to adjust for a higher number of psychiatry services, and adjusting for health inflation (ABS, 2015a), gives **an average outpatient cost of $1,259.72 per visit in 2015**.

Survey results for **both children and parents/carers showed a non-significant change** in the number of hospital outpatient services. For children, there was a non-significant decrease in the mean number of outpatient services (0.86 before, 0.77 after). For adults, no visits were recorded either before or after KidsXpress to hospital outpatient services. In addition to the non-significant results, the large RSEs for the results in children mean that these estimates cannot be used in the cost-benefit analysis. However, since the change for children is in the expected direction, it is recommended that data continue to be collected so that, over time and with larger sample size, RSEs can potentially be reduced.

5.2.1.5 Community health services

Community mental health care refers to government-funded and -operated specialised mental health care provided by community mental health care services and hospital-based ambulatory care services, which is typically provided by outpatient and day clinics (National Health and Medical Research Council, 2008). Data from the National Health and Medical Research Council (2015) show that in 2013/14, there were 8,713,131 services provided in Australia, which cost $1,802,504,000 to provide. **Inflated to 2015, the average price per service in 2015 was $215.10**.

Both children and parents/carers recorded non-significant changes in their use of community health services: children (1.17 before, 0.82 after) and adults (0.67 before, 0.55 after). In addition to the non-significant results, the large RSEs mean that these estimates cannot be used in the cost-benefit analysis. As with hospital outpatient services, since the change for children and parents/carers is in the expected direction, it is recommended that data continue to be collected so that, over time and with larger sample size, RSEs can potentially be reduced.

5.2.1.6 Emergency departments

The most recent authoritative data on the cost of emergency department admissions come from Round 16 of the NHCDC (IHPA, 2015), which has collected data from 429 participating hospitals across all states and territories in Australia. From these data, the average cost of an emergency department presentation in NSW which went on to be admitted to the hospital was $1,163 in 2011/12, while the average cost of an presentation that was not admitted was $397 in 2011/12. Adjusting for Sydney health system inflation (ABS, 2015a), and taking a weighted average to account for a lower number of admitted presentations

compared to non-admitted presentations, **the average cost of an emergency department visit in Sydney in 2015 was estimated to be $737.73**.

Both children and parents/carers had a non-significant decrease in emergency department visits. For children, the mean number of visits decreased from 0.91 to 0.76, while for adults, the mean number of visits decreased from 0.14 to 0.09. The large RSEs also preclude these results from being included in the analysis, with a similar recommendation for ongoing monitoring as for outpatient visits and community health services.

5.2.1.7 Hospitalisations (inpatient admissions)

The average hospital inpatient cost is sourced from the AIHW (2015). In 2013/14, the average cost of a patient who was admitted for mental diseases and disorders (using the Major Diagnostic Category version 6.0x) in a public hospital was $9,128. Using the average cost weights for public and private hospitals in NSW (1.05 and 0.94, respectively), the average cost of a hospital separation for mental diseases and disorders in NSW is $9,584.40 for public hospitals and $8,580.32 for private hospitals.

There were 138,230 separations for mental diseases and disorders that occurred in public hospitals, and 138,228 separations that occurred in private hospitals. Combining this information, taking a weighted average of separations in public and private hospitals, and adjusting to 2015, **the average cost of a separation for mental diseases and disorders in NSW in 2015 is $9,443.77.**

Neither children nor parents/carers had a statistically significant change in the number of hospitalisations. The survey results show that the mean number of inpatient hospitalisations for children remained unchanged in the 12 months before and after KidsXpress. For adults, there was a non-significant increase in inpatient hospitalisations, with no hospitalisations recorded before KidsXpress, and a mean of 0.05 hospitalisations recorded after KidsXpress. Again, results for children and adults should continue to be monitored due to the small sample size effects evident in this survey data.

5.2.2 Avoided pharmaceutical costs

The medications used by children who attended KidsXpress were sourced from the survey, which asked parents and carers to note which medications were used by their children, the daily dosage taken by the children, and whether this dosage had changed in the 12 months before and the 12 months after KidsXpress. Table 5.1 shows the percentage of children attending KidsXpress who used each type of medication that was identified in the survey.

Table 5.1: Pharmaceutical use

Product	%
Ritalin	15.2
Concerta	6.1
Luvox	3.0
Straterra	3.0
Catapres	3.0
Dexamphetamine	3.0
Risperdal	3.0

Source: Deloitte Access Economics survey results.

Very little information was provided regarding the daily dosage taken by children, and so where this information was not provided it was assumed that children were prescribed half of the maximum daily dose that is recommended to be prescribed to children by the Therapeutic Goods Administration (TGA).

It was not possible to use the survey results to assess whether medication use had changed as a result of KidsXpress. There was a low number of respondents to this question on the survey (13 respondents), and several of these respondents did not provide details on the type of medication for which the dose had changed. As such, historical results from Access Economics' 2006 evaluation of KidsXpress were used. This evaluation used survey data to estimate that there had been an **average reduction in medication use of 3% across all types of medication used, as a result of children attending KidsXpress.**

The costs of pharmaceuticals were obtained from the DOH's listing of all pharmaceuticals which are available under the PBS (DOH, 2015b). Additional information on pharmaceuticals was sourced from Product Information sheets from the TGA. Details on each type of medication (including the cost and daily dosage) are provided in Appendix D, with the results of this analysis summarised in Table 5.2.

Table 5.2: Summary of pharmaceutical details

Pharmaceutical brand name	Active ingredient	Maximum daily dose for children	Assumed daily dose^	Price for assumed daily dose*
Ritalin	Methylphenidate	60 mg	30 mg	$1.26
Concerta	Methylphenidate	60 mg	30 mg	$1.26
Luvox	Fluvoxamine maleate	200 mg	50 mg	$0.74
Strattera	Atomoxetine hydrochloride	50.4 mg	10 mg	$0.74
Dexamphetamine	Dexamphetamine	40 mg	20 mg	$1.07
Risperdal	Risperidone	Not available	0.875 mg	$0.61

Source: DOH (2015b); TGA (2015a, 2015b, 2015c, 2014a, 2014b, 2014c, 2014d).
Notes: ^ where not available from survey data, the assumed daily dose is 50% of the maximum daily dose. * the price for the assumed daily dose is calculated using the higher of the DPMQ and the price paid by consumers.

5.2.3 Avoided informal care costs

Informal care refers to care that is provided free of charge, and outside of the formal care sector. Informal care is typically provided by a family member of the person receiving the care, and provided by someone who lives in the same household as the recipient of care. In the case of informal care provided to children who attend KidsXpress, the informal care they receive is provided by their parent or carer.

Every hour of informal care that is provided by a parent or carer as a result of their child's mental health condition represents an economic cost. There are three components to the informal care costs which were estimated for this evaluation.

The first component ('Component A') is the total number of hours of care provided to the child as a result of their condition. This care is in addition to the usual care that is provided to a child by their parent or carer. The second component ('Component B') is a subset of the first: it is the hours of care provided, which would otherwise have been spent in paid employment. The difference in hours (between total care provided, and hours of work forgone) is care that is not provided from forgone work time ('Component C'). Thus, A = B + C.

The hours of paid employment forgone (Component B) are valued at the hourly wage which the parent or carer would otherwise have earnt. Thus, the cost to parents and carers of reducing their employment is the 'lost' wages. As at May 2015, the average person in the labour force in NSW earnt $1,150.50 each week (ABS, 2015b). Assuming a 40 hour working week, **this equates to $28.79 per hour**. This is inclusive of personal income tax and superannuation.

The other hours of care, which do not impact on employment, are valued based on the cost of 'replacing' the care with formal care provided by a paid provider. This method establishes the 'cost' of this care by estimating the cost that would have to be incurred to purchase these services from the formal care sector. **In 2015, Deloitte Access Economics estimated the hourly cost of employees in the formal care sector to be $31.36**. This represents the total cost of the formal carer to their employer, as it includes the base salary earnt by employees, as well as loadings for on-costs, capital, and supervision and administration.

For Component B, survey results were used to estimate the impact of KidsXpress. **While the survey results showed a decrease from 12.00 hours per week before KidsXpress to 8.43 hours per week after KidsXpress, this decrease was not statistically significant**.

For Component C, estimated hours of care per week were calculated based on Question 12 from the survey, which asked respondents to estimate the total additional care provided to their children, and also to estimate how much of this time would otherwise have been spent in employment. As with Component B**, the results for Component C showed a non-significant decrease from 4.31 hours to 3.18 hours.**

As such, the informal carer costs are not included in the benefits estimated here, with a recommendation for ongoing data collection to increase sample size, to confirm whether the mean reduction evident here becomes significant with more evidence.

5.2.4 Avoided burden of disease costs

This section outlines the methodology for calculating the burden of disease costs. The burden of disease is measured in **DALYs**, which can be converted into a dollar figure using an estimate of the **value of a statistical life** (VSL). As the name suggests, the VSL is an estimate of the value society places on an anonymous life. Since Schelling's (1968) discussion of the economics of life saving, the economic literature has focused on **willingness to pay** (WTP) – or, conversely, willingness to accept – measures of mortality and morbidity, in order to develop estimates of the VSL.

Estimates may be derived from observing people's choices in situations where they rank or trade off various states of wellbeing (loss or gain) either against each other or for dollar amounts, for example, stated choice models of people's WTP for interventions that enhance health or willingness to accept poorer health outcomes or the risk of such states. Alternatively, risk studies use evidence of market trade-offs between risk and money, including numerous labour market and other studies (such as installing smoke detectors, wearing seatbelts or bike helmets, and so on).

The extensive literature in this field mostly uses econometric analysis to value mortality risk and the 'hedonic wage' by estimating compensating differentials for on-the-job risk exposure in labour markets; in other words, determining what dollar amount would be accepted by an individual to induce them to increase the probability of death or morbidity by a particular percentage.

In an attempt to overcome some of the issues in relation to placing a dollar value on a human life, a non-financial approach to valuing human life is used. Pain, suffering and premature mortality are measured in terms of DALYs, with 0 representing a year of perfect health and 1 representing death. This approach was developed by the World Health Organization, the World Bank and Harvard University (Murray and Lopez, 1996). Methods and data sources are detailed further in Murray et al (2001).

The DALY approach has been adopted and applied in Australia by the AIHW (Mathers et al, 1999; Begg et al, 2007). In any year, the disability weight of a condition (for example, 0.18 for a broken wrist) reflects a relative health state. In this example, 0.18 would represent losing 18% of a year of healthy life because of the inflicted injury.

The DALY approach has been successful in avoiding the subjectivity of individual valuation and is capable of overcoming the problem of comparability between individuals and between nations, although nations have subsequently adopted variations in weighting systems. For example, in some countries DALYs are age-weighted for older people although in Australia the minority approach is adopted – valuing a DALY equally for people of all ages.

As DALYs are enumerated in years of life rather than in whole lives it is necessary to calculate the **value of a statistical life year (VSLY)** based on the VSL. This is done using the formula:[17]

[17] The formula is derived from the definition:
VSL = ΣVSLYi/(1+r)^{i} where i=0,1,2….n
where VSLY is assumed to be constant (that is, no variation with age).

$$VSLY = \frac{VSL}{\Sigma_{i=0,\ldots,n-1}(1 + \ +r)^i}$$

Where:
n = years of remaining life, and
r = discount rate

The Department of Prime Minister and Cabinet (2014) provided an estimate of the 'net' VSLY (that is, subtracting financial costs borne by individuals). This estimate was $182,000 in 2014, which inflates to around **$184,730 in 2015 dollars for the VSLY**.

There are three critical parameters which are needed to estimate the overall burden of disease savings as a result of KidsXpress. These parameters are the prevalence of mental health conditions in the KidsXpress children, disability weights for these conditions, and the improvement in quality of life as a result of KidsXpress. These parameters are discussed below.

5.2.4.1 Prevalence

The KidsXpress survey data were used to establish the prevalence of mental health conditions in the KidsXpress population. As shown in Table 5.3, most children (57.1%) attending KidsXpress have no formal diagnosis. The most common condition was anxiety (20.6%), and then ADHD (12.7%). Some children had been diagnosed with more than one condition.

Table 5.3: Prevalence of mental health conditions

Condition	Prevalence (%)
Attention Deficit Disorder (ADD)	7.9
ADHD	12.7
Oppositional Defiant Disorder (ODD)	6.3
Conduct disorder	0.0
Depression	4.8
Autism	4.8
Anxiety	20.6
No formal diagnosis	57.1
Other	12.7

Source: Deloitte Access Economics survey results.
Note: Of the respondents who answered 'Other', one child had been diagnosed with trichotillomania, two had been diagnosed with dyslexia, and the other five conditions were not considered to be mental health conditions.

In typical burden of disease calculations, an estimate is made of the mortality attributable to the condition. This is then compared against the Standard Life Expectancy Table (West Level 26), and a 3% discount rate is applied to discount the loss of future deaths. However, for the conditions assessed in this report, the literature reviewed indicated that there were no deaths attributable to the mental health conditions of children at KidsXpress.

- While the mental health conditions in this report result in a small number of deaths, the most recent Australian burden of disease study (Begg et al, 2007) and the most recent global burden of disease study (Vos et al, 2015) both did not include any deaths from these conditions in their burden of disease calculations, due to the extremely low mortality rate from these conditions.
- A study by Erskine et al (2014) undertook a systematic review of literature on Conduct Disorder and ADHD, and established that there was no evidence of deaths resulting directly from either of these conditions. The ABS (2015c) also recorded no deaths for Conduct Disorder (ICD-10[18] code F91) or ADHD (using the broader hyperkinetic disorders category for ADHD, F90) in Australia in 2013.
- The ABS (2015c) recorded no deaths for recurrent depressive disorders or obsessive compulsive disorder (OCD). However, it recorded eight deaths for other anxiety disorders (ICD-10 code F41). Data on the age at which these deaths occurred is not publicly available. However, the ABS (2015c) shows that there were only six years of potential life lost from the F41 deaths. This indicates that none of these deaths occurred in children or adolescents[19].
- The ABS (2015c) does not record deaths from autism or Asperger's Syndrome. However, it does record deaths due to pervasive development disorders (ICD-10 code F84), which autism and Asperger's Syndrome are part of. One death for F84 was recorded in 2013. Deloitte Access Economics considers it unlikely that this death occurred in a child or adolescent, as this cohort represents a small component of the total.

5.2.4.2 Disability weights

In Australia, the current disability weights for mental health conditions come from the AIHW[20] (Begg et al, 2007), who established various disability weights based on the work by Stouthard et al (1997). For the conditions which were not included in Begg et al (2007), these have been sourced from two of the 2010 global burden of disease publications (Salomon et al, 2012; Whiteford et al, 2013). The disability weights for the mental health conditions found in the KidsXpress sample population are summarised in Table 5.4.

[18] International Statistical Classification of Diseases and Related Health Problems, 10th revision.

[19] The years of potential life lost measures the extent of 'premature' mortality, which is assumed to be any death between the ages of 1-78 years inclusive, and aids in assessing the significance of specific diseases or trauma as a cause of premature death. Estimates are calculated for deaths of persons aged 1-78 years based on the assumption that deaths occurring at these ages are untimely (ABS, 2015c).

[20] The AIHW has been funded to update burden of disease estimates for Australia and for the Aboriginal and Torres Strait Islander population, with results expected to be published in early 2016. The study is building on methodological developments in recent global burden of disease studies, which will be tailored to the Australian context. This will potentially include a revision to the disability weight(s) that is/are used for mental health conditions. At this stage, the AIHW is planning to use disability weights from the 2013 Global Burden of Disease study, which was published in Vos et al (2015).

Table 5.4: Disability weights

Condition	Disability weight	Source
Depression (weighted average of mild, moderate and severe)	0.384	Begg et al (2007)
Generalised anxiety disorder (weighted average of mild, moderate and severe)	0.224	Begg et al (2007)
ADHD and ADD (weighted average of mild, moderate and severe)	0.085	Begg et al (2007)
Autism and Asperger's syndrome	0.400	Salomon et al (2012)
Conduct Disorder	0.236	Salomon et al (2012)
Oppositional Defiant Disorder	0.236	Whiteford et al (2013)

5.2.4.3 Reduction in burden of disease

To estimate the reduction in burden of disease in the children who attended KidsXpress, results from the parent and carer survey, and the referrer survey were used. KidsXpress utilises Key Transformation Indicators (KTIs) to assess the overall mental health condition of the children who attend the program. The KTIs evaluate the mental health condition of children against the following areas:

- self-awareness;
- expressing feelings and emotions;
- connection to others;
- ability to work in a group;
- awareness of how individual behaviour affects others;
- understanding others;
- ability to regulate or control behaviour; and
- listening.

Children are assigned a score ranging from 1 (very poor) through to 7 (very strong) against each area.

The proportional improvement in the KTI scores was used as a proxy for estimating overall improvement in quality of life. This estimated improvement was applied against the disability weights for each of the mental health conditions to estimate the reduction in each of the disability weights.

Using survey data, a weighted average across all children was calculated on a before and after basis, from both the parent and carer survey, and the referrer survey. The parent and carer survey showed a statistically significant improvement of 37.3% from 3.38 to 4.65 (RSE = 3.0%), and the referrer survey also showed a statistically significant improvement of 61.9% from 2.42 to 3.92. **An average of these two improvements was used in the modelling (49.6%)**.

The referrer survey asked respondents to evaluate the change in KTIs against several different referral reasons for children attending KidsXpress: abuse and neglect, anxiety and depression, domestic violence, grief and loss, substance or alcohol abuse in the household,

and other. However, due to the small number of responses for each referral reason, this additional level of detail was not included in the analysis, and the aggregate results across all children were used instead. The results of the literature review in Chapter 3 suggest that the impact of expressive therapy in addressing a child's overall mental condition is relatively similar across the referral reasons.

5.2.4.4 Worked example

This section provides a brief worked example of how the burden of disease calculations are performed. Using the example of anxiety:

- There were estimated to be 56 children in 2015 who have been formally diagnosed with anxiety. This is calculated as 271 children who attended the program (see Section 5.3), multiplied by the estimated prevalence of anxiety (20.6%).
- In the absence of KidsXpress, these children would have incurred quality of life losses equivalent to $2.3 million in 2015. This is calculated by multiplying the 56 children with anxiety by the disability weight for anxiety (0.224) and the VSLY ($184,730).
- However, KidsXpress is estimated to reduce the burden of disease by an average of 49.6% (see discussion in Section 5.2.4.3). Thus, the quality of life losses incurred by these children as a result of attending KidsXpress are now $1.2 million. This is calculated by multiplying the 56 children with anxiety by the disability weight for anxiety (0.224), the VSLY ($184,730) and the proportional reduction in lost quality of life (1-0.496).
- Thus, for children with anxiety the quality of life costs avoided as a result of KidsXpress are ($2.3m - $1.2m) = $1.1m.

5.3 Number of children attending KidsXpress in 2015

All costs and benefits in the cost-benefit analysis are calculated on a per child basis. As such, establishing the number of children attending KidsXpress in 2015 is a critical component of the modelling, as this 'drives' all the calculations in the model. As this report has been undertaken before the full number of children attending KidsXpress in 2015 can be established, the number of children attending KidsXpress in 2015 was estimated based on the number of attendees in 2014. A per capita attendance rate for all children in New South Wales (NSW) aged 4-14 years was established, and this was used to estimate the number of attendees in 2015 (based on population forecasts from the ABS (2013b)). **In 2014, 268 children[21] attended KidsXpress, and this is estimated to grow to 271 children in 2015 in line with population growth.**

5.4 Summary tables

The tables in this section summarise the parameter values (Table 5.5) and the results of the statistical analysis (Table 5.6).

[21] Data provided by KidsXpress.

Table 5.5: Summarised parameter values

Health practitioners	*Visits in 12 months before*	*Visits in 12 months after*	*Cost per visit*
GP	6.88	3.95	$50
Psychologist	7.58	4.79	$100
Psychiatrist	3.52	2.23	$188
Outpatient	0.86	Unchanged	$1,260
Community health service	1.84	Unchanged	$215
Emergency department	1.05	Unchanged	$738
Inpatient	0.55	Unchanged	$9,443
Pharmaceuticals	*Number of children using medication*	*Cost per day*	
Ritalin	41	$1.26	
Concerta	16	$1.26	
Luvox	8	$0.74	
Strattera	8	$0.74	
Dexamphetamine	8	$1.07	
Risperdal	8	$0.61	
Average reduction in usage	3%		
Informal care	*12 months before*	*12 months after*	*Unit cost*
Hours of forgone work per week	12.00	Unchanged	$28.79/hour
Hours of care provided from non-work time	4.31	Unchanged	$31.36/hour
Burden of disease	*Number of children diagnosed with condition*	*Disability weight of condition*	
ADD	21	0.085	
ADHD	34	0.085	
ODD	17	0.236	
Depression	13	0.384	
Autism	56	0.400	
Anxiety	21	0.224	
Average improvement in KTIs	49.6%		
VSLY	$184,730		

Source: Deloitte Access Economics research and calculations.

Table 5.6: Summarised statistical analysis

	Before		After		Sample size	t-statistic	Critical value	Significance
	Mean value	*RSE (%)*	*Mean value*	*RSE (%)*				
Health system visits (child) – mean number of visits in the 12 months before and after KidsXpress								
GP	3.79	18.00	1.82	20.09	46	3.44	2.01	Yes
Psychologist	4.26	18.40	2.68	26.57	40	2.04	2.02	Yes
Psychiatrist	2.29	28.60	1.00	30.52	38	2.38	2.03	Yes
Outpatient	0.86	59.53	0.77	66.87	32	1.44	2.04	No
Community health service	1.17	53.69	0.82	65.41	33	0.92	2.04	No
Emergency department	0.91	51.20	0.76	60.74	35	1.06	2.03	No
Inpatient	0.55	91.55	0.55	91.55	32	0.00	2.04	No
Health system visits (parent/carer) – mean number of visits in the 12 months before and after KidsXpress								
GP	3.09	23.82	2.14	28.98	40	2.75	2.02	Yes
Psychologist	3.31	20.81	2.11	26.69	40	2.65	2.02	Yes
Psychiatrist	1.23	45.12	0.86	37.28	33	0.87	2.04	No
Community health service	0.67	76.17	0.55	91.55	32	1.39	2.04	No
Outpatient	0.00	N/A	0.00	N/A	32	N/A	N/A	No
Emergency department	0.14	55.84	0.09	69.56	32	1.00	2.04	No
Inpatient	0.00	N/A	0.05	100.00	32	-1.00	2.04	No
Informal care hours – mean number of hours per week in the 12 months before and after KidsXpress								
Hours of work forgone	12.00	31.08	8.43	35.77	16	1.53	2.13	No
Hours of leisure forgone	4.31	24.95	3.18	27.29	16	1.33	2.13	No
KTIs – mean score in the 12 months before and after KidsXpress								
Rated by parent	3.38	4.76	4.65	3.01	60	-10.22	2.00	Yes
Rated by referrer	2.42	7.20	3.92	4.09	22	-9.07	2.08	Yes

Source: Deloitte Access Economics analysis of survey results.

Note: (1) for each of the 18 elements in the table, survey responses which did not provide both before and after estimates were excluded from the analysis. (2) Of the elements which were not significantly different at 5%, none were difference at the 10% level. When tested at the 20% level of significance, visits to hospital outpatient services had a significant decrease for children. For parents, visits to community health services and, and the hours of work forgone, showed a significant decrease at the 20% level of significance.

6 Cost-benefit analysis results and concluding remarks

This chapter presents the results of the cost-benefit assessment and provides concluding remarks on the KidsXpress program.

6.1 Results

The results of the cost-benefit modelling are shown in Table 6.1. Cost items which did not have a statistically significant change between "before KidsXpress" and "after KidsXpress" are excluded from the calculation of costs as they do not result in a validated incremental change.

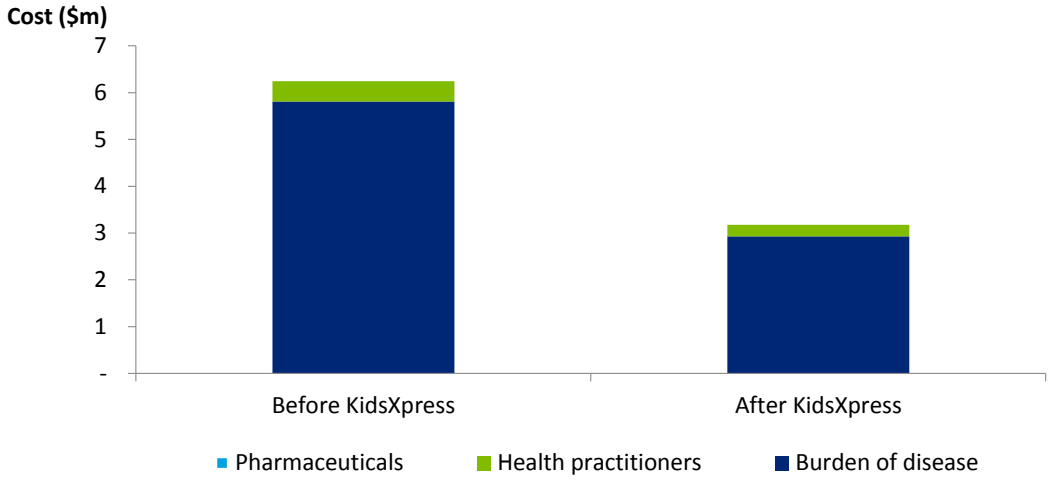
Table 6.1: Summary of results

	Before KidsXpress ($)	After KidsXpress ($)	Change ($)
Medical practitioner costs			
GP	93,168	53,520	39,648
Psychologist	205,417	129,826	75,591
Psychiatrist	178,988	113,359	65,629
Subtotal	*477,573*	*296,705*	*180,868*
Pharmaceutical costs			
Ritalin	18,874	18,307	566
Concerta	7,549	7,323	226
Luvox	2,217	2,150	67
Straterra	2,217	2,150	67
Dexamphetamine	3,206	3,109	96
Risperdal	1,827	1,773	55
Subtotal	*35,890*	*34,813*	*1,077*
Burden of disease			
ADD	335,983	169,244	166,739
ADHD	540,124	272,075	268,049
ODD	743,915	374,730	369,185
Depression	922,238	464,556	457,682
Autism	960,665	483,913	476,752
Anxiety	2,308,798	1,163,004	1,145,794
Subtotal	*5,811,723*	*2,927,522*	*2,884,201*
Total costs	**6,325,186**	**3,259,040**	**3,066,146**

Source: Deloitte Access Economics calculations.

As shown in Chart 6.1, the largest incremental cost reduction is the burden of disease ($2.9 million), followed by health practitioner costs ($0.2 million).

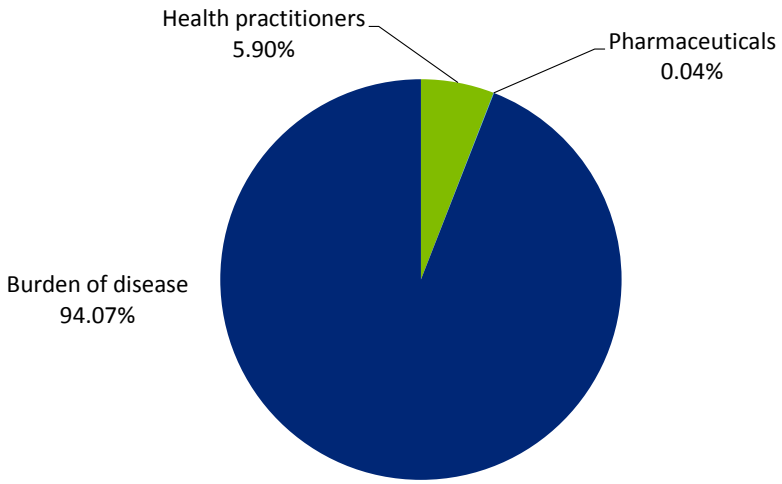
Chart 6.1: Costs avoided, 2015



Source: Deloitte Access Economics calculations.

On a proportional basis, the burden of disease incremental cost reductions comprise the largest component (94.07%) of the cost reduction. This is shown in Chart 6.2.

Chart 6.2: Proportional contributions to costs avoided, 2015



Source: Deloitte Access Economics calculations.

Overall, in 2015 KidsXpress is estimated to deliver net benefits of $2.0 million, and generate a BCR of 2.76. This means that every $1 invested in the KidsXpress program generates $2.76 of benefits to society in 2015 (see Table 6.2).

Table 6.2: Cost-benefit results

Costs	$1,112,805
Benefits	$3,066,146
Net benefits	$1,953,341
BCR	2.76

Source: Deloitte Access Economics calculations.
Note: Costs are the annual program costs of KidsXpress. Benefits are the avoided costs due to KidsXpress in 2015. Net benefits are calculated by subtracting costs from benefits. The BCR is calculated by dividing benefits by costs.

It is important to note that this cost-benefit assessment has not established a causal link between KidsXpress and the cost savings included in the analysis. While statistically significant reductions in the economic costs of children and parents/carers have been established, it is possible that some of this reduction would have occurred even in the absence of KidsXpress (for example, children may also be attending additional therapy programs, which would contribute to the cost reductions). The requisite regression analysis necessary to ascribe the portion of the benefits attributable to KidsXpress is beyond the scope of this analysis, since a matched control group was not available.

6.2 Concluding remarks

Childhood stress and trauma is highly prevalent in Australian young people. Triggers of childhood stress, such as domestic violence, abuse and neglect, separation and divorce, bullying and developmental conditions contribute to 53.9% of Australian children exhibiting signs of psychological distress. 17.0% of Australian children suffer from high levels of psychological distress (Lawrence et al, 2015).

This places a significant burden on Australian children, families, community and the economy. Since 2006, the KidsXpress program has been providing an expressive therapy program that offers a non-threatening and creative environment to engage in music, drama, art and play therapy, which seeks to alleviate the negative outcomes of childhood stress and trauma.

The results of the cost-benefit analysis have established that the KidsXpress program delivers significant economic benefits to Australia: every dollar invested avoids $2.76 in costs to society that would otherwise have been incurred.

> Given the significant prevalence of childhood stress and trauma in the broader Australian child population, and the efficacy of the KidsXpress program, it is recommended that the KidsXpress program be expanded to allow for a greater reach throughout Sydney and the rest of Australia.

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Appendix A: Parent and carer survey details

Two surveys were developed by Deloitte Access Economics to provide inputs for the economic evaluation of KidsXpress. The first survey was provided to the parents and carers of children who had attended KidsXpress, while the second survey was provided to the people who had referred children to KidsXpress (for example, school principals and social workers). This appendix details the parent and carer survey, while the referrer survey is detailed in Appendix B.

The therapists employed by KidsXpress were not surveyed, as they would be unable to provide knowledge of the health system and informal care costs associated with each child, and it was considered that they are not in a position to provide an objective assessment of the children's outcomes.

The parent and carer survey was developed in SurveyMonkey and distributed via email to 455 people, with a response received from 68 people. To incentivise parents and carers to participate, each respondent who completed the survey was entered into competition to win a 12 month Family Pass to Taronga Zoo in Sydney.

The parent and carer survey contained 14 questions, which were used to generate inputs for 17 elements in the cost-benefit analysis[22]. For each element, survey responses which had not provided a before and after estimate were excluded from the analysis of that element. For example, a respondent which had estimated the number of visits to a GP both before and after, but only provided an estimated number of visits to a psychiatrist before KidsXpress, only had their answers for the GP calculations included.

Survey responses which were inconsistent were also excluded. For example, a respondent had answered "no" to question 11 ("Does your child's condition require any additional care"), but had then indicated in question 12 that they provided 25-30 hours of additional care.

Answers to questions which provided different ranges (for example, "1-2", 3-5", etc.) were converted to numerical values by taking the average of the range (for example, 1.5 and 4, from the previous example).

[22] These elements were: health system visits for children (GP, psychologist, psychiatrist, outpatient, community health service, emergency department, and hospital inpatient); health system visits for parents (GP, psychologist, psychiatrist, outpatient, community health service, emergency department, and hospital inpatient); informal care hours (hours of work forgone, and hours of care provided outside of work hours); and KTI estimates.

Questions and summarised responses

1. How old was your child (in years) when they attended KidsXpress?

Table A.1: Question 1 responses

Age	4	5	6	7	8	9	10	11	12	13	14
No. of responses	0	5	6	9	14	16	8	3	4	1	2

Source: Deloitte Access Economics survey results.

2. In what year did your child attend KidsXpress?

Table A.2: Question 2 responses

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015
No. of responses	0	0	1	0	2	8	16	22	19

Source: Deloitte Access Economics survey results.

3. What is the gender of your child who attended KidsXpress?

Table A.3: Question 3 responses

Gender	Male	Female
	42	23

Source: Deloitte Access Economics survey results.

4. What is the postcode of your child who attended KidsXpress?

Table A.4: Question 4 responses

Postcode	No. of responses
2036	9
2031	6
2034	4
2770	3
2035	3
2021	3
2032	3
Other	36

Source: Deloitte Access Economics survey results.
Note: 2036 = Chifley, Eastgardens, Hillsdale, La Perouse, Little Bay, Malabar, Matraville, Phillip Bay, Port Botany. 2031 = Clovelly West, Clovelly, Randwick, St Pauls.

5. Which KidsXpress program did your child attend?

Table A.5: Question 5 responses

Program	Centre*	Outreach^	Other
No. of responses	61	6	1

Source: Deloitte Access Economics survey results.
Note: * This is at the KidsXpress centre at Moore Park. ^ This is at the child's school or other location.

6. Who referred your child to KidsXpress?

Table A.6: Question 6 responses

	No. of responses
School teacher	8
School principal/deputy principal	10
School counsellor	17
Psychologist/psychiatrist	12
General practitioner (GP)/paediatrician	0
Social worker	8
Unsure	2
Other	9

Source: Deloitte Access Economics survey results.

7. Prior to entering KidsXpress, was your child diagnosed with any of the following conditions? Please select all that apply.

Table A.7: Question 7 responses

	No. of responses
Attention Deficit Disorder (ADD)	5
Attention Deficit Hyperactivity Disorder (ADHD)	8
Oppositional Defiant Disorder (ODD)	4
Conduct Disorder	0
Depression	3
Autism Spectrum Disorder	3
Anxiety	13
No formal diagnosis	36
Other	8

Source: Deloitte Access Economics survey results.

8. In relation to the condition(s) for which your child attended KidsXpress, how many times did your child visit the following health care providers?

Table A.8: Question 8 responses

	0	1-2	3-5	6-10	11-15	>15	Total
	Number of visits in the 12 months before KidsXpress						
General practitioner (GP)	20	12	14	5	2	3	56
Psychologist or other allied health worker (for example, nurse, dietician, etc.)	23	6	7	9	4	4	53
Psychiatrist or other medical specialist	31	6	3	5	1	1	47
Community health service	36	4	2	0	1	1	44
Hospital outpatient service	32	5	1	0	0	1	39
Emergency department	31	8	2	0	0	1	42
Hospital inpatient	37	1	0	0	0	1	39
	Number of visits in the 12 months after KidsXpress						
General practitioner (GP)	19	15	10	1	1	0	46
Psychologist or other allied health worker (for example, nurse, dietician, etc.)	25	4	4	5	1	2	41
Psychiatrist or other medical specialist	27	4	6	1	0	1	39
Community health service	29	2	0	1	0	1	33
Hospital outpatient service	27	3	1	0	0	1	32
Emergency department	27	7	0	0	0	1	35
Hospital inpatient	31	1	0	0	0	1	33

Source: Deloitte Access Economics survey results.
Notes: For each item, respondents were given the following choices: 0, 1-2, 3-5, 6-10, 11-15, and more than 15. For each range, an assumed value of the middle of the range was used in the calculations. The final option was given an assumed score of 16.

9. Please list the medications (and medication strength if appropriate) which were prescribed to threat the condition(s) for which your child attended KidsXpress.

Table A.9: Question 9 responses

Medication	No. of responses	Mean medication strength
Ritalin	5	N/A
Concerta	2	N/A
Luvox	1	50 mg
Strattera	1	10 mg
Dexamphetamine	1	N/A
Risperdal	1	N/A

Source: Deloitte Access Economics survey results.

10. For each of the medications listed above, please record whether or not the medication was still required after your child attended KidsXpress

Table A.10: Question 10 responses

Medication	Yes – same dosage	Yes – higher dosage	Yes – lower dosage	No longer required
Medication 1	8	0	2	1
Medication 2	1	0	0	
Medication 3	1	1	0	

Source: Deloitte Access Economics survey results.

11. In your view, did the condition(s) for which your child attended KidsXpress require any 'additional' care from you, more than what a child without that condition might require? For example, additional care at home, or time off work to attend medical appointments.

Table A.11: Question 11 responses

Yes/No	Yes	No
No. of responses	32	31

Source: Deloitte Access Economics survey results.

12. If you answered yes to Question 11, for the average week, please estimate the number of hours that were spent on the following tasks (please select the closest option).

Table A.12: Question 12 responses

	No time	1-2 hours	3-5 hours	6-10 hours	11-15 hours	16-20 hours	21-25 hours	26-30 hours	> 30 hours	Total
					In the 12 months before KidsXpress (average hours per week)					
Total amount of care (hours) your child required due to their condition (e.g. food, assistance with schoolwork, nurturing time, etc.)	0	1	6	8	6	2	2	1	6	32
How much time did you spend away from paid employment as a result of your child's condition(s) (e.g. due to attendance at medical appointments or care provision)?	7	6	2	2	1	4	1	0	8	31
					In the 12 months after KidsXpress (average hours per week)					
Total amount of care (hours) your child required due to their condition (e.g. food, assistance with schoolwork, nurturing time, etc.)	0	2	10	2	5	0	1	0	4	24
How much time did you spend away from paid employment as a result of your child's condition(s) (e.g. due to attendance at medical appointments or care provision)?	8	3	2	3	1	2	1	1	4	25

Source: Deloitte Access Economics survey results.
Notes: For each item, respondents were given the following choices: 1-2, 3-5, 6-10, 11-15, 16-20, 21-25, 26-30, more than 30. For each range, an assumed value of the middle of the range was used in the calculations. The final option was given an assumed score of 35.

13. Did your child's condition result in you seeking health treatment for yourself?

Table A.13: Question 13 responses

	0	1-2	3-5	6-10	11-15	>15	Total
	Number of visits in the 12 months before KidsXpress						
General practitioner (GP)	26	8	8	2	1	3	48
Psychologist or other allied health worker (for example, nurse, dietician, etc.)	26	4	6	10	0	2	48
Psychiatrist or other medical specialist	31	3	3	1	0	1	39
Community health service	34	2	1	0	0	1	38
Hospital outpatient service	38	0	0	0	0	0	38
Emergency department	35	2	0	0	0	0	37
Hospital inpatient	37	0	0	0	0	0	37
	Number of visits in the 12 months after KidsXpress						
General practitioner (GP)	24	5	6	1	2	1	39
Psychologist or other allied health worker (for example, nurse, dietician, etc.)	24	3	6	5	0	1	39
Psychiatrist or other medical specialist	24	3	4	1	0	0	32
Community health service	29	1	0	0	0	1	31
Hospital outpatient service	31	0	0	0	0	0	31
Emergency department	30	1	0	0	0	0	31
Hospital inpatient	30	1	0	0	0	0	31

Source: Deloitte Access Economics survey results.

Notes: Notes: For each item, respondents were given the following choices: 0, 1-2, 3-5, 6-10, 11-15, and more than 15. For each range, an assumed value of the middle of the range was used in the calculations. The final option was given an assumed score of 16..

14. Thinking of the year before and the year after your child attended KidsXpress, please record their performance against each of the following indicators.

Table A.14: Question 14 responses

	Very Poor	Poor	Limited	Typical	Competent	Strong	Very Strong	Total
				12 months before KidsXpress				
Self-awareness	9	11	15	12	7	5	1	60
Expressing feelings & emotions	12	14	15	8	11	1	1	62
Connection to others	5	11	15	11	10	8	2	62
Ability to work in a group	10	10	15	12	7	8	0	62
Awareness of how individual behaviour affects others	8	15	14	12	5	6	2	62
Understanding others	3	11	18	13	4	11	2	62
Ability to regulate or control behaviour	13	15	10	11	5	6	2	62
Listening	5	10	18	16	5	5	3	62
				12 months after KidsXpress				
Self-awareness	0	1	9	18	14	11	6	59
Expressing feelings & emotions	0	1	11	12	21	10	6	61
Connection to others	0	1	12	17	11	14	6	61
Ability to work in a group	0	3	11	12	19	14	2	61
Awareness of how individual behaviour affects others	0	2	13	12	19	9	6	61
Understanding others	0	2	13	12	14	12	8	61
Ability to regulate or control behaviour	1	1	12	14	17	12	4	61
Listening	0	3	9	18	18	8	5	61

Source: Deloitte Access Economics survey results.
Note: respondents were asked to rate their child on the following scale: very poor, poor, limited, typical, competent, strong, very strong. These have been assigned numerical values from 1 (very poor) to 7 (very strong).

Appendix B: Referrer survey details

Two surveys were developed by Deloitte Access Economics to provide inputs for the economic evaluation of KidsXpress. The first survey was provided to the parents and carers of children who had attended KidsXpress, while the second survey was provided to the people who had referred children to KidsXpress (for example, school principals and social workers). This appendix details the referrer survey, while the parent and carer survey is detailed in Appendix A.

The therapists employed by KidsXpress were consulted both at the beginning of the project as well as during the design of the survey instruments. They were not explicitly surveyed as it was considered that parents and referrers would have the greatest knowledge of a child's *normal* environment (i.e. outside of the KidsXpress therapy areas).

The referrer survey was developed in SurveyMonkey and distributed via email to 227 people, with a response received from 42 people.

Survey responses which had not provided a before and after estimate for each component of the survey were excluded. For example, responses which had estimated KTI scores for a child before they entered KidsXpress, but not after, were excluded from the analysis.

Questions and summarised responses

1. What is your occupation?

Table B.1: Question 1 responses

Occupation	No. of responses
School teacher	5
School principal/deputy principal	5
School counsellor	9
Psychologist/psychiatrist	4
General practitioner (GP)/paediatrician	0
Social worker	0
Other	9*

Source: Deloitte Access Economics survey results.
Note: * responses included: play therapist, program manager, assistant principal, clinical psychologist, kids pastor, occupational therapist, community engagement officer, program manager for a preschool and early intervention service, occupational therapist, and counsellor.

2. Approximately how many children have you referred to KidsXpress in each year since the program began?

Table B.2: Question 2 responses

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015
No. of responses	0.2	0.2	2.6	2.1	6.2	5.1	7.4	6.5	5.4

Source: Deloitte Access Economics survey results.
Note: results are the average response for each year. For example, the average respondent referred 0.2 children to KidsXpress in 2007.

3. Approximately how many children have you referred to KidsXpress for the following broad reasons.

Table B.3: Question 3 responses

Broad admission reason	No. of responses
Abuse and neglect	13
Anxiety and depression	25
Grief and loss	19
Domestic violence	12
Substance or alcohol abuse in the household	9
Other	14*

Source: Deloitte Access Economics survey results.
Note: * responses included self-esteem, bullying, chronic illness and disability, PTSD, anger, anxiousness, forlornness, behavioural issues, attachment issues, adjustment following health issues, divorce, stress, and social difficulties.

4. For the average child in each of the broad referral categories below, please assign a score for the following attributes before you referred them to KidsXpress.

Table B.4: Question 4 responses

Score	1	2	3	4	5	6	7	Total
Abuse and neglect								
Self-awareness	3	3	4	2	0	0	0	12
Expressing feelings & emotions	5	4	2	0	0	0	0	11
Connection to others	3	2	3	2	0	1	0	11
Ability to work in a group	1	2	4	3	0	0	0	10
Awareness of how individual behaviour affects others	2	5	4	0	0	0	0	11
Understanding others	3	3	1	3	0	1	0	11
Ability to regulate or control behaviour	3	4	2	2	0	0	0	11
Listening	1	3	5	1	1	0	0	11

Score	1	2	3	4	5	6	7	Total
Anxiety and depression								
Self-awareness	8	6	3	2	0	1	0	20
Expressing feelings & emotions	6	11	2	0	0	0	0	19
Connection to others	1	12	2	2	0	1	0	18
Ability to work in a group	3	3	7	5	0	0	0	18
Awareness of how individual behaviour affects others	3	6	7	2	0	0	0	18
Understanding others	5	8	3	2	0	0	0	18
Ability to regulate or control behaviour	5	6	5	2	0	0	0	18
Listening	3	2	6	6	1	0	0	18
Domestic violence								
Self-awareness	2	5	2	1	1	0	0	11
Expressing feelings & emotions	3	4	0	0	1	0	0	8
Connection to others	2	2	4	1	0	0	0	9
Ability to work in a group	2	2	3	1	1	0	0	9
Awareness of how individual behaviour affects others	1	2	4	2	0	0	0	9
Understanding others	2	3	2	2	0	0	0	9
Ability to regulate or control behaviour	3	1	4	1	0	0	0	9
Listening	2	0	4	3	0	0	0	9
Grief and loss								
Self-awareness	1	1	2	5	1	1	1	12
Expressing feelings & emotions	1	2	5	1	1	1	0	11
Connection to others	0	3	5	3	0	1	0	12
Ability to work in a group	0	2	1	7	0	1	0	11
Awareness of how individual behaviour affects others	2	0	3	5	1	0	0	11
Understanding others	1	0	5	3	1	2	0	12
Ability to regulate or control behaviour	1	1	3	5	1	0	0	11
Listening	1	2	2	5	1	0	0	11
Substance or alcohol abuse in the household								
Self-awareness	3	4	1	2	0	0	0	10
Expressing feelings & emotions	4	1	0	1	0	0	0	6
Connection to others	2	3	1	1	0	1	0	8
Ability to work in a group	2	2	3	1	0	0	0	8
Awareness of how individual behaviour affects others	2	2	4	0	0	0	0	8
Understanding others	2	2	2	2	0	0	0	8
Ability to regulate or control behaviour	3	1	3	1	0	0	0	8
Listening	2	2	4	0	0	0	0	8

Score	1	2	3	4	5	6	7	Total
Other								
Self-awareness	1	3	3	0	0	0	0	7
Expressing feelings & emotions	3	2	1	1	0	0	0	7
Connection to others	2	3	2	0	0	0	0	7
Ability to work in a group	2	2	1	2	0	0	0	7
Awareness of how individual behaviour affects others	3	4	0	0	0	0	0	7
Understanding others	3	2	1	0	1	0	0	7
Ability to regulate or control behaviour	4	1	2	0	0	0	0	7
Listening	1	2	4	0	0	0	0	7

Source: Deloitte Access Economics survey results.
Note: respondents were asked to score each category on a scale from 1-7, where 1 is "below age appropriate expectations", 4 is "neutral (meets age appropriate expectations)", and 7 is "advanced for age".

5. For the average child in each of the broad referral categories below, please assign a score for the following attributes after they attended KidsXpress.

Table B.5: Question 5 responses

Score	1	2	3	4	5	6	7	Total
Abuse and neglect								
Self-awareness	0	1	3	2	1	0	0	7
Expressing feelings & emotions	0	2	2	2	0	1	0	7
Connection to others	0	0	2	3	1	0	0	6
Ability to work in a group	0	0	1	3	1	0	1	6
Awareness of how individual behaviour affects others	0	0	1	6	0	0	0	7
Understanding others	0	0	2	4	1	0	0	7
Ability to regulate or control behaviour	0	1	3	3	0	0	0	7
Listening	0	0	1	5	1	0	0	7
Anxiety and depression								
Self-awareness	0	0	1	5	4	0	0	10
Expressing feelings & emotions	0	0	1	5	3	0	1	10
Connection to others	0	0	0	6	3	0	0	9
Ability to work in a group	0	0	0	6	2	0	1	9
Awareness of how individual behaviour affects others	0	0	1	8	1	0	0	10
Understanding others	0	0	1	6	3	0	0	10
Ability to regulate or control behaviour	0	0	1	9	0	0	0	10
Listening	0	0	2	6	2	0	0	10
Domestic violence								
Self-awareness	0	0	1	5	1	0	0	7
Expressing feelings & emotions	0	0	3	3	0	1	0	7
Connection to others	0	0	2	2	1	1	0	6
Ability to work in a group	0	0	3	2	0	0	1	6
Awareness of how individual behaviour affects others	0	0	1	6	0	0	0	7

Score	1	2	3	4	5	6	7	Total
Understanding others	0	0	2	4	1	0	0	7
Ability to regulate or control behaviour	0	1	2	3	0	0	0	6
Listening	0	0	1	4	2	0	0	7
Grief and loss								
Self-awareness	0	0	4	2	0	0	0	6
Expressing feelings & emotions	0	1	4	1	0	0	0	6
Connection to others	0	0	5	0	1	0	0	6
Ability to work in a group	0	1	1	2	2	0	1	7
Awareness of how individual behaviour affects others	0	3	2	1	0	0	0	6
Understanding others	0	2	2	1	1	0	0	6
Ability to regulate or control behaviour	0	2	2	1	1	0	0	6
Listening	0	1	1	4	0	0	0	6
Substance or alcohol abuse in the household								
Self-awareness	0	1	0	8	1	1	0	11
Expressing feelings & emotions	0	0	4	3	2	1	0	10
Connection to others	0	1	0	8	0	2	0	11
Ability to work in a group	0	0	2	6	2	0	1	11
Awareness of how individual behaviour affects others	0	1	2	7	1	0	0	11
Understanding others	0	0	3	6	0	2	0	11
Ability to regulate or control behaviour	0	0	3	7	1	0	0	11
Listening	0	0	0	7	4	0	0	11
Other								
Self-awareness	0	1	4	9	3	1	0	18
Expressing feelings & emotions	0	0	7	7	3	0	1	18
Connection to others	0	0	3	6	7	1	0	17
Ability to work in a group	0	1	2	9	4	1	1	18
Awareness of how individual behaviour affects others	0	1	4	9	4	0	0	18
Understanding others	0	1	5	8	4	0	0	18
Ability to regulate or control behaviour	0	1	4	8	5	0	0	18
Listening	0	0	2	10	5	1	0	18

Source: Deloitte Access Economics survey results.
Note: respondents were asked to score each category on a scale from 1-7, where 1 is “below age appropriate expectations”, 4 is “neutral (meets age appropriate expectations)”, and 7 is “advanced for age”.

Appendix C: Explanation of statistical methods

This appendix presents an explanation of t-statistics, critical values, RSEs and sample sizes. These methods are used to determine whether:

- the results from the survey are representative of the entire population of KidsXpress children; and
- there has been a decrease in health system, productivity and burden of disease costs.

T-statistics and critical values

A key component of the analysis undertaken by Deloitte Access Economics in this report is to assess whether economic costs have changed as a result of children attending KidsXpress. For example, whether the average number of visits to a GP has decreased. This assessment is undertaken via the surveys, which survey a sample of the population of children (and their parents and carers) who have attended KidsXpress, on a "before KidsXpress" and "after KidsXpress" basis.

It is possible that the sample of the population which was surveyed may not be representative of the population as whole. For example, the sample may show that there has been a decrease in the average number of GP visits. However, it is possible that the same survey, conducted on a different sample of parents and carers, would have returned a different result – for example that there was not a decrease in the average number of GP visits.

Due to the uncertainty created by not sampling the entire population, statistical significance allows us to state with some level of confidence whether the change is true for the entire population. A statistically significant change in the number of GP visits may occur where the change is substantially different from zero (no change). For this analysis, Deloitte Access Economics chose a 5% level of significance. This means that with 95% confidence, the change observed in the number of GP visits for the sample population is a true change. That is, the change is representative of the change in the number of visits for the entire population due to the intervention. A test at this level is considered to provide strong evidence (Keller and Warrack, 2003).

To assess the statistical significance of the change, a t-statistic for the change observed in the sample is calculated, and compared to the critical value for the population distribution (assumed to be normally distributed): if the absolute value of the t-statistic is greater than the critical value, then the change observed in the sample mean is considered to statistically significant, with 95% confidence. Microsoft Excel was used to calculate the t-statistics and critical values. The results of the analysis are presented throughout Chapter 5.

It is important to note that tests of statistical significance only indicate whether the change can be relied upon: that is, whether it can be reliably assumed that the number of GP visits

has changed substantially due to the intervention (either an increase or a decrease). RSEs (discussed below) are used to assess the certainty with which the mean value from the sample is representative of the population's mean value.

Relative standard error

Standard error (SE) refers to the error that can occur when a sample of a population is surveyed, rather than surveying the entire population. The SE indicates the extent that a sample estimate may vary from the population estimate by chance. The RSE converts the SE into a proportion, by expressing the SE as a percentage of the estimated value. The ABS advises that estimates with an RSE above 25% be treated with caution, while estimates with an RSE above 50% not be used (ABS, 2013c).

Sample sizes

A sufficient number of survey responses is needed for the survey results to be representative of the entire KidsXpress population of children and parents/carers. The **central limit theorem** states that the distribution of survey results is approximately normal, given a sufficient sample size. The distribution becomes more normal the larger the sample population. In most situations, a sample size of 30 is sufficiently large (Keller and Warrack, 2003). As shown in Table 5.6, most of the elements from the survey had a sample size of greater than 30.

Appendix D: Pharmaceutical details

This section presents price and dosage details for the pharmaceutical cost calculations in Section 5.2.2.

Ritalin and Concerta

Ritalin and Concerta are prescribed to children to treat ADHD. The active ingredient in Ritalin is methylphenidate. The TGA recommends (TGA 2014a, 2014c) that children start with 5 mg once or twice daily, with gradual increments of 5 or 10 mg weekly, up to a total of 60 mg per day. Ritalin and Concerta are available in a variety of formulation sizes under the PBS, ranging from 10 mg to 54 mg. For the calculations, Deloitte Access Economics has assumed that a box of 30 x 10 mg capsules is purchased. The maximum consumer price of this box is $37.70, and the dispensed price for maximum quantity (DPMQ[23]) is $35.00 (DOH, 2015b).

Luvox

Luvox is prescribed to treat OCD in children and adolescents (as well as major depression in adults). The active ingredient in Luvox is fluvoxamine maleate. For the treatment of OCD in paediatric populations (ages 8-17 years), the TGA recommends (TGA, 2015a) that Luvox be administered in a single 25 mg dose each day, which can be increased in 25 mg increments every four to seven days, up to a maximum of 200 mg per day. One respondent to the survey provided the medication strength that their child took for Luvox, which was 50 mg per day. It is assumed that a box of 30 x 50 mg tablets is purchased. The maximum consumer price of this box is $22.28, and the DPMQ is $16.84 (DOH, 2015b).

Strattera

Strattera is prescribed to treat ADHD in children and adolescents, and has atomoxetine hydrochloride as the active ingredient. The TGA recommends (TGA, 2014b) that Strattera be initiated at a daily dose of 0.5 mg/kg, with a maximum daily dose of 1.4 mg/kg. Using an average child weight[24], the maximum daily dose is 50.4 mg. One respondent on the survey provided information on the amount of Strattera used by their child each day (10 mg). It is assumed that two boxes of 28 x 25 mg capsules is purchased. The maximum consumer price for these boxes are $37.70, and the DPMQ is $207.77 (DOH, 2015b).

[23] The DPMQ is the price that the Government pays for the medication under the PBS.

[24] Analysis of the 2011/12 Australian Health Survey (ABS, 2013a) shows that the average weight of a person aged 4-14 years is 36.0 kg.

Catapres

Catapres (active ingredient clonidine hydrochloride) is primarily used to lower blood pressure. However, it is also used to treat ADHD. The TGA (2014d) notes that the use and safety of clonidine hydrochloride among children and adolescents has minimal evidence from randomised controlled trials, and as such the TGA recommends that clonidine hydrochloride not be used in this population. As it is not possible to determine a recommended dose, the cost of Catapres has not been included in this analysis.

Dexamphetamine

Dexamphetamine (active ingredient dexamphetamine sulfate) is used in the treatment of ADHD. The TGA recommends that children over three years of age start with 2.5 mg daily, with 2.5 mg increments weekly up to a maximum of 40 mg per day over two doses (TGA, 2015b). It is assumed that a box of 100 x 5 mg tablets is purchased. The maximum consumer price of this box is $26.65, and the DPMQ is $22.38 (DOH, 2015b).

Risperdal

Risperdal is prescribed to treat mental health conditions in children such as Conduct Disorder and autism, and has risperidone as the active ingredient. The TGA recommendations (TGA, 2015c) for dosing depend on the condition that is being treated. For treating Conduct Disorder in patients aged under 50 kg, the optimum dose is 0.5 mg per day (no advice is provided on the maximum daily dose). For treating autism in patients aged 20 kg and over, the maximum daily dose is 2.5 mg. Thus, taking an average of the optimum daily dose for Conduct Disorder (0.5 mg) and the assumed daily dose for autism (half of 2.5 mg, which is 1.25 mg), the assumed dosage of risperidone is 0.875 mg. It is assumed that a box of 60 x 500 mcg tablets is purchased. The maximum consumer price of this box is $20.92, and the DPMQ is $15.48 (DOH, 2015b).

Limitation of our work

General use restriction

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