

**An investigation of
adolescent empathy and virtual reality**

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Doctor of Education

March 2024

Melbourne Graduate School of Education

Submitted in total fulfilment for the degree of

Doctor of Education

at

The University of Melbourne

Abstract

Empathy is a pro-social skill that develops during adolescence and is a key part of socio-emotional learning in schools. The aim of this research program was to examine the relationship between virtual reality and empathy in adolescents. Given the immersive elements of virtual reality, it was predicted that virtual reality could assist in the development of empathy more effectively than a less immersive 2D control condition. The participants comprised 117 adolescents (64 males, 52 females) aged 13 and 14 years of age from an independent co-educational school based in Melbourne, Australia. The first part of the study involved participants completing an initial Adolescent Measure for Empathy and Sympathy (AMES) survey (Vossen et al., 2015). Next, they were shown the empathy – provoking documentary, *Clouds over Sidra*, in one of two forms: 1) using virtual reality (experimental condition); or 2) through traditional viewing, projected as a 2D film onto a whiteboard (control condition). Immediately after viewing, participants completed the AMES survey a second time, and answered three open-ended prompts that provided qualitative data about the participant experience. Two weeks later, the students completed the AMES survey and the three open-ended questions again to see if there was any longer-term effect of the intervention on empathy. Analysis showed no significant difference between the use of virtual reality and control conditions for empathy over time. However, an improvement in empathy was found for the documentary alone, indicating that an emotion-provoking documentary by itself can produce an increase in empathy, although this improvement was not sustained two weeks later. Thematic analysis indicated three key themes that encapsulated the participant experience: specifically, their experiences of learning,

emotion and engagement. These data highlighted the role that virtual reality and, more specifically, differing levels of immersion, have in experiences of sadness, guilt, engagement, knowledge and empathy. The qualitative data suggested that the relationship between virtual reality and empathy may be influenced by the increased learning and novelty provided by the technology of virtual reality. These findings have important implications for schools and socio-emotional learning programs, indicating that, whilst virtual reality might improve engagement and aspects of learning for adolescents, longer-term empathy change due to virtual reality alone is less likely.

Statement of Original Authorship

This thesis does not contain material that has been accepted for any other degree in any university.

To the best of my knowledge and belief, this thesis contains no material previously published or written by any other person, except where due reference is given in the preface.

This thesis is fewer than the maximum word limit in length, exclusive of tables, figures, references, and appendices.

Signature:

Preface

I. Information on Co-Authored Papers

Parts of this thesis have been submitted for publication. Chapter 4 was accepted for publication in *The Australian Educational Researcher* on 27 February 2024. The article - and, therefore, the chapter - has benefited from the review process and suggestions by two anonymous referees.

The following calculations of authorship are based on Winston's suggested method (1985).

Chapter 4 Publication: A study of Virtual Reality and Empathy in Australian Adolescents.		
Author		Contribution
Emma Phillips	65%	Concept and design; literature search; completing ethics application; recruiting participants; preparation, data entry and analysis; full first, second and third draft of manuscript; editing manuscript for publication.
Terence Bowles	25%	Overseeing project; concept and design; overseeing ethics application; overseeing data and statistical analysis; editing and providing feedback on first, and second draft of manuscript for publication.
Aaron Jarden	15%	Editing and providing feedback on first, second and third draft of manuscript for publication.

II. Third Party Editorial Assistance

I acknowledge that Dr. Niranjana Casinader proofread the thesis in its final draft in accordance with the current Guidelines for Editing Research Theses (Institute of Professional Editors). Editorial feedback was provided on matters of grammar, semantics, consistency and formatting (including citations and references), but preserving my meaning, style, organisation and voice.

III. Funding Acknowledgments

The author acknowledges the following support towards the completion of this degree:

- Australian Government Research Training Program Scholarship (Fee offset)
- Powerhouse Youth Leadership Foundation award

Acknowledgements

Firstly, I would like to express my gratitude to my principal supervisors over the years, Associate Professor Terence Bowles; Associate Professor Aaron Jarden and Professor Dianne Vella-Brodrick, for their patience, support, input to my thesis and encouragement both in writing and towards publication. I have been so lucky to have three different primary supervisors to learn from, with each bringing their amazing wealth of experience and expertise: thank you. My gratitude also goes to my extended supervisory team over the years, Dr. Anneliese Gill and Dr. Shiralee Poed, who have provided me with such valuable feedback and encouragement in my journey. Thank you also to Associate Professor Melissa Barnes for her support and friendship not only throughout this thesis but since 2010.

To my advisory chair, Dr Vicki McKenzie, who has been with me since I started the thesis journey in 2016, thank you for all your support and encouragement, especially in periods of extended maternity leave (three times!). It is hard to believe that I started this journey with no children, and that, at the end of this journey, almost a decade later, I have three children and a thesis.

Thank you to my family and my husband, Tim, who has read endless drafts of work over the years as I continue to pursue academic studies and given up his weekends and holidays so that I could 'write'. To my three children, Rosie, Angus and Beatrix. I hope this thesis makes you proud and shows you that you can achieve anything you set your mind to. You are the joy of my life, and I am endlessly grateful and proud of the people you are.

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Key Definitions

Affective Empathy refers to the capability to experience or share in another's emotion (Jolliffe & Farrington, 2006; Healey & Grossman, 2018; Mehrabian & Epstein, 1972).

It is a subset of empathy, and distinct from cognitive empathy.

Cognitive Empathy refers to the capability to perceive and understand another's emotions/feelings, including the ability to reason why another person feels/behaves a certain way (Feshbach, 1997; Preston & Hofelich, 2012). It is a subset of empathy, and distinct from affective empathy.

Empathy is often described as a broad capacity, ability or skill that enables one to do the following: 1) perceive the emotions of others; 2) resonate with others both emotionally and cognitively; and 3) take the perspective of others (Riess, 2017).

2- Dimensional (2D) refers to the image viewed when digital media is displayed onto a larger screen. The visual information is displayed on this screen and the audio is projected through the screen or speakers to the viewers.

Socio-emotional Learning (SEL) refers to the process through which all people “acquire and apply the knowledge, skills, and attitudes to develop healthy identities, manage emotions and achieve personal and collective goals, feel and show empathy for others, establish and maintain supportive relationships, and make responsible and caring decisions” (CASEL, 2019b, para.1). It is considered an essential part of education and human development.

Sympathy refers to the feelings of sorrow for another's misfortune (Clark, 2010).

Virtual Reality refers to an immersive experience using a digital device involving an attached headset with a screen and includes headphones. The audio and visual are fully immersive.

Chapter 1: Introduction

1.1 Introduction and Context

Socio-emotional learning has been a topic that has gained momentum in educational philosophy over the last few decades, resulting in a strong research base being established. It refers to “the process through which children and adults understand and manage emotions, set and achieve positive goals, feel and show empathy for others, establish and maintain positive relationships, and make responsible decisions” (CASEL, 2019b, para.1).

Academically, researchers have been building on concepts of emotional intelligence and social intelligence underlying socio-emotional learning for many years (Goleman, 1995, 2006). The focus on teaching socio-emotional skills explicitly in the classroom, however, has been a more recent phenomenon, even though the concept of socio-emotional learning and its impact on learners is seen as being significant to schools and their practitioners. For example, 93% of teachers in the United States believe that the concepts addressed by socio-emotional learning are integral to student success in school, work and life (CASEL, 2019c). Research on the explicit teaching of socio-emotional learning has been shown to generally have a positive effect on several student outcomes, such as significantly improved academic gains, attendance, behaviour, attitudes, and socio-emotional skills (Durlak et al., 2011).

Led by the Collaborative for Academic, Social and Emotional Learning (CASEL) based in the United States, there has been a worldwide movement to research and implement programs in schools, based on concepts such as emotional intelligence and wellbeing that are branded collectively as ‘socio-emotional learning’. The aim of

CASEL is to have schools and teachers teaching socio-emotional learning explicitly, rather than just talking about it *ad hoc*. In Australia, the Australian Curriculum Assessment and Reporting Authority (ACARA) and the Victorian State Government cite CASEL and the importance of socio-emotional learning as part of the teaching of general capabilities (Australian Curriculum and Assessment Authority, 2010). Indeed, ACARA and the Victorian Curriculum and Assessment Authority (VCAA) adopted the phrase ‘Personal and Social Capability’ to use in their curriculum documentation and express that this can be used interchangeably with the term ‘socio-emotional learning’ (VCAA, 2015).

Socio-emotional learning in schools is made up of five distinct competencies that form a framework (CASEL, 2019a). These competencies include self-awareness, self-management, social awareness, relationship skills and responsible decision-making. Within these competencies lie several measurable psychological constructs, such as self-efficacy, motivation, communication, confidence and empathy. Empathy is the focus of the research discussed in this thesis.

Empathy is one of the key characteristics of the socio-emotional learning competency ‘Social Awareness’ and is recommended to be explicitly taught in schools, where the ability to ‘feel and show empathy’ is a goal (CASEL, 2019a). Likewise, in Australia, there is a dedicated section on the VCAA website under ‘Personal and Social Capabilities’ that addresses the need to “develop empathy for and understanding of others and recognise the importance of supporting diversity for a cohesive community” (VCAA, 2015, para.5).

Overall, empathy can be considered to be the broad capacity, ability or skill that enables one to: 1) perceive (recognise) the emotions of others; 2) resonate with others both emotionally and cognitively; and 3) take the perspective of others (Riess, 2017).

Empathy is broadly considered to have both affective and cognitive components, which are consequently often referred to independently in research and theory as affective empathy and cognitive empathy. These concepts will be explored further in Chapter Two.

Research on empathy has found that it is widely considered to be a fundamental element in morality and healthy social engagement (Eisenberg & Fabes, 1990; Stueber, 2016). Therefore, it is important that educational research focuses on empathy as a construct, not only because of its importance in socio-emotional learning and society, but also because some concerning research suggests that future generations are becoming less empathetic (Konrath et al., 2011; Twenge, 2014). Moreover, there is evidence that empathy may improve with the use of particular interventions, and that there are developmental periods when children and adolescents experience an increase in empathy (Hudnall & Kopecky, 2020; Ross et al., 2011). These findings indicate that there is an opportunity to research interventions to improve both types of empathy in different contexts.

Sympathy is another important concept within socio-emotional learning that is commonly confused or used interchangeably with empathy. For example, sympathy is occasionally considered by some researchers to be a branch of empathy, and early research scales in this area were criticised for not doing enough to distinguish between sympathy and empathy (Malti et al., 2016; Vossen et al., 2015). As a result of this academic debate on theoretical understandings of sympathy and empathy, there are recommendations that any research on empathy should always include sympathy (Vossen et al., 2015). This idea will be discussed in further detail in Chapter Two.

Schools can use a range of interventions or techniques for building empathy and socio-emotional learning. According to CASEL (2023), approaches to socio-emotional learning can include explicit instruction, teacher instructional practices, integration with curriculum areas and organisational strategies. Whilst there is evidence that socio-emotional learning will improve if taught explicitly in a single environment/community, it seems that it occurs best when using multiple approaches in various settings, or, if it is present through the entire learning environment of the individual, both within and outside school (CASEL, 2023). This specific research focusses on another potential, yet relatively new and less researched learning environment in the digital realm: virtual reality.

‘Virtual reality’ refers to an immersive experience using a device incorporating a headset attached to a screen. Key to understanding the potential impact of virtual reality is the unique immersion and engagement opportunities involved in the experience. This includes the opportunity to experience more sensory fidelity, or, where more senses are focussed on a singular experience, instead of being split or divided, than is possible with other digital technology, such as a film on a screen. When one uses virtual reality, the sensory input can be visual, auditory, and tactile and it has been linked to an increased presence in the virtual world. It is the presence of the improved immersion experience that is believed to be the reason that virtual reality has been used successfully in a range of applications in training and education, including simulations for construction safety, as well as in surgery, where other options were difficult or costly to provide (Arora et al., 2014; Zhao & Lucas, 2015).

Virtual reality provides an opportunity to digitally ‘step into another person’s shoes’ and see things from their perspective which is an important element of empathy (Milk, 2015). This suggests that virtual reality could be a useful mode of intervention

for schools looking to develop empathy within their socio-emotional learning programs. However, the initial research on the relationship between virtual reality and empathy is contradictory. Some research indicates that virtual reality may improve empathy (Christofi et al., 2020; Schutte & Stilianovic, 2017). However, other research, including the meta-analysis by Ventura et al. (2020), suggests that virtual reality has no significant effect on empathy.

In Australian schools, there has been an increasingly large uptake of virtual reality as an educational tool. Traditionally, it has been used for curriculum-based work (Fabola & Miller, 2016). However, much of the limited research conducted on empathy and virtual reality has used small samples with adult participants, and it is often recommended that more research, including longitudinal studies and qualitative work, be considered (AlBasri, 2019; Sora- Domenj3, 2022). The use of virtual reality for socio-emotional learning in schools is less studied, providing scope for new uses and understandings, and paves the way for the current research.

1.2 Significance of Research

This research aims to add to the growing body of research on virtual reality and the role it plays in schools. It is hoped that its findings will contribute to an improved understanding of empathy development, providing schools with insight about the role of virtual reality in supporting wellbeing programs in schools. This program of research will also contribute to the body of research around socio-emotional learning and, specifically, empathy (and its oft-confused relative, sympathy), as well as the development of these constructs.

As the use of virtual reality becomes more frequent in schools, it is important for research to investigate the role that it can play in educational areas other than subject-specific content delivery. Further, the importance of socio-emotional learning in schools for a well-functioning society makes this research even more valuable, as socio-emotional learning is being increasingly prescribed by curriculum authorities in Australia. The more learning environments that we can provide for adolescents for socio-emotional learning, the better, and virtual reality offers a unique opportunity for possible empathy development.

It is this link between virtual reality and empathy in adolescents that is the focus of this study. Insights from this research can contribute to the discussion about whether to invest and use virtual reality as another approach for improving socio-emotional learning outcomes in schools, or whether another approach would be more effective.

1.3 Outline of Thesis Structure

This chapter (**Chapter One**) contextualised the research project and outlined the importance of its potential theoretical and research contribution to education, in particular, for practitioners of socio-emotional learning in educational settings.

Chapter Two will review the literature relevant to this study. First, the chapter will present an overview of the current research and modern theoretical understandings of empathy and sympathy, including the neurological underpinnings and development of empathy. Next, the theoretical understanding of virtual reality will be introduced and explored. Finally, the limited research investigating the relationship between virtual reality and empathy will be presented and critiqued. This chapter will also discuss the current theoretical understanding of virtual reality in order to explore the reasons why it may theoretically provide opportunity for empathy development. Finally, the

application and use of virtual reality in schools will be discussed. Principally, this chapter will aim to provide a context for this research within the body of existing research and theory.

Chapter Three will present the research questions and hypotheses based on the literature. It will outline and justify the use of mixed methods methodology used to address the research questions of the study, as well as the role of quantitative and qualitative methods in the data collection and analysis process, including the use of self-report measures. The chapter also describes the background and context for the study, including the participants, materials, and the development of the survey.

Chapter Four presents the quantitative data analysis, findings, and discussion, through a journal article accepted for publication. Further relevant information relating to the quantitative data and analysis that could not be included in the published journal article due to the required word limit can be found in Appendix A.

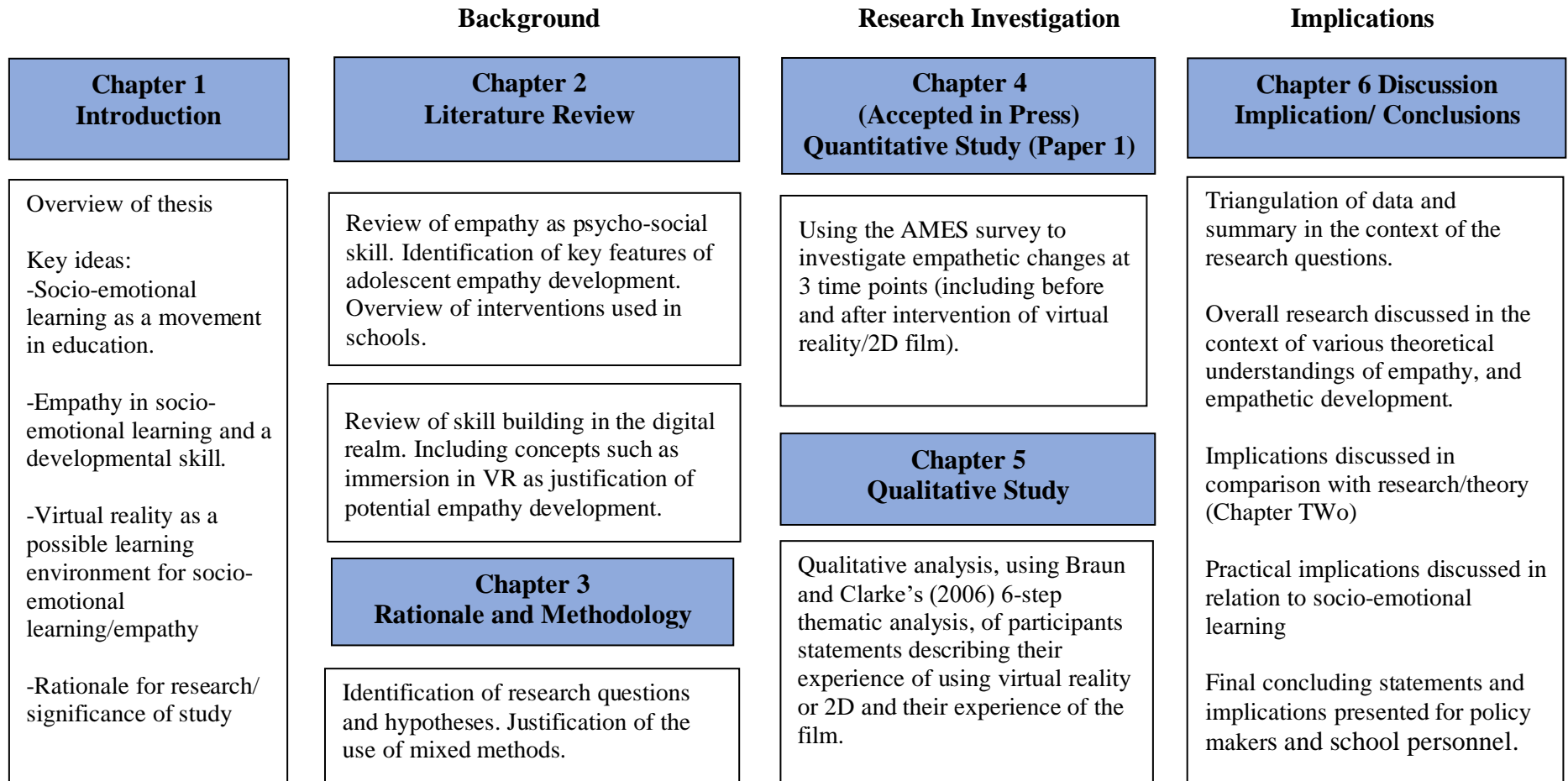
Chapter Five presents and discusses the qualitative data collected from this study, including justification and details of the thematic analysis conducted. Using Braun and Clarke's (2006) thematic analysis method, six phases of analysis will then be described, followed by the analysis of these themes in the context of the research questions.

Chapter Six is the concluding chapter of the thesis and is focused on the overarching discussion. It will begin by triangulating both the qualitative and quantitative data, and discussing both sets of data in the context of the research questions. The chapter will then consider the results of this research in the context of past research studies and the literature reviewed in Chapter Two. The practical implications and limitations of the research study will be discussed, along with future

research directions and conclusions. Figure 1 provides a visual map of the flow of the thesis chapters.

Figure 1

A Summary of the Thesis by Chapter



Chapter 2: Literature Review

2.1 Introduction and Context

This chapter investigates the literature on empathy and virtual reality as theoretical and research concepts. It begins (Section 2.2) with an overview of how the literature presents empathy as a multi-dimensional concept, including the role that empathy and the related concept of sympathy play in society. The same section then focuses on the theoretical significance of the current debates surrounding empathy, including theories on how empathy occurs neuro-biologically.

Section 2.3 illustrates how empathy changes over the lifespan, with a special focus on the importance of the adolescent developmental period. Section 2.4 describes the possible mediating factors in the development of empathy. This section also explains the role that schools and education systems play in the development of empathy, including the role of socio-emotional learning in schools.

Section 2.5 introduces digital technology as a possible mediating factor of empathy, including a discussion of the role of virtual reality. Section 2.6 explores the current state of the literature and research investigating virtual reality and socio-emotional factors, with an emphasis on how this applies to adolescents. Finally, Section 2.7 provides a summary of the chapter.

2.2 What is Meant by Empathy?

Empathy is widely considered to be an important element in pro-social, moral, altruistic behaviour (Barbot & Kaufman, 2020; Eisenburg, 2003). As described in Chapter One, empathy is the multi-dimensional capacity, ability or skill that enables one to perceive the emotions of others, to resonate with them emotionally and cognitively, and to take their perspective (Riess, 2017). Although there is dispute in the literature

about the facets that comprise empathy, theorists tend to agree that there are both cognitive and affective elements (Decety & Jackson, 2006; Eisenberg, 2000). These will be explored in further detail in the following section.

2.2.1 Cognitive Empathy

Cognitive empathy is generally considered to be made up of two components: being able to recognise the way another feels and to discriminate their affective cues (Feshbach, 1997; Preston & Hofelich, 2012); and the ability to understand the way another feels, or to see from another person's point of view (Feshbach, 1997; Preston & Hofelich, 2012). Essentially, cognitive empathy requires two elements. Firstly, a perceptual element needs to occur, where one becomes aware of another's emotion. Once this has occurred, a cognitive understanding of their point of view (perspective-taking) needs to occur in order for cognitive empathy to happen.

In cognitive empathy research, it is acknowledged that there are both perceptual and cognitive neural circuits that are active (Dorris et al., 2022). Cognitive empathy is considered to be intentional, with a focus on adopting another person's perspective to understand their subjective experience (Decety, 2020). This perspective-taking element is described as the mental simulation of "putting oneself in another's shoes" via one's imagination and is often held to be the cornerstone of an empathetic response (Batson, 2015). The perspective-taking that occurs in cognitive empathy has been shown to foster several positive qualities, such as the reduction of stereotypes, improved attitudes and helping behaviours (Ahn et al., 2013; Batson, 2015; Galinsky et al., 2005).

2.2.2 Affective Empathy

Affective empathy is commonly described as the capability to experience or share in another's emotion (Jolliffe & Farrington, 2006; Healey & Grossman, 2018; Mehrabian & Epstein, 1972). Affective empathy includes several elements, the first of which is emotional contagion: "the tendency to automatically mimic and synchronize facial expressions, vocalizations, postures, and movements with those of another person and, consequently, to converge emotionally" (Hatfield et al., 1993, p. 5). Emotional contagion encapsulates the idea that, when an individual sees someone's emotion, they essentially 'catch' that emotion, through automatic mirroring (Hatfield et al., 2009).

Emotional contagion is often considered unconscious, innate, and reflexive (de Waal & Preston, 2017; McQuarrie, 2022). Its role in affective empathy is debated, as some theorists suggest there needs to be a conscious perception in affective empathy for it to truly occur, or that emotional contagion is too instinctual to be considered empathy, and that the mirroring in emotional contagion is another process altogether (de Waal & Preston, 2017; Kim et al., 2021). Others suggest conscious perception is only required for cognitive empathy, but not for affective empathy (Hatfield et al., 2009).

Clark et al. (2019) states that when affective empathy occurs, there should be an affective congruence, or a matching of feelings, not just an affective similarity. This is the second important element in affective empathy. The distinction between affective congruence and similarity is that, when similarity occurs, there can be a general lower (or higher) intensity feeling of the other person's emotion. Affective congruence may not be a perfect match of emotions between two people, but it is a term that represents a closer intensity and neurological activation than a mere similarity (de Vignemont & Singer, 2006). Clark et al. (2019) have argued that, when researchers use definitions of

similar affect rather than affective congruence for affective empathy, confusion with sympathy is more likely to occur.

2.2.3 Sympathy

Sympathy, which refers to one's feelings of sorrow for another's misfortune (Clark, 2010), is often confused with empathy and scholars have previously referred to it as a dimension of empathy (Davis, 1983). However, modern theorists tend to consider sympathy as a distinct concept from empathy (Lamm et al., 2019).

There is a significant, key difference between sympathy and empathy. When affective empathy occurs, there is a congruence in feeling or shared feeling with the other person (Clark et al., 2019). This emotional resonance is not necessary for sympathy, which has a clear distinction between self and other's experiences and feelings. Moreover, there are a range of different feelings and situations in which one can show affective empathy. For example, a shared feeling of frustration or enjoyment can demonstrate affective empathy. In sympathy, one only experiences feelings of sorrow or discomfort, and it only occurs when the self perceives the other to be suffering. Sympathy cannot occur in other contexts such as shared enjoyment (Bloom, 2017; Clark, 2010). Sympathy does not require an affective congruence and is more limited in the contexts in which it can apply.

Riess (2017) explained the distinction between empathy and sympathy through this illustration and experience:

You look out your office window and see a man in the cold rain, shivering, no raincoat. You feel sorrow for this person. This is sympathy. Empathy is the capability to imagine as if oneself is next to the man, out there in the rain. It's

the capability to experience the discomfort of them as your own; without losing the sense of the 'as if'. If we lose the 'as if' we are unable to move beyond our own self-interests; and it is with the 'as if' that motivates a caring empathetic response (e.g. taking down an umbrella) (p. 13).

This example demonstrates sympathy as a case of sorrow and empathy being both the capability to and take the perspective of the other person, both through understanding and feeling. To take the example further, cognitive empathy is demonstrated by first perceiving that the man is shivering, the lack of a raincoat, and fact that it is raining. Cognitive empathy then allows us to understand why he would be shivering by piecing these together and being able to imagine that experience from his perspective. For example, understanding that rain soaks clothes which contributes to understanding the feeling of cold and causing shivering. In this example, affective empathy is the sharing of the feelings and associated emotions with being cold, wet, and shivery. Instead of feeling only sorrow for the man, which is sympathy, feeling affective empathy may lead to a range of emotions, such as helplessness, sadness or frustration, based on shared feelings with the man. An individual showing affective empathy may shiver themselves as a result, despite actually being dry.

Cognitive empathy, affective empathy, and sympathy are related as they all concern responsiveness to others, but they are also clearly distinguishable from each other (Davis, 1983). The inconsistency in defining each of cognitive empathy, affective empathy and similar constructs have made theoretical discussions and research difficult. Moreover, affective empathy also tends to be conflated with other terms aside from sympathy, such as personal distress and empathetic concern.

Personal distress is experienced when we are unable to separate ourselves from another person's emotional position. In this case, it is experiencing and exhibiting

personal distress about the situation for ourselves, rather than adopting an ‘other’ orientation. This is strongly linked to emotional contagion and can be explained by the mirror neuron system. Some theorists believe that ‘too much’ affective empathy can lead to personal distress and that it is a negative type of empathetic response (Stevens & Taber, 2021). The inability to separate the feelings of ‘self’ from the ‘other’ could create a sense of helplessness, which manifests as personal distress. In the example above, this may relate to feeling overwhelmed about the rain and weather. Empathetic concern, on the other hand, is when an individual shares in and experiences the other’s emotional position but is still able to differentiate the self from the other. This tends to relate more similarly to sympathy as a construct (Clark et al., 2019). Like sympathy, in the example above, this may manifest as feeling sorrow for the man in the rain.

Some literature suggests that sympathy is an emotional response that is similar to personal distress, but more akin to empathetic concern (Eisenberg & Strayer, 1990; Janssen, 2012); that is, sympathy, personal distress and empathetic concern are all possible responses to affective empathy. These concepts are then considered to be types of empathetic responding, rather than empathy itself. Whilst each of these concepts do become conflated with affective empathy, it is worth noting that, in the context of empirical measurement, sympathy and empathetic concern commonly cause the most crossover with empathy. Thus, whilst the focus of this research is on empathy change, sympathy will also be considered.

2.2.4 The Self-Other Debate

The perceptions and distinction of self and other are important in differentiating empathy types and related concepts, such as sympathy. In cognitive empathy, the

distinction between self and other is clear. The ‘self’ must be able perceive the ‘other’s’ feelings first and then understand (and take) the perspective of the other. The self and other are distinct and it is not necessary to have similarities between self and other to show cognitive empathy. For example, one can perceive an emotion (e.g. anger) in another and understand the reasons for that (e.g. they were arguing). The self does not have to feel anger to do show cognitive empathy, although they do need to be able to recognise the cues for anger more generally. However, there is no overlap or congruence between selves necessary.

Affective empathy, on the other hand, can involve a blurring or merging of the self and other to some extent. At its most primitive level affective empathy does not require conscious thinking. While there may be a blurring between self and other in developed affective empathy, there is an importance in retaining feeling of self, as stated by Rogers (1959):

The state of empathy, or being empathic, is to perceive the internal frame of reference of another with accuracy and with the emotional components and meanings which pertain thereto as if one were the person, but without ever losing the “as if” condition (pp. 210-211).

However, modern neurological research has found that the part of the brain involved in the self-other distinction for affect is possibly distinct to self-other distinction in the motor or cognitive domain (Santisteban et al., 2012). This indicates there are differences in the perception of self-other processes and demonstrates the importance of distinguishing between affective and cognitive empathy. Sympathy, like cognitive empathy, requires a distinction between self-and-other to occur. When sympathy occurs, there is no self-other overlap (Eisenberg & Sulik, 2012). When self feels sorry for another, they do not necessarily feel sorrow for themselves. The

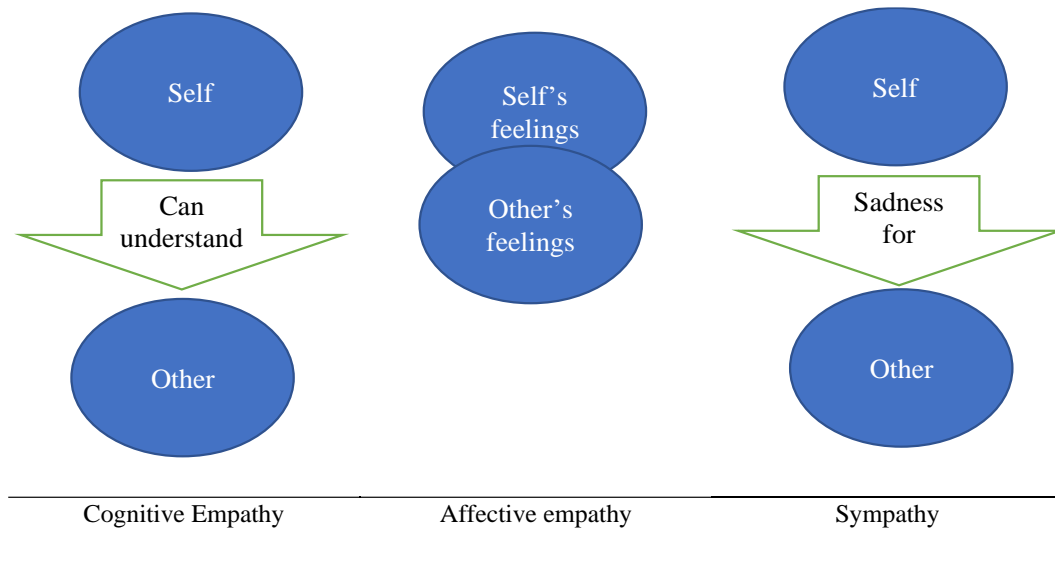
challenge is determining at what point the merging of self-other differentiates between affective empathy and sympathy. This is more pertinent if the valence of the feeling is sadness. For example, if the other is sad, the self would be sad if they are experiencing affective empathy. Equally, the self would be sad if they were experiencing sympathy. It would take careful and sophisticated self-reflection of an individual to discern whether they were feeling sad because of a merging shared feeling, or if they were feeling sad due to feeling sorrow for someone. Empirically, this is quite difficult to measure and ascertain, especially if there is an importance of the retention of the separate self in affective empathy, as described by Rogers (1957).

It may be that it is empirically useful to view affective empathy in its most primitive form as emotional contagion, which allows us to differentiate other forms of empathy as being more other-oriented (Read, 2019). Accordingly, the research in this program of research does not view self-other distinction as a necessary component of affective empathy.

In summary, cognitive empathy involves the ability to recognise and understand the way another feels (Preston & Hofelich, 2012), whereas affective empathy involves the ability to share the way another feels (Mehrabian & Epstein, 1972). These definitions are congruent with previous research in the area and are generally agreed to by psychologists (Vossen & Valkenburg, 2016). Sympathy is a related factor to empathy and includes the feelings of sorrow and concern about another's misfortune (Clark, 2010). These differences are summarised in Figure 2 (see below).

Figure 2

How Views of Self and Other Relate for Cognitive Empathy, Affective Empathy and Sympathy in Terms of Empirical Research



To take Figure 2 further, current understanding of personal distress would look similar to affective empathy but would involve a full merging of other's feelings over self's feelings, essentially represented by one circle. Empathetic concern would look similar to sympathy, but may involve 'warmth for' as well as sadness, as described by Davis (1980). In order to differentiate these concepts further for the purposes of research, understanding how they occur is helpful. Most recently, neurological research has shed light on differentiating cognitive empathy, affective empathy and sympathy which will be explored in the following section, along with theoretical perspectives.

2.2.5 The Process of Experiencing Empathy

Over the last decade, increased use of technology has shed light on the neuro-biological perspective of how humans experience empathy (e.g. Decety, 2010, 2015).

Affective empathy is different to both emotional contagion and sympathy and this is evidenced through the neural networks each uses. At this point, it is necessary to describe how researchers and theorists suggest empathy occurs.

A key model of the neurobiological perspective of empathy is presented by Preston and de Waal (2002), who described empathy occurring due to a proposed perception-action-model (PAM). This model proposed that there is an innate perceptual process, whereby an observer unconsciously and spontaneously mimics the emotional state of another (de Waal & Preston, 2017). This process occurs neurologically, meaning that it occurs through set networks within the nervous system, and that there is little conscious choice in the final, mimicked action. This is commonly referred to as emotional contagion, which was discussed earlier (Section 2.2.2).

Adding to the original model, de Waal (2003) further proposed a Russian-Doll model of evolution of empathy, where emotional contagion and the perception-action mechanism (PAM model) are at the centre, and the outer layers (more developed empathy) include self-other distinction and cognition. The Russian-Doll model suggests that emotional contagion is the centre of affective (and cognitive) empathy, indicating it is more innate and primitive. According to this model, the unconscious mimicking that occurs in emotional contagion is not empathy alone for a range of reasons, some being that it lacks the necessary perception, emotional regulation, self-other distinction, and cognition that is required in empathy (de Waal, 2003). Pfeifer et al. (2008) suggested that this mimicking occurs due to an innate mirror neuron system, whereby similar activation occurs in the brain of the self, when viewing another's emotion. If this is the case, the idea that emotional contagion constitutes empathy is flawed as the physical mirror neuron mimicking can only be linked to a motor resonance, not to a social

resonance (Decety, 2010). Additionally, lesions to the motor-mirroring system do not tend to impact affective empathy (Decety & Michalska, 2010).

In contrast, other researchers suggest that affective empathy is exactly this mirror-neuron system combined with activation of additional cortical regions (Stietz et al., 2019; Yu & Chou, 2018). The cortical regions (or other part of the brain) that activates when one experiences affective empathy depends upon the intensity and valance of the specific emotion (Stietz et al., 2019; Yu & Chou, 2018). For example, when sharing in another's joy, the ventral striatum is activated, whereas, if sharing in another's pain, the anterior insula is activated (Stietz et al., 2019). Despite some researchers suggesting that there is a theoretical distinction between emotional contagion, and perhaps a more advanced affective empathy, the differences are rarely measured and are empirically indistinguishable (Clark et al., 2019): "the PAM account of affective empathy explicitly states that neural representations are automatically and *unconsciously* activated in response to a target's affective state. Thus, we do not view the self–other distinction as a necessary component of affective empathy" (Clark et al., 2019, p. 168). This provides further support for the idea that for the purposes of this research, the self-other distinction is not necessary (as discussed in Section 2.2.4)

The neurological basis of cognitive empathy involves different regions of the brain compared to affective empathy. It is generally agreed that cognitive empathy is related more widely to information processing areas such as the pre-frontal cortex and the temporoparietal junction (Stietz et al., 2019; Yu & Chou, 2018). Whilst de Waal and Preston (2017) called for less distinction between cognitive empathy and affective empathy, given that they have the same base of emotional contagion, others call for more distinction and clarity in research given the differing neural patterns (Bloom, 2016; Stietz et al., 2019). There is evidence that the affective empathy pathway and the

cognitive empathy neural pathway influence each other, and that cognitive and affective empathy should both be measured at the same time in empathy research (Yu & Chou, 2018). Sympathy on the other hand, is more like a motivational concept towards the perceived welfare of someone in need, which is indicated by partially different neural mechanisms to affective empathy (Decety & Michalska, 2010). These differing neural networks are linked to intentionality and changes in the frontal cortex (Decety & Michalska, 2010).

Providing an alternative to the neurobiological perspective, Janssen (2012) suggested a three-component framework for empathetic responding. Firstly, cognitive empathy needs to occur. Broadly, Janssen describes this first step as a perception of another person's emotional state and is also known as the perspective-taking stage (Archer & Finger, 2018). The second component is 'emotional convergence' between two people. This is where two interacting people begin to have similar emotions that could be considered a form of affective empathy. The self- and -other relationship is less distinct during emotional convergence than in the final stage (Janssen, 2012). Finally, the third component, empathetic responding, can take the form of sympathy (or empathetic concern) or personal distress, depending upon the self-other distinction. If there is no self-other distinction, the response would be personal distress, but if one can separate self from other, it is then more likely to be sympathy.

Offering a different view, some empathy theorists clarify the differentiation in these terms of the behaviours they elicit. Chismar (1988) suggested sympathy involves an egoistic motivation to help and thus cannot lead to true altruism, like empathy can. Sympathy requires a conscious choice to help, presumably due to the self-other distinction, whereas empathy initiates a somewhat unconscious helping behaviour

(Chismar, 1998). Indeed, there does tend to be a link between empathy and pro-social behaviours (Hoffman, 1984; Knafo, et al., 2008). Further, Gaspar and Esteves (2022) suggest that pro-social behaviour is largely predicted by empathy.

According to Stevens and Taber (2021), pro-social behaviour requires cognitive empathy, affective empathy, and compassion (using emotional regulation). In reviewing the research, they consider compassion as a concern for others, and importantly, the motivation to help. The definition of compassion is ‘sympathetic pity for the sufferings of others’ (Breyer, 2020). The empathy-altruism hypothesis states that empathy is more likely to lead to altruism than other processes (Batson et al., 1991). Altruism is often referred to as helping others without material or social rewards, or as the motivational state to help with the aim of increasing another’s welfare (Batson et al., 1991).

However, the empathy-altruism hypothesis has been criticised for misinterpreting the definitions of empathy (Eisenberg, 1991). Indeed, the basis of this hypothesis was later described by Batson et al. (2015) not as empathy, but empathetic concern which is most like sympathy (Janssen, 2012). It could be that evidence from this hypothesis demonstrated empathetic concern and possibly sympathy led to altruism, not empathy. Hoffman (1991) suggested that in Batson et al.’s research (1983), there is the situation of someone in distress, drawing similarities between Batson et al.’s definitions of ‘empathy’ and of someone experiencing distress due to sympathy. This makes it difficult to understand exactly what is being measured and whether sympathy or empathy are more likely to lead to altruism.

Overall, it appears that empathetic responding subsumes sympathy, empathetic concern and personal distress (Maibom, 2009). In addition, there is evidence that sympathy and empathetic concern lead to pro-social behaviours, whereas personal distress does not (Eisenberg & Fabes, 1990; Batson, 1998). Research has also shown

mixed results on whether affective empathy can be positively related to pro-social behaviour, or have an opposite effect (Barlińska et al., 2013; Decety & Yoder, 2016). It seems that only a certain 'level' of affective empathy will elicit a pro-social behaviour (Stevens & Taber, 2021). If there is too much affective empathy, this leads to a person focusing on coping themselves (due to personal distress). If there is too little affective empathy, then they do not care (Eisenberg & Fabes, 1990).

Cognitive empathy has also been linked to pro-social behaviour, so long as it is not too taxing on the self (Stevens & Taber, 2021). For example, one can perceive that another is struggling, and understand why, but if the self has too many other concerns, or is in crisis themselves, they may not be in a position to help, or if they do, they could experience a cognitive overload. It seems that, whilst affective empathy for others is important for pro-social behaviours (when it leads to empathetic concern), how individuals respond to their own emotions and manage their cognitive load is more important for altruism (Stevens & Taber, 2021). These individual responses may be based on a range of factors that are not limited to their context, wellbeing, background, and values. It is perhaps these factors that influence whether affective empathy leads to pro-social behaviour or not, rather than just the presence of affective empathy.

Therefore, observing pro-social behaviours and outcomes is a less reliable measure of empathy, as without also measuring these individual differences, one person may respond to the same situation with personal distress, hindering pro-social behaviour, or sympathy and empathetic concern, leading to pro-social behaviour. Decety and Jackson (2004) believe it is the self-other distinction that allows one to move from personal distress to empathetic concern in terms of empathetic responding, and as previously described, this is difficult to measure in research.

It appears that both sympathy and empathy could lead to pro-social behaviours although the mechanisms are unclear and there are a range of other contributing factors that can lead to pro-social behaviours as well. Thus, for the purposes of this research, pro-social behaviours are not explicitly measured.

Other theories suggest empathy occurs when three components are present: 1) taking on the feelings of the other; 2) cognitively understanding those feelings; and 3) acting pro-socially on those feelings (Ochsner, 2013). In contrast, Decety and Jackson (2004) suggested that the three components of empathy are: 1) affective; 2) cognitive; and 3) distinction between self and other. Yet another view is offered by Weisz and Zaki (2018), who described the three components of empathy as being cognitive, affective and empathetic concern in the form of compassion. As these three theories demonstrate, there is debate about the contributing facets of empathy in modern literature. However, researchers generally agree that there are two forms of empathy (cognitive and affective) that contribute to the experience of empathy.

2.2.6 The Problem with Empirical Research on Empathy

As previously described, the extant literature has presented varying and sometimes conflicting definitions and conceptions of empathy. These differences have been reflected in the struggles of empirical research in defining the various subsets of empathy and sympathy (Jolliffe & Farrington, 2006; Reniers et al., 2011; Vossen et al., 2015; Vossen & Valkenburg; 2016). When looking at past research on empathy, sympathy is often confused with affective empathy, particularly if the observer experiences feelings of sorrow and the result is pro-social behaviour (Vossen et al., 2015). Consequently, research in empathy has been occasionally problematic as

measurement of affective empathy could overlap with various features of sympathy (Vossen et al., 2015).

According to a review conducted by Igunaite et al. (2017), the most popular tool for measuring empathy was the Interpersonal Reactivity Index (Davis, 1980). The Interpersonal Reactivity Index (IRI) measures empathy over four subscales: perspective-taking; fantasy; empathetic concern; and personal distress. This tool has been criticised for not making a clear distinction between empathy and sympathy, although it continues to be widely used in empathy research (Vossen & Valkenburg, 2016). The empathetic concern (EC) subscale has been criticised for not differentiating between sympathy and empathy (Jolliffe & Farrington, 2006; Vossen & Valkenburg, 2016). The scale aims to measure “the tendency of the respondent to experience feelings of warmth, compassion, and concern for others undergoing negative experiences” (Davis, 1980, p. 6). However, Vossen and Valkenburg argued that this description tends to align more closely to the definition of sympathy than empathy. In close analysis of the scale, the items tend to be more associated with feelings of sympathy as well; for example: “sometimes I don’t feel very sorry for people when they are having problems” (Davis, 1980, p. 2). Davis (1983) later acknowledged that the EC scale assesses other-oriented feelings of sympathy, which further supports Vossen and Valkenburg’s (2016) analysis. Thus, it could be considered that measuring empathetic concern is akin to the measurement of sympathy and related constructs. Moreover, some recent empathy research suggests that the empathetic concern scale is perhaps more a ‘motivating’ call to action for pro-social behaviour, otherwise called ‘motivational empathy’. It could also be measuring an empathetic response to affective empathy.

An example of this issue can be demonstrated by the cross-temporal meta-analysis conducted by Konrath et al. (2011). This study of 13,737 college students (mean age of 20 years) found that, between 1979-2009, there was a decline in adolescent and young adult empathy. These authors speculated that this decline could be due to the increase in use of digital technology. However, as the method used involved a literature search of studies that used the IRI, and the EC scale had the most significant decline; results of this study could provide indications about sympathy, not empathy. This is due to the EC scale being more relevant to experiences of sympathy, rather than empathy (Vossen & Valkenburg, 2016). Thus, the findings could be interpreted as a decrease in sympathy over time, rather than empathy.

A lack of clarity around the definitions of empathy and sympathy has been highlighted as an area of concern by some researchers (Reniers et al., 2010; Vossen & Valkenburg, 2016). Separate measurement of the effects of both sympathy and empathy need to be explored in further detail and differentiated in future research. This research project will acknowledge this distinction by using a measurement tool that includes cognitive empathy, affective empathy and sympathy (see Chapter Three). Due to the ongoing debates around empathy and sympathy, whilst the focus of the current research is empathy, sympathy will be also measured so as to investigate similarities and differences in results.

The continuing theoretical debates as to the composition of empathy, the various measurement tools that conflate these terms, and the extent to which the self-other awareness in empathy is important have impacted empirical research; however, there are ways in which a researcher can attempt to mitigate these issues. As noted earlier, it is important to ensure a test for empathy includes sympathy as a measure. In addition, adopting a multi-method approach to empathy and sympathy studies would be

beneficial; researchers could consider measuring facial movements, using fMRI technology or adopting a qualitative and quantitative approach. However, given facial expression measurements and fMRI technology cannot always be used due to cost and availability, researchers are limited in consideration of methodology. These issues will be further discussed in Chapter Three where the justification for the methodology is outlined.

In summary, there are three key debates or issues in understanding and researching empathy. The first is the difficulty in defining empathy and related concepts, causing confusion in empirical research. The second is the self-other debate and the consequences on how self-other can be measured empirically. The third is the overall difficulty with measurement of empathy, especially when referring to or relying on past research and measurement of empathy, which has used a range of definitions that do not necessarily hold with today's understandings.

2.3 Adolescent and Developmental Empathy

Empathy can be regarded as a developmental skill (Philippot & Feldman, 1990; Hudnall & Kopecky, 2020). Even preschool children begin to show the capability to take another person's perspective, which leads to a development in cognitive empathy (Bensalah et al., 2016). Throughout childhood and adolescence, both types of empathy generally increase through a combination of biological and environmental influences (Allemand et al., 2015; Heyes, 2018). In early childhood, environmental influences of empathy tend to be primarily related to familial interactions, whilst in early adolescence an increased range of environmental influences affect empathy including conflict

resolution style, education, social media and degree of socialisation (Buck & Ginsberg, 1997; Dorris et al., 2022; Feldman, 2007; Vossen & Valkenburg, 2016).

Affective empathy is sometimes considered to be a more stable and inherited type of empathy. Zahn-Waxler et al. (1992) found that empathetic concern related to affective empathy was closer for genetically identical siblings than non-identical siblings in infancy. Furthermore, they found that heritability characteristics for empathetic concern were more stable than other forms of empathy which could suggest a more innate element to affective empathy than cognitive empathy. The primitive emotional contagion that is the basis of affective empathy first appears in infancy (Decety, 2020). Although perhaps more innate than cognitive empathy, there is also evidence that there is a developmental burst in affective empathy in adolescence which can be linked to a range of factors (Silke et al., 2018). For example, in a study investigating stories, empathy and prosocial behaviour, Johnson (2012) found reading fiction and being 'transported' by a story can improve affective empathy. This indicates that affective empathy can also be improved by environmental influences.

Development of cognitive empathy tends to correlate with age (Schwenck et al., 2014). In some respects, adolescence is seen as a more important time for developing cognitive empathy than affective empathy (Van der Graaff, 2014). This is demonstrated by neurological research (Decety & Jackson, 2004). While both forms of empathy generally rely on a sense of 'self', the pre-frontal cortex is vital for cognitive empathy and this does not reach maturation until late adolescence (Bunge et al., 2002; Frith & Frith, 2003; Decety & Jackson, 2004). Cognitive empathy is said to be a late-developing ability, with significant gains occurring at ages 6-7 years and 10-12 years (Dorris et al., 2022); it is slower to mature than affective empathy (Winters et al., 2021).

Adolescence is a period when there tends to be important emotional developments that can be stimulated for both empathy types (Eisenberg, 2000; Gross, 2015). In a systematic review of literature, Silke et al. (2018) found some studies suggested active participation in sport and religious communities may stimulate empathy, however the authors acknowledge that this link is not fully explored yet. Adolescence is a time when any developmental changes have a long-term consequence; there is a predictive element between empathy development during adolescence and social outcome variables in adulthood (Allemand et al., 2015). Early adolescence is considered a critical period to develop empathy, although research is relatively sparse in this area (Gaspar & Esteves, 2022; van Lissa et al., 2014). Nevertheless, it appears that by 12 years of age, an individual has capability for an emotional resonance, perspective-taking and empathy-driven responses (Gaspar & Esteves, 2022). It is also believed that knowledge of others' lives starts affecting a child's empathetic responses from the ages of 7–10 years (Hoffman, 2008). Overall, past research indicates that most empathy development occurs once a sense of self is established, or by 11-12 years.

In terms of sympathy development, it has been suggested that sympathy can be shown as young as 1-2 years (Hoffman, 1984). This, like empathy, occurs when children can sense the 'other' as separate to 'self'. Sympathy tends to develop as role-taking occurs throughout childhood and has similar periods of growth as empathy (Hoffman, 2000). This adds to the difficulty in distinguishing between empathy and sympathy.

2.4 Mediating Factors for Empathy and the Effectiveness of School-based Programs

Prior to 13 years of age, it appears that empathy development is largely related to interactions with parents and perceived similarities between self-other (Batson et al., 2005; Hoffman, 2000; van Lissa et al., 2014). Parental styles throughout childhood and early adolescence, and the perceived environment at school also play a role in the development of empathy, as do certain childhood and heritability factors (Farrell & Vaillancourt, 2021; Gaspar & Esteves, 2022).

Research suggests that various interventions aimed to improve empathy are only effective for short periods of time (Herrera et al., 2018; Lor et al., 2015). Some studies suggest that although the initial improvement in empathetic response may decline, the ‘spike’ that occurs after intervention may lead to an overall improvement in a related empathetic response, or an enduring appreciation and value of the other (Herrera et al. 2018).

Additional studies have shown that intervention programs in education can improve empathy; indicating that empathy is a malleable skill (Chismar, 1998). A slate of programs focused on the adolescent period have found effectiveness in improving affective empathy. Castillo et al. (2013) investigated the effectiveness of a two-year intervention program (the INTEMO program) on aggression and empathy in adolescence. The INTEMO program is an intervention program focussed on building emotional intelligence, conducted within the classroom. The authors focussed on both cognitive and affective empathy and these concepts were measured using the Interpersonal Reactivity Index (IRI; Davis, 1983). The results found that, for 590 adolescents, the INTEMO program, conducted across two years in one-hour lesson

blocks, facilitated the promotion of empathy, particularly for adolescent boys, with small effect sizes ranging from $r = .15$ to $.25$.

Pecukonis (1990) investigated a short cognitive and affective empathy training program with 24 adolescent females who had previously shown aggression. After randomization, the participants were exposed to four different 1.5-hour training sessions. The sessions comprised of role-taking (imaginative perspective taking), affect discrimination (identifying emotional states in others), affective matching (identify and match the emotion in the other person) and event analysis (possible causes of behaviour and states in others). Participants completed both the Hogan Empathy Test (1969) and an additional measure of affective empathy by Mehrabian and Epstein (1972) pre and post-test. The results showed significant improvement in affective empathy, although the effect size was not reported. The limitation of the small sample size, and the pre-existing aggressive behaviour in the sample should be noted.

Other research suggests that elements related to empathy can be enhanced with socio-emotional training in school-aged children when a whole-school approach occurs. For example, the widely adopted socio-emotional learning program of PATHS (Promoting Alternative Thinking Strategies) has shown some improvement in empathy-related skills. The PATHS curriculum focusses on providing school aged children with explicit instruction on the expression, understanding and regulation of emotions. Greenberg et al. (1995) found that for 286 children in Grades Two and Three, the PATHS curriculum intervention improved elements of empathy over the course of a year compared to the control condition. Whilst not explicitly investigating affective and cognitive empathy, the improvements related to understanding cues to emotions in self and others (perceiving an emotion), which is an important first step in both forms of

empathy. The teachers were trained in the intervention model through an intensive three-day workshop and were provided with PATHS lessons 2-3 times a week over a year, whilst also receiving ongoing support from PATHS instructors.

Similarly, a study of PATHS in Northern Ireland, involving 1,430 students in primary school, found that, over the course of three years, students reported significant improvements in empathy (Ross et al., 2011). Given the success of these types of interventions, and the importance of empathy in a well-functioning society, education systems have incorporated empathy development into their key outcomes for socio-emotional learning. The school environment is an important context for learning a range of socio-emotional learning skills such as empathy as it is relevant for school functioning (Spinrad & Eisenberg, 2014). The Collaborative for Academic, Social and Emotional Learning (CASEL) was established in 1994 to consider how socio-emotional learning can be incorporated into the classroom, and is widely adopted, including in the Australian curriculum.

CASEL (2023) suggests that the ability to ‘feel and show empathy’ is one of the key elements of socio-emotional learning. Empathy, specifically, is identified as a key characteristic of the skill of ‘social awareness’ and can be explicitly taught in various communities, such as schools (CASEL, 2023). Although sympathy is not the focus of the current research, due to the conflation in definitions explained in Section 2.2, it is also important to note that it does have value within socio-emotional learning programs. Sympathy is related to two competencies of socio-emotional learning, namely social awareness and relationship skills (CASEL, 2023).

Interventions and programs in schools for socio-emotional learning that aim to promote empathy have had some success. Generally, researchers suggest that school programs aimed at promoting empathy and pro-social behaviour are effective (Spinrad

& Eisenberg, 2014). Malti et al.'s (2016) assessment of 19 school empathy-related programs found that programs targeting empathetic constructs specifically were more effective than those taking a more generic approach, although these needed to be developmentally tailored, not just age-based. This indicates that any intervention in empathy should not be one-off and should include building on the individual's developmental stage.

In addition, a range of interventions in arts, mindfulness, anti-bullying and design thinking have been shown to improve empathy in the short term (Cheang et al., 2019; Dawbin et al., 2022; Garandau et al., 2022; Mogro-Wilson & Tredinnick, 2020). There is some evidence that in early adolescence, empathy-improving interventions for socio-emotional learning are less likely to be successful if they involve direct appeals from adults (Yeager et al., 2018). This indicates the importance of having socio-emotional learning taught through an array of different experiences. Many of the aforementioned interventions were teacher-led after teacher training or, more recently an online program that students complete (Mogro-Wilson & Treddinnick, 2020; Okonofua et al., 2016; Weisz et al., 2022).

Most socio-emotional learning programs that aim to improve empathy occur as a skills-training based-program within the classroom (Feshbach & Feshbach, 2009). Some of these programs involve role-play, class discussions or art, and focus on teaching students how to recognise emotions and take perspectives (Davis & Bekovic, 2014). However, due to this being a recent research area, there is not much evidence as to how long an intervention should be sustained for, how to developmentally tailor better to an individual, or recommended intervention timings (Malti et al., 2016). Some evaluated studies last less than two weeks and may only include one to two lessons as an

intervention (Weisz et al., 2022). In a meta-analysis of socio-emotional learning programs, it was found that over three-quarters run for less than a year (Durklak et al., 2011). Other analyses of these programs are limited and tend not to focus on specific constructs, such as empathy. However, it is recommended that a range of strategies in teaching socio-emotional learning be used to address individual differences across developmental levels (Malti et al., 2016).

In summary, there is evidence that empathy can be fostered through socio-emotional learning programs in schools during adolescence. Recent research on improving empathy through socio-emotional learning in general is promising. However, more evaluative research is needed in this area, especially in terms of measuring longer-term impact. The school environment is an important context for learning a range of socio-emotional learning skills, such as empathy. It is therefore important that a range of programs and opportunities be developed in different contexts to promote empathy as part of socio-emotional learning in schools.

One part of the education domain that could provide programs for socio-emotional learning is the use of digital technologies. In the last decade, and as part of coping with the COVID-19 pandemic, there has been a rapid uptake in the use of a range of digital technologies for teaching and learning (Mospan & Sysoieva, 2022). This warrants further investigation as there are few empirical research studies on schools' use of socio-emotional learning programs using digital technology. This research project aims to consider this area for socio-emotional learning and empathy development.

2.5 Defining Virtual Reality

Digital technology refers to a broad range of resources ranging from computers to social media networks and Artificial Intelligence (Rogers & Euchner, 2022; Salmi,

2020). There has been some research that digital technologies can facilitate improved empathy, such as that of some video games (Greitemeyer & Osswald, 2010; Harrington & O'Connell, 2016) and the use of social media (Vossen & Valkenburg, 2016).

Virtual reality is of specific interest when it comes to promoting empathy in schools. It has been popularly touted as the *Ultimate Empathy Machine* through a TED talk by Milk (2015). The idea that virtual reality can promote empathy has been made even more popular through media and journalism, due to its unique perspective-taking capabilities. The possible positive relationship between virtual reality and empathy has been emphasised by broader community groups such as the United Nations.

In 2015, the United Nations Sustainable Development Goals group developed a division called the UNVR (United Nations Virtual Reality), which was designed to focus on the effects of using virtual reality for empathy. Their mission statement is to 'use the power of immersive storytelling [in this case, virtual reality], to inspire viewers towards increased empathy, awareness and positive social change' (UN-SDG, 2016, para 1). They have created five virtual reality experiences of which *Clouds over Sidra* was one of their first. *Clouds over Sidra* shows a day in the life of Sidra, a 12-year-old Syrian refugee. It was created with the purpose of generating empathy for those living in vulnerable conditions (UN-SDG, 2016). The UN-SDG have found that people are twice as likely to act (donate) after viewing their film *Clouds over Sidra* using virtual reality when compared to a projection of predicted donations. A project involving the UNVR in Canada called 'The Sidra Project' investigated the effectiveness of this approach. They presented the virtual reality experience to over 29 schools. This project reported that 95% of viewers said the experience heightened their empathy for refugees

(Artscape, 2021). However, the empirical research in this area suggests that the relationship between virtual reality and empathy is not fully developed and evaluated.

2.5.1 What is Virtual Reality?

Virtual reality has been a capricious area for researchers. For technological producers, it is defined as a set of technological hardware that allows an individual to be transported in some form to a place that is not their present. Prior to the 1990s, the term ‘virtual reality’ was defined purely by its technological merits, not by its experiential elements (Steuer, 1992). This allowed for the rapidly changing development in technology with undefined experiential boundaries. The term ‘virtual reality’ was loosely applied to all technological developments.

Initially, key pioneers of virtual reality tended to continue to focus on the definitions of virtual reality in relation to its technological specifications (Coates, 1992; Greenbaum, 1992). These theorists focused on goggles or headsets, as opposed to other hardware, but as the technology developed, others argued that the technical definition did not fully encapsulate the virtual reality experience. Some researchers suggested that, instead, the focus should be on the desired human experience of using virtual reality (Steuer, 1992). Having a definition of virtual reality that was separate from the technological specifications would avoid the problem of ever-changing technology making research that focused on the technological definition of virtual reality more or less redundant. For example, by the time research focuses on a particular development of a new headset of virtual reality, it becomes irrelevant as the technology improves, Augmented Reality becomes important and relevant, and so forth. Thus, focusing purely on the technological definition cannot contribute to the same body of research as that

definition changes. If research is instead focused on the human experience, it is possible to build on the body of research of the virtual experience and what it aims to achieve.

Considering the human experience, the focus on the term ‘presence’ became important. Steuer (1992) suggested that virtual reality is defined as the experience of the human presence in an environment by means of a communication medium, or, as he defines it, its “telepresence”. Steuer focused on two important elements in defining ‘levels’ of telepresence: 1) interactivity, or the ability for the individual to modify content in a mediated environment in real-time; and 2) vividness, or the richness of a mediated environment in the way it is presented to the senses.

Steuer (1992) suggests that vividness and interactivity in virtual reality will improve as technology advances, but despite not knowing how these advances will eventuate, using the definitions above of these concepts does not diminish the literature in the area as they are broad enough. Thus, despite his work being over two decades old, Steuer’s proposal of this sort of definition has meant that research conducted with older technology is still relevant to research today. Other researchers have since agreed that, when contributing to research and defining virtual reality, the key was to focus on telepresence, or presence (Witmer & Singer, 1998). More recently, it has been suggested that the experience of virtual reality presence can be influenced by other factors, such as emotional arousal or embodiment within the experience (Bouchard et al., 2008; Gall et al., 2021; Riches et al., 2019). A useful definition of presence associated with virtual reality is that it is an “*experience* of being in another place or situation, a detachment from the *normal* reality and a perceptual attachment to a different reality” (Wilkinson et al., 2021, p. 1101). An important element of this definition is that presence is considered a perceptual illusion, not a cognitive illusion

(Slater, 2018); that is, the person experiencing virtual reality presence does not actually think they are there. Users are aware that what they are experiencing is not their true reality, but more a sensory experience.

By the early 2000s, the use of virtual reality had moved away from being used primarily in the field of science and computers, to the fields of education, medicine and entertainment (Burdea & Coiffet, 2003). Virtual reality was still defined using interactivity and vividness and presence, but another term, 'immersion', had gained popularity (Freina & Ott, 2015; Slater, 1999). Immersion is associated with the technical aspects of a virtual system that help the user to feel a sense of presence that is an experiential quality in virtual environments (Wilkinson et al., 2021). Since immersion was first introduced, virtual reality researchers have been debating whether immersion or presence is the defining factor in the virtual reality experience and related research (Slater & Wilbur, 1997). In addition, the relationship between presence and immersion has been investigated (Kardong-Edgren et al., 2019).

2.5.2 Immersion and Presence

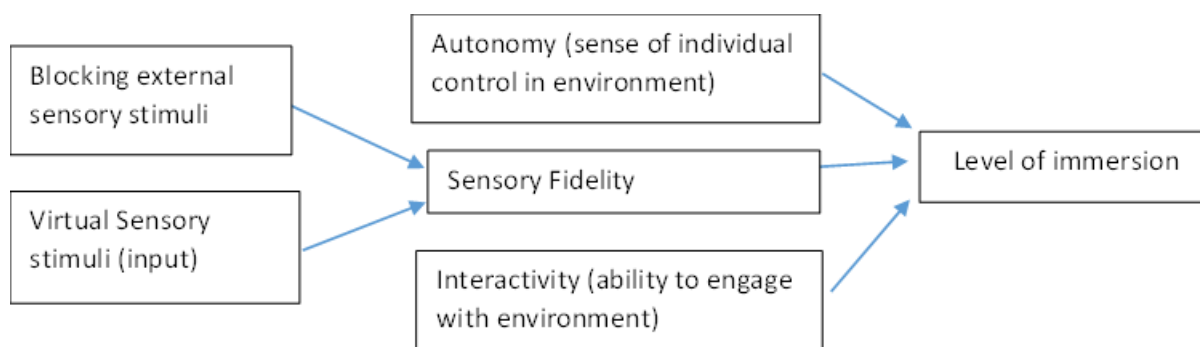
Understanding the relationship between immersion and presence is vital to understanding virtual reality's potential impact on empathy. Immersion refers to "the extent to which the system presents a vivid virtual environment while shutting out physical reality" (Cummings & Bailenson, 2016, p. 274). Whilst traditionally related to the technological capability of a digital device, the literature on immersion tends to rely on three factors. The first is autonomy in the virtual environment. For example, this could refer to the difference between a user being passive and watching (low autonomy), or actively deciding where to go (high autonomy) (Zeltzer, 1992). There is some evidence that, the more control an individual has in their digital environment (i.e.

where they choose to look/walk), the more enjoyment they will have, and that this autonomy is related to higher immersion (Ijaz et al., 2020). In designing virtual experiences, the current advice is to enhance autonomy so as to improve engagement, satisfaction and continued use (Jung, 2011; Makransky & Lillieholt, 2018).

The second factor is sensory fidelity. The more immersive a digital device, the more it blocks out external stimuli and interruption, providing greater sensory stimuli input (Bowman & McMahan, 2007). Sensory fidelity comes from technological hardware and software features; for example, field of view, display size and resolution, and head-based rendering (Bowman & McMahan, 2007). By manipulating these elements of technological hardware, a researcher can manipulate the level of immersion a participant experiences. A device that has high sensory fidelity leads to higher immersion.

A third factor that may increase immersion is interactivity, although this idea has been contentious. There is a possibility that it is the combination of high sensory fidelity and mental activity and response (interactivity) that makes a virtual reality environment work in a more immersive way. For example, Roussou (2004) suggested that it is interactivity with an activity that improves engagement, and therefore perceived immersion. In considering impact in education and learning, engagement is a widely-agreed-upon positive influence on learning (Barker, 1994; Sims, 1997) and could be an important factor in developing empathy. However, other researchers have suggested that interactivity is not as important a factor in terms of immersion compared to sensory fidelity (Bowman & McMahan, 2007).

Figure 3 shows the three contributing factors of interactivity, autonomy and sensory fidelity that can influence immersion based on the above research.

Figure 3*The Contributing Factors That Influence Immersion Levels of a Digital Experience*

Considering each pathway to immersion that is represented in Figure 3, higher individual control within a virtual environment (autonomy), increased levels of sensory virtual stimuli (sight, sound), concurrent reduction of external stimuli, and the ability to mentally engage with the environment, may lead to a more immersive experience in the virtual environment. This suggestion of increasing autonomy, sensory fidelity and interactivity to increase immersion is consistent with past research (Zeltzer, 1992). Currently, virtual reality headsets are one of the most fully immersive technological devices available, especially if they incorporate the use of headphones to block out any external sounds, interactivity with gloves and the individual being fully able to interact with the virtual environment in the way that they wish through the chosen experience.

The proposed research aims to investigate changes to empathy through virtual reality. However, the question of designing research based on presence and/or immersion in research needs to be considered, as the issue of the relationship between presence and immersion has been only recently explored, especially since this program of research began. Although immersion is associated with the technical aspects of a virtual system, presence is an experiential quality in virtual environments (Wilkinson et al., 2021). It is the technical aspects of immersion that help the user to feel a sense of

presence (Wilkinson et al., 2021). Thus, presence and immersion appear related, but not identical. Research has shown that changing levels of immersion could possibly change levels of presence (Makransky et al., 2019; North & North, 2016; Wilkinson et al., 2021). One possible reason for this is that presence is encompassed by immersion (Sherman & Craig, 2003). Other researchers suggest presence is akin to a psychological response to immersion (Slater & Sanchez-Vives, 2016). Although the reasons and nuances of the relationship are still being explored, recent findings suggest that there is a positive relationship between immersion and presence (Han et al., 2022).

Considering the focus on empathy for the current program of research, ideally the virtual reality intervention would be designed to maximise presence, enabling a deeper investigation of the psychological and behavioural responses to virtual reality (Slater & Wilbur, 1997). Presence could be an important mediating variable between the virtual reality technology and the emotions induced, in that if a medium cannot produce presence, the effect may be lower.

There is evidence that presence is influenced by emotional arousal (Bouchard et al., 2008). Certainly, researchers who have investigated the changes to human emotion tend to be drawn to 'presence' being the defining component of virtual reality and use presence surveys to measure and compare presence to affect (Riva et al. 2007).

Although presence can be influenced by technological features, it can also be impacted by the characteristics of the chosen experience provided by the technology (Riva et al., 2007). However, research that focuses on presence instead of immersion has been criticised because the questionnaires used are too generic. For example, Usoh et al. (2000) suggest the Witmer and Singer (1998) questionnaire on presence had no noticeable difference in results when participants were carrying out a task in a virtual

environment compared to a real environment. Usoh et al. (2000) argued that tasks in the real world should always have higher presence.

This is likely the key reason that there are fewer research studies on virtual reality using presence as a measurable variable (Slater et al., 2009). Slater et al. proposed that the only way presence can be measured is against grounded truth data, or by comparing actions and responses of people within a virtual environment compared to the same situation in a real environment. Although this would be a highly complex and time-consuming process, it has been suggested that this would be necessary if presence is to be measured as a variable in empirical research instead of immersion (Slater et al., 2009).

Immersion is the key to conducting empirical research using virtual reality. Research that manipulates immersion is preferred over presence in research as immersion involves 'external, objectively measurable characteristics that lead to a capability of placing an individual inside a computer-generated environment' (Slater & Wilbur, 1997, p. 8). This allows for empirical research tasks to be conducted between groups, as it is easy to design differing immersion groups in comparison to the challenges involved in measurement and differentiation based on the human experience of presence.

Applications of virtual reality need to be investigated on a continuum that is relevant for the specific field of inquiry. For example, in the medical field, in treatment of phobias, high levels of immersion to mimic real life situations are useful, but when helping civil engineers navigate an area, less immersion has the same usefulness as higher levels of immersion in achieving the aim of the program (Bowman & McMahan, 2007). Bowman and McMahan (2007) suggest that the reason for this is that the aims of psychotherapy for phobia patients require an intense flooding of feelings, which can

happen with sensory fidelity, whereas a highly immersive experience for navigating a tunnel requires clear direction, and less distraction. Less immersive devices have a lower cost, and thus each field needs to consider what level of immersion is necessary for the user to experience the benefits of using a virtual environment (Bowman & McMahan, 2007). Schools need to consider whether and how they use the virtual reality devices, and whether investment in top-end immersive devices is truly good value for their programs, for socio-emotional learning or not.

The research suggests that virtual reality provides an opportunity at both a cognitive and affective level for greater learning and engagement, indicating exciting possibilities for schools. The levels at which schools use digital devices for immersion (and for what purpose) is affected by social, cultural and economic pressures and this impacts the levels of immersion in the design of the current research.

2.5.3 Virtual Reality in Education

Schools are beginning to invest in virtual reality headsets more readily as they become more cost-effective, easily accessible and ergonomically improved (Bower et al., 2020; Freina & Ott, 2015; Martín-Gutiérrez et al., 2017). Moreover, the use of virtual tools in education has also grown due to the COVID-19 pandemic, making them relatively familiar to many schools (Raja & Priya, 2022; Rospigliosi, 2022). In fact, it is argued that virtual reality is set to have a significant role in education (Freeman et al., 2017). The virtual reality system can offer educators a range of alternatives, such as the visiting of sites, a variety of experiences and even alternate eras that would be otherwise impossible and can also be built into a range of educational approaches such as inquiry-

based, constructivist and blended learning (Fegely et al., 2020; Patterson et al., 2022; Zantua, 2017).

The increased immersion that virtual reality provides has theoretical links to educational goals of learning. Features of immersion, such as autonomy and interactivity, can facilitate educational aims of engagement in learning. Brown and Cairns (2004) suggested that digital immersion has features similar to Csikszentmihalyi's (1990) concept of flow, or the state in which one is so immersed that nothing else seems to matter. Flow and engagement factors are considered integral to the learning process and the educational domain more broadly (Bransford et al., 1999). As virtual reality is considered more immersive than other means, such as 2D, it may be beneficial in education settings as it has the potential to provide improved engagement and flow and therefore warrants further investigation.

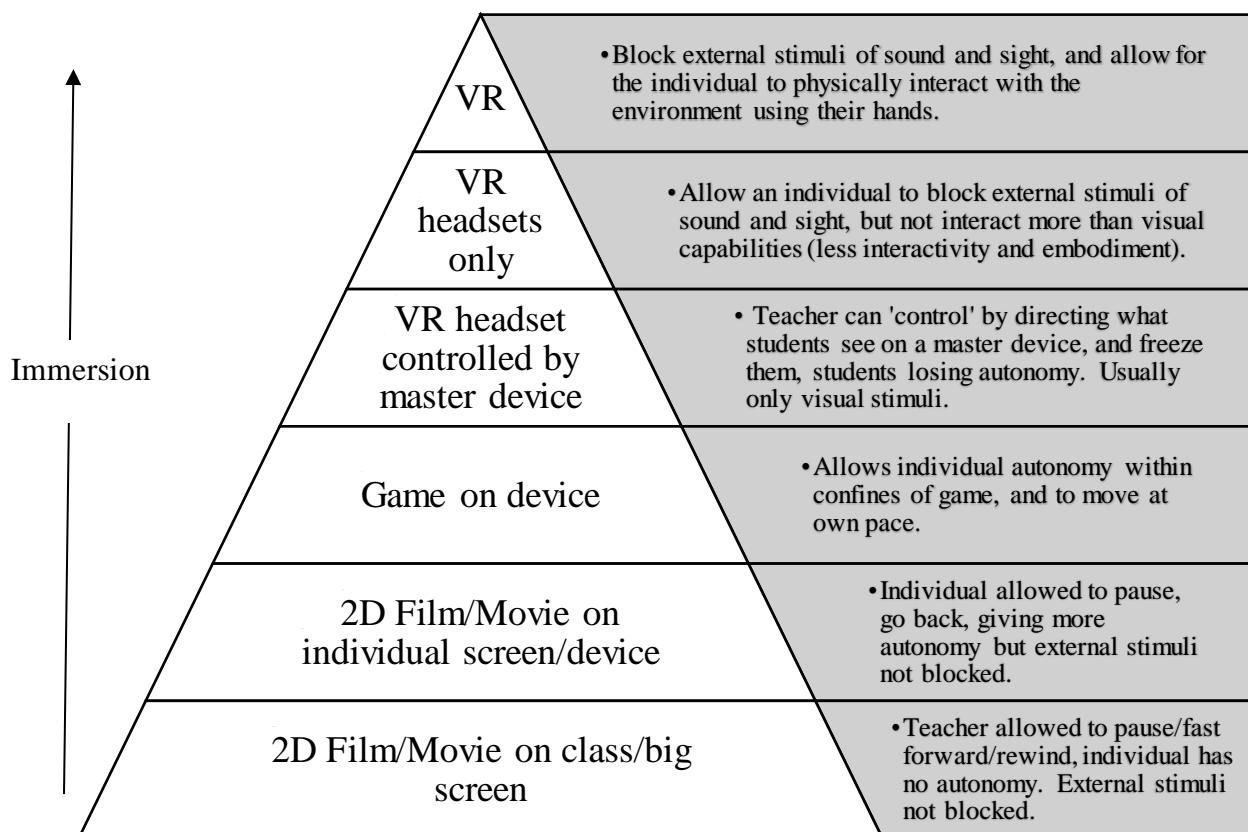
Research on the uses of virtual reality in education has been positive. Schools tend to use virtual reality as a replacement method for content delivery based on learning disciplines, with educators suggesting that it can also improve engagement across learning disciplines (Fabola & Miller, 2016; Yap, 2016). Although limited, most studies on the use of virtual reality in schools have focused on subject-specific knowledge within the learning discipline (e.g. Humanities, Science) rather than socio-emotional learning (Olmos-Raya et al., 2018; Hui et al., 2022). Some results of research in this area have shown that more immersive devices, such as headsets, contribute to high knowledge retention for students than content delivered in 2D form or regular classwork (Hui et al., 2022; Olmos-Raya et al., 2018). However, other research suggests that, whilst presence and engagement may be increased when using virtual reality, there is no difference in procedural and declarative knowledge (as measured by post-test outcomes) compared to 2D (film on screen) interventions (Makransky et al., 2019;

Parong & Mayer, 2018). Moreover, there appears to be some evidence that virtual reality can increase cognitive load and hinder learning (Makransky et al., 2019). On the other hand, most of this research is based on a one-off intervention, with up to 60 minutes being taken for the whole research study (Makransky et al., 2019; Olmos Raya et al., 2018; Parong & Mayer, 2018). These findings demonstrate the importance of investigating any effects of virtual reality longitudinally if the aim of the research is on long-term learning effects.

Since the 2D form is commonly used in education as shown in the research above, it is appropriate for use in digital immersion research to compare with virtual reality. A range of educational tools that can be used by researchers to differentiate by immersion levels are listed in Figure 4.

Figure 4

Some of the Currently Used Digital Devices in Education by Level of Immersion



Note. in the above diagram VR stands for Virtual Reality.

Considering the various options and ways in which digital technology can be used in the classroom, virtual reality can be defined as a highly immersive experience involving an attached headset. This definition considers the context of the research in schools with available resources, as well as considering the use of the term 'immersion', which encompasses sensory fidelity, interactivity, and autonomy, and is recommended in any definition of virtual reality for empirical research (Kardong-Edgren et al., 2019).

Typically, teachers and schools use virtual reality for subject-specific content in their classrooms; however, virtual reality has the scope to build on psycho-social skill building and wellbeing for schools (Parong & Mayer, 2018). Research has been

growing in this area, but more is required, as most of the research tends to be on young adults aged over 18 years. Blasovich and Bailenson (2011) found that virtual reality can be used to improve cultural awareness, but the research was not on school-aged participants. Compared to a traditional 2D format, virtual reality has been shown to improve some pro-social behaviours, such as concern for others, emotional regulation, general helping behaviours and volunteering (Ahn et al., 2013; Colombo et al., 2021; Kandaurova & Lee, 2019; Rosenberg et al., 2013). Use of virtual reality for socio-emotional learning in schools in the adolescent age range is less studied, but the research has produced mixed results that will be discussed in the next section. The potential for development of skills relating to socio-emotional learning warrants further investigation of virtual reality in education, especially given its shared characteristics with flow and with engagement (Brown & Cairns, 2004).

The current project aims to build on the research by exploring virtual reality use in schools for socio-emotional learning, rather than subject-specific learning. In addition, given the improvement in adult pro-social behaviours related to socio-emotional learning that previous research has shown, it will investigate these effects with a focus on adolescents. Finally, elements of a longitudinal design will be adopted to investigate any longer-lasting effects that have not been investigated in previous studies.

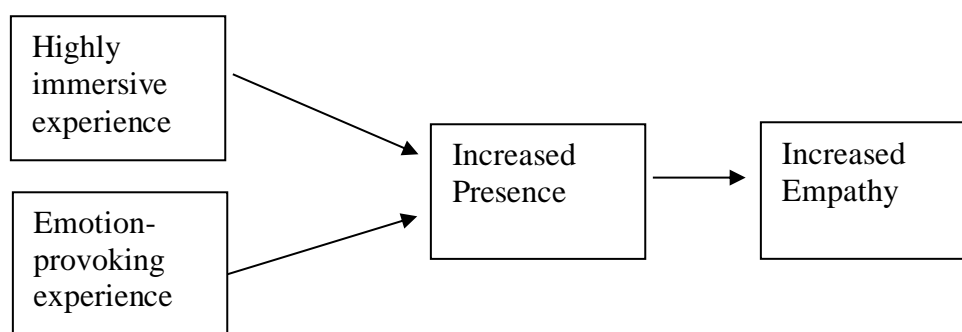
2.6 Virtual Reality and Empathy

Virtual reality is important to empathy research because of the sense of presence and immersion it can offer and the possible subsequent connection that can be achieved to another individual. If empathy refers to the individual connecting to another person

for an affective congruence, presence is the individual connecting to the environment or the world around them (Nicovich et al., 2005). This suggests that empathy and presence may use similar neurological processes. It is important to remember here that presence is a perceptual illusion and not a cognitive one. Some researchers, such as Brinck (2018), suggest that without a level of ‘presence’ one cannot have empathy. It is only when you are present and perceptually observant of another’s experience can you have an empathetic response. As Brinck (2018) suggested, presence permits responding with empathy. This relationship is demonstrated in Figure 5, below.

Figure 5

The Proposed Relationship Between Immersion, Presence and Empathy



Note. An emotion-provoking experience has been added, as emotional arousal is linked to increased presence (see Section 2.5.1). More detail on the chosen experience in the current research is provided in Chapters Three and Four.

If use of virtual reality increases immersion and presence compared to traditional 2D forms of media, there is a possibility that it will also increase empathy as supported by research (Alberghini, 2020; Barbot & Kaufman, 2020; Schutte & Stilinovic, 2017). Although research is limited, it appears the positive relationship between virtual reality and empathy is due to the cognitive factors associated with presence in virtual reality (Shin, 2018).

Virtual reality has been shown to reduce bias, and to occasionally increase empathy towards another group (Banakou et al., 2020; Seinfeld et al., 2018). By conceptualising empathy as involving both affective and cognitive components, it is important to investigate if virtual reality improves both of these components, or just one. Barbot and Kaufman (2020) found that virtual reality can improve empathy and have argued that it is the perspective-taking element of empathy that makes virtual reality key to empathy improvement. This suggests that cognitive empathy is more likely to be improved through the use of virtual reality than affective empathy (van Loon et al., 2018).

There is reason to predict that cognitive empathy would be heightened through immersion considering the theoretical concepts. Cognitive empathy is the capability to see and understand from another person's point of view (perspective-taking). In virtual reality there is increased immersion, and external visual and auditory stimuli are blocked, so that the user can only actually see and hear from the viewpoint of the other; the higher the sensory fidelity (and immersion), the higher the perspective-taking experience. In a study by Brown and Cairns (2004), seven gaming participants aged over 18 years reported through interviews that a lack of immersion led to a reduced level of empathy. The features that led to full immersion were noted as visual, auditory and mental stimulation (sensory fidelity and engagement). Furthermore, games that were first-person perspective (through the eyes of the individual) all reported greater feelings of empathy (Brown & Cairns, 2004). This finding is key to understanding and supporting the idea that cognitive empathy has a perspective-taking element.

Furthermore, a within-between study of 128 pre-service teachers, conducted by Han et al. (2022), found that increasing immersion levels increased presence, but that

this was only related to higher empathy when paired with embodiment as a level of perspective-taking. This research study used two videos with varying perspective-taking elements; one where they had a virtual body and was first person, whilst the other participant was an observer and was not embodied. Each participant viewed both videos, either through virtual reality, which was considered highly immersive, or a low-immersion 2D screen. Their research suggests the experience of embodiment may also improve empathy.

Improvement in perspective-taking due to virtual reality was also evident in a meta-analysis of seven studies (335 participants) by Ventura et al. (2020). The low number of studies included in the meta-analysis is reflective of the limited research in this area. Whilst many studies were initially found, many of these did not do a pre- and post-test on empathy. However, this particular analysis, and its theoretical underpinnings described earlier, suggests that there is a link between perspective-taking and cognitive empathy (Bensalah et al., 2020). Given that perspective-taking is fundamental to theoretical understandings of cognitive empathy, there may be a possible improvement in cognitive empathy through virtual reality, although research has not found this link consistently (Martingano et al., 2021). Investigating links between cognitive empathy and virtual reality using more robust research designs is therefore warranted.

There is also evidence that virtual reality can be used to increase affective empathy, demonstrated by the meta-analysis on virtual reality and empathy conducted by Martingano et al. (2021). Interestingly, this meta-analysis, which involved 43 studies and 5644 participants from predominantly Western cultures, found that the immersion level of the virtual reality headset made no difference to overall empathy levels compared to reading and imagining. The included studies only measured empathy as

outcome variables and the virtual reality program was predominantly pro-social in nature. Other analyses suggested that affective empathy is enriched by virtual reality whereas cognitive empathy is not (Martingano et al., 2021). However, all the studies involved in this meta-analysis were single sessions of virtual reality and a sustained program of virtual reality intervention with a longitudinal design had not been investigated. It could be that cognitive empathy requires a longer intervention time and a sustained program to be improved. However, on this meta-analysis, it is reasonable to predict that a virtual reality experience may improve affective empathy.

Finally, there is research evidence that virtual reality can improve both types of empathy. In a 24-person study, Schutte and Stilinovic (2017) found that virtual reality headsets can increase engagement compared with traditional 2D films. Higher levels of engagement were associated with a greater overall experience with empathy; they found this was the case for both affective and cognitive empathy. Alberghini (2020) found similar improvements in empathy when comparing the virtual reality and 2D experience with 107 adolescents, using two different films that focused on refugees. Han et al., (2022) found that more immersive virtual reality did increase empathy compared to low immersion, but only when a particular stimulus was viewed. Overall, it appears there is some research evidence that suggests virtual reality can improve both types of empathy, but under certain conditions. Thus, both types of empathy are being investigated in the current research, especially given the theoretical debate on their relationship to each other.

Although this research area is still in its infancy, there are limitations in the few studies that have been done, such as lack of control groups and pre-tests on empathy, leading to the weaker validity of many studies (Ventura et al., 2020). Moreover, the

aforementioned studies implemented brief interventions and did not adopt a longer-term approach, which is another frequent limitation in empathy research (Vossen & Valkenburg, 2016). Interestingly, the small number of studies that have employed a longitudinal design to examine empathy and virtual reality have reported conflicting results. Herrera et al. (2018) found that individuals exposed to a virtual reality film, *Becoming Homeless*, were more positive and had lasting results compared to individuals who read a text or interacted with a 2D version of the same experience. After eight weeks, self-reported empathy levels were similar, but there were more lasting positive attitudes from those in the virtual reality condition.

Important in this study was that there was the longitudinal element of eight weeks and a large sample of 500 people (15-88 years old). Interestingly, it demonstrated that empathy levels remain similar across groups as long as a perspective-taking task is undertaken by participants. This indicates the importance of the perspective-taking element in empathy. Furthermore, they determined that those in the virtual reality condition experienced an increase in empathy in the short term compared to other conditions, but that this faded over time. This may indicate that any change in empathy intervention programs may be a one-off. In another longitudinal study over five months, those that used immersive digital technologies were more likely to elicit pro-social behaviour towards out-groups (Hasson et al., 2019), and whilst other studies found similar levels of immersion can improve moral judgement, there were no significant differences between groups for empathy (Hasler et al., 2021). This suggests that, for research in empathy, the longitudinal approach is a necessary element.

2.6.1 Virtual Reality, Empathy and Adolescents in Schools

There is some evidence that a more immersive experience, using virtual reality, can influence affective and cognitive factors, and therefore could benefit learning and be of use to schools (Makransky & Lillieholt, 2018). The affective factors include enjoyment and engagement, whilst the cognitive factors are related to learning include improved perception, understanding and application (Makransky & Lillieholt, 2018). The idea that virtual reality involves a dual cognitive/affective route to greater learning is important for socio-emotional learning, especially considering virtual reality's effect on empathy's affective and cognitive components.

To date, there have been few studies that address virtual reality, empathy, and the adolescent in schools. When this research project was initially designed in 2015, there was no research on adolescent empathy and virtual reality to the author's knowledge. Subsequently, as studies have been conducted, it is important to note these research studies did not adopt a longer-term approach, but nevertheless do give an insight on the impact of using virtual reality and empathy in adolescence. These key studies are described below.

In one study, Ingram et al. (2019) found that when middle school students used virtual reality for a six lesson anti-bullying program, their empathy levels increased, compared to students who had regular classes. However, the regular classes did not do an anti-bullying program of any sort, and additionally did not have the specialist teacher, so the conclusions need to be interpreted cautiously, although effects were measured both one week pre-intervention and one week- post intervention.

Similarly, Alberghini (2020) found that for 107 middle school students, empathy improved for those who watched the film *Clouds over Sidra* using virtual reality,

compared to those who watched a 2D video of *Step into a Refugee Camp*, suggesting that virtual reality can help develop perspective-taking qualities. An advantage of this study is that the control condition still had an experience on improving empathy.

Alberghini adopted a mixed methods approach, with a 5-point Likert-type scale being used for created questions, and a series of open-ended questions to gain qualitative data including the opportunity for follow-up questions, such as “Any other feeling or comment about *Clouds over Sidra?*”.

In the most recent study, Trudeau et al. (2023) observed that 60 middle school students who used virtual reality to watch a film about refugees had larger increases in empathy when compared to those who watched the same film in 2D form. Interestingly, both formats (2D and virtual reality) showed increases in participant empathy, although the effects for the virtual reality condition were larger. The formats shown to the participants included a virtual reality headset and headphones in comparison to participants viewing the 360-degree film on their own laptop. This means there was less sensory fidelity in the control group than the virtual reality group, but there was still some autonomy in the control condition, as participants were able to navigate their own laptop and viewing (choosing where to look themselves in the 360-degree video). Trudeau et al. (2023) used the Adolescent Measure of Empathy and Sympathy (AMES) Survey by Vossen et al. (2015) and found that these increases for both cognitive and affective empathy existed when comparing data both pre-test (one week before intervention) and post-test (immediately after intervention). In addition, there was no significant improvement in sympathy using virtual reality.

Although limited, the initial research described above indicates promising potential of virtual reality for empathy with the target population of adolescence. This study aims to add to the existing body of research.

2.7 Summary of Chapter

This chapter outlined some of the key theoretical issues with researching empathy. There is consensus that empathy has both affective and cognitive elements, that it is linked to pro-social behaviour, and that it is an important skill to be fostered. However, beyond this there is a conflation of empathy with other concepts, and little consensus on how it occurs, impacting insights on how it can be developed. This field of inquiry has limited research in the area, leaving confusion, especially with the similar concept of sympathy. Researchers tend to agree that empathy is developed throughout childhood, and that by adolescence one can distinguish self-other and respond empathetically. This is important for schools to note when developing socio-emotional learning programs and considering age-appropriate interventions.

In addition, this chapter covered the broader history of the use of virtual reality in technological terms and its use in education. Theoretically, virtual reality provides the presence and immersion that can improve empathy. Although there have been few studies investigating the use of virtual reality for socio-emotional learning with an adolescent sample, and even fewer that adopt a longitudinal element, those that do suggest the possibility of virtual reality being an engaging way to improve both types of empathy. This is important, because as the technology becomes cheaper, and digital technology becomes more embedded in education, empirical research to support school policy and practice is required.

The limited research in this area warrants further investigation. Firstly, the literature review has justified research in empathy as an important element worthy of investigation, especially considering its potential links to pro-social behaviour, and the

reported decline in empathy in the population (Konrath et al., 2011). Given the difficulties in measuring empathy, using a multi-modal approach may provide insight and thus a mixed methods approach will be adopted in the current research. As there is a burst of empathy development that occurs in adolescence, this seems an appropriate time to measure interventions that can potentially improve empathy. Certainly, schools promote empathy-intervention socio-emotional learning programs during this developmental period. Thus, this age group is an appropriate group with which to research empathy and is the focus of the current research.

Secondly, virtual reality is a novel approach to improving empathy in schools with promising potential. Current research on empathy and virtual reality has produced mixed results on its effects, despite being popularly touted as the ‘ultimate empathy machine’. The proposed research will investigate this claim further, adding to the body of literature in this area. Furthermore, most of the research has not been longitudinal in approach, nor has it been focussed on the developmental period of adolescence. In addition, some research lacks a control group or does not pre-test for empathy. The current research aims to improve on these limitations by investigating any long-lasting change post-intervention, including a lower-immersion control group, as well as pre-testing for empathy. Details of this design will be presented in Chapter Three.

With schools increasingly investing in digital technologies, and with the focus on socio-emotional learning in schools becoming more important, the current climate in education highlights the importance of this research project, which aims to explore the relationship between virtual reality and empathy for the purposes of improved socio-emotional learning.

Chapter 3: Rationale for Research Design and Methods

3.1 Introduction

This chapter provides a description and justification for the methodology that will be employed in this study. Section 3.2 outlines the research questions justified by past research and the direction of this research. Section 3.3 begins with an overview and rationale for the choice of a mixed methods research design based on these research questions and also justifies the use of a survey for data collection. Section 3.4 provides the details of the proposed research design and procedure. Section 3.5 provides details of ethical considerations and Section 3.6 summarises the chapter and the key points.

3.2 Research Questions and Hypotheses

The focus of this study is to investigate the role of virtual reality for socio-emotional learning for adolescents in schools. Specifically, the current research aims to investigate whether adolescent cognitive empathy and affective empathy can be affected by virtual reality and whether any effects (if any) are immediate or longer lasting. Sympathy is also investigated for reasons related to mismeasurement as discussed in the literature review (Chapter Two).

Research Question 1: Does the use of a virtual reality program affect adolescent empathy and sympathy?

This first research question aims to explore whether there is any impact of using virtual reality on both cognitive and affective empathy. It includes a measurement of sympathy, based on the recommendations of past researchers, to ensure this is not

conflated with affective empathy (Vossen & Valkenburg, 2016). As suggested by Yu and Chou (2018), there are different neural pathways involved for affective and cognitive empathy, yet each influences the other. Thus, Yu and Chou (2018) recommend that cognitive and affective empathy should both be measured at the same time in empathy research, rather than a more ‘generic empathy’. Moreover, whilst there are many theories on the components that make up empathy, theorists generally agree that there is a cognitive and affective component (Decety & Jackson, 2004; Weisz & Zaki, 2018). Thus, the use of a tool to measure these specific concepts is important.

Past research has found differing results to describe the relationship between virtual reality and empathy, with some researchers suggesting that virtual reality does improve empathy (e.g. Schutte & Silinovic, 2017) whereas others (e.g. Hasler et al., 2021) suggest that it does not. Therefore, the first aim of this research is to investigate if there is an effect of using virtual reality on the three concepts in focus: cognitive empathy; affective empathy; and sympathy for adolescents.

Research Question 2: Do adolescents receiving the same information from different mediums with different immersion levels (virtual reality vs 2D projected film) have different empathetic and sympathetic reactions?

This research question is designed to investigate possible differences between the virtual reality experiences and another, less immersive experience, in this case, the 2D format of the same film presented to a screen. Given the research that suggests that it may be immersion that leads to greater possible empathy, a comparison will be helpful in terms of finding out if immersion can impact empathy change (Brown & Cairns, 2004).

Immersion can be objectively measured on a continuum and is a useful way to design research with virtual reality. As described in the literature review, the reason for using the term ‘immersion’, rather than ‘presence’, is that immersion is more measurable; presence questionnaires tend to lack validity and can be impractical to conduct due to the subjective nature of this construct (Slater et al., 2009). Presence is also positively correlated to immersion. Therefore, varying immersion levels will be investigated in the current research.

Measuring immersion will help elucidate some of the mechanisms that may be involved in producing empathy in an intervention. The varying levels of immersion will be designed in consideration of the context, in this case, for socio-emotional learning and education. For the purposes of this research, given the context of the school environment and availability of technology, the different immersion levels will only comprise virtual reality headsets (high immersion) and 2D film (low immersion). These conditions are represented in Figure 4, with the virtual reality headset only condition representing the second highest level of immersion provided by digital devices currently used in education, whereas the 2D film condition sits at the lowest level of immersion. The virtual reality headset involves higher sensory fidelity to the digital environment of sight and sound compared to the 2D condition. It also provides more visual autonomy (that is, being able to choose where to look) compared to the 2D condition. Finally, there is slightly more interactivity in the virtual reality condition than the 2D, again due to being able to choose what to look at. Since these qualities are increased in the virtual reality condition, this leads to improved immersion compared to the 2D film condition (see Figure 3, p. 40). This type of comparison (virtual reality headset only compared to

2D film) is consistent with past research (Schutte & Stilinovic, 2017; Trudeau et al., 2023).

Research Question 3: How does the use of a virtual reality program affect adolescent empathy and sympathy?

This research question investigates the mechanism that may underlie any relationship between virtual reality and adolescent empathy and sympathy. Building on Research Question (RQ) Two, this question will guide the design and analysis of the qualitative work, with the aim of uncovering any nuances in the participant experience of virtual reality, but with a focus on empathy.

The following hypotheses have been generated to explore the quantitative research questions.

- That 13-15 year-old students who experience the documentary *Clouds over Sidra* in any condition (virtual reality or 2D) will show an increase in affective and cognitive empathy and sympathy.
- That 13-15 year-old students who experience the documentary *Clouds over Sidra* using virtual reality will experience a larger increase in both affective and cognitive empathy after viewing the documentary compared to those viewing the 2D projected format.
- That 13-15 year-old students who use virtual reality to watch the film *Clouds over Sidra* will experience a larger increase in sympathy after viewing the documentary compared to those viewing the 2D projected format.

These hypotheses were based on the research by Schutte and Stilinovic (2017), Alberghini (2020), Ingram et al., (2019), and Trudeau et al., (2023) who suggest that a

virtual reality experience of an emotion-provoking documentary will improve empathy more than a 2D condition of the same documentary. Whilst empathy is the focus of this research, sympathy is also included as it is often conflated with empathy, as described in Chapter Two. Based on the conflation in measurements of these concepts, it is predicted that sympathy will also change, as prior research that showed empathy improved using virtual reality, potentially, boosted sympathy. Moreover, some theorists suggest that virtual reality improves sympathetic responses (Ramirez et al., 2021).

3.3 Rationale for Mixed Methods

A mixed methods approach will be utilised to assess the participant experience of the intervention. This approach useful when it comes to research in social science, and there are several reasons for adopting mixed methods for the current research (Doyle et al., 2009). Firstly, a mixed methods approach is justified based on the concepts being investigated. Empathy as the core concept in this research is multi-faceted and complex. The many layers of empathy include elements of language, feelings, sense of self and the other, behaviours, facial indicators, and culture. There has been qualitative, quantitative and mixed methods research in relation to empathy in the field of education (Peck et al., 2015; Schutte & Stilianovic, 2017; Webster, 2010). Whilst most empathy research is quantitative, reasons for qualitative empathy research include that the concepts are multi-dimensional and poorly defined (Peck et al., 2015; Pederson, 2009). It is recommended that empathy research adopt more than one method and perspective in research, and that qualitative approaches not be neglected (Pederson, 2009).

In the most recent research on the relationship between virtual reality and empathy, one of the key recommendations was to conduct qualitative research (Trudeau et al., 2023). Historically, virtual reality research has tended to draw primarily on the quantitative approach, but this has been debated and many suggest the qualitative element should also be investigated, as the subjective experience of presence is important and difficult to measure objectively through quantitative measures (Slater et al., 2009). Thus, adopting a mixed methods approach is useful when researching concepts such as empathy and virtual reality.

Another benefit of mixed methods is that concurrent design of mixed methods allows for qualitative responses to explain complex or contradictory survey responses (Driscoll et al., 2007). Research investigating the relationship between virtual reality and empathy has been contradictory with some findings indicating that virtual reality does improve empathy, whereas others have found no relationship. Thus, the opportunity for qualitative research to investigate this complexity in more depth will be beneficial.

Furthermore, mixed methods design often suits intervention type research such as the proposed research, as it can provide exploratory and confirmatory questions and answers to the potential research questions (Lund, 2012). If the findings in such intervention research are divergent, there is a possibility of new theoretical insights (Lund, 2012).

3.3.1 An Overview of Mixed Methods

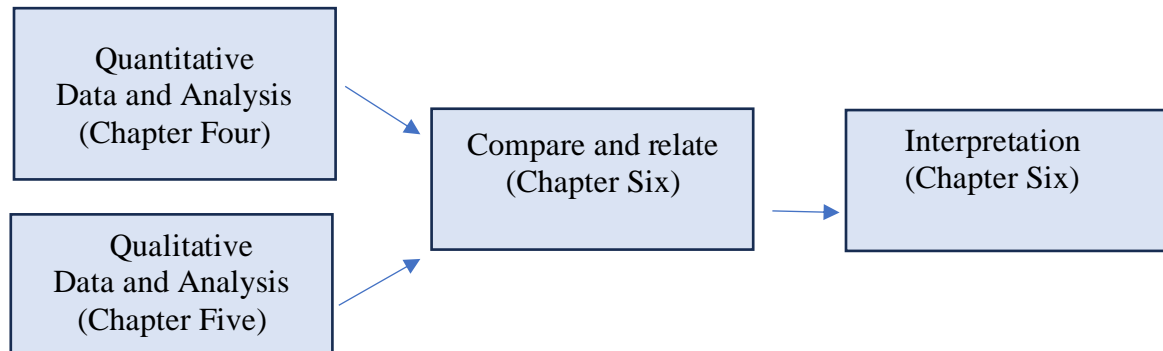
A good mixed methods approach to research has four characteristics, according to Denscombe (2008). Firstly, both qualitative and quantitative methods are used, although implementation of this may vary to suit the needs of the project (Greene, 2008;

Johnson & Onwuegbuzie, 2004; Teddlie & Yu, 2007). In this project, quantitative data collection using a Likert-type scale survey will be analysed quantitatively using SPSS to address RQs One and Two. Concurrently, qualitative data collection will be undertaken through three open-ended survey questions and investigated through thematic analysis, addressing RQ Three.

Secondly, mixed methods researchers must specify the qualitative and quantitative sequencing and priority of the analysis and collection (Denscombe, 2008). In this project, a convergent-parallel mixed methods approach will be used, as described by Creswell (2017) and shown in Figure 6. This approach analyses the qualitative and quantitative data separately, under the assumption that both the quantitative and qualitative data provide different and important types of information (Creswell, 2017). Key to this approach is that the concepts (in this research, empathy and sympathy) are investigated qualitatively and quantitatively at the same time, or in a parallel form. One difficulty with this design is in how to combine the two sources of information, and subsequently investigating if there are convergent and divergent findings. Should divergences occur, it is up to the researcher to provide steps for follow up (Creswell, 2014), which in this program of research, will be addressed in the final chapter of this thesis.

Figure 6

Convergent-Parallel Mixed Methods Approach for the Current Research (Adapted from Creswell, 2017)



The approach taken in this project can be also seen as an embedded mixed methods design that “nests both qualitative and quantitative data within a larger design” (Creswell, 2014, p. 278). In this case, the larger design is a quasi-experiment, as there are clear experimental and control groups, although participants are not randomly allocated. An embedded mixed methods approach is typical of real-world research, such as in schools where there has been an intervention or program applied (Creswell, 2014).

The third factor necessary for good mixed methods research is that the researcher needs to be explicit in the way they relate the qualitative and quantitative aspects to each other, and how the triangulation is used (Denscombe, 2008). Triangulation is referred to as the “combination of methodologies to study the same phenomenon” (Denzin, 1978, p. 291). The adoption of a survey that includes both Likert-type data and open-ended questions enables both qualitative and quantitative data to be collected at the same time and analysed separately, whilst studying the same phenomenon; that is, empathy.

Finally, some researchers suggest that pragmatism is a key philosophical guide for mixed methods research (Denscombe, 2008; Johnson & Onwuegbuzie, 2004), based on the principle that researchers should use the best philosophical and/or methodological approach best suited for the themes to be investigated (Tashakkori & Teddlie, 1998).

In summary, the main positive of using mixed methods research is that it allows for triangulation of data, facilitating a more complete understanding and possibly improved overall validity of the results (Greene et al., 1989; Sale et al., 2002; Youngs & Piggots-Irvine, 2012), thereby minimising implicit biases and improving the possibility of generalised conclusions (Denscombe, 2008).

3.3.2 A Note on Research Paradigms

Pragmatism as a theoretical underpinning of mixed methods is generally well regarded (Denscombe, 2008). The relationship can be understood in the same way that the quantitative and positivist paradigm relate to each other, and equally, to the qualitative constructivist paradigms that exist (Denscombe, 2008). As the core tenet of mixed methods research, pragmatism is an approach to knowledge that attempts to consider multiple viewpoints, perspectives and positions, including that of qualitative and quantitative research (Johnson et al., 2007). Johnson, et al. (2007) suggest that mixed methods approaches can incorporate several overlapping groups of mixed method research types. They argue that it is satisfactory for researchers to be based more in a qualitative or quantitative paradigm, and yet still be adopting a mixed methods approach. This also suggests that mixed methods researchers should embrace moving between the two approaches, as their individual research may dictate. For

example, they allow researchers to embrace mixed methods from a constructivist or post-structuralist paradigm, and this may contribute to the research being qualitative dominant, but still categorised as mixed methods. Equally, quantitative-dominant mixed methods research may approach research from a positivist paradigm, where qualitative data can supplement the research study.

In virtual reality investigations, positivist researchers tend to favour empirical research on immersion rather than presence (e.g. Olmos-Raya et al., 2016). Immersion allows for objectivity, as described in Chapter Two, whereas with presence, the empathetic platform is considered the ‘psychological and behavioural response to immersion’ (Slater & Wilbur, 1997, p. 9). In deciding whether to create a research design with changing ‘immersion’, rather than changing ‘presence’ the research is adopting a pragmatic approach. Having one group with a ‘higher immersion level’, such as virtual reality headsets, and a control group of ‘lower immersion level’, such as a 2D film, is a much more valid methodological approach. Researchers who have used presence questionnaires have found them to not be as reliable or valid as necessary, and there is no clear consensus on what presence actually is (Schuemie et al., 2001). Therefore, approaching the research from a pragmatic perspective is demonstrated by designing research based on immersion rather than presence.

In summary, there are different ways in which a researcher can approach mixed methods research, including either combining or separating research paradigms and looking at the different data sets separately. The design should be focused on the research questions being studied, rather than developing research questions focused on specific paradigms (Youngs & Piggots-Irvine, 2012). There is improved validity that comes from the use of mixed methods, but only if each method is analysed independently of the other, and later brought back together to be cross-examined during

triangulation (Morgan, 1998). Thus, based on past research and the research questions for the current research, it seems reasonable to design a mixed methods approach, adopting both qualitative and quantitative elements.

This research will adopt elements of the positivist approach, in which validity, reliability and generalisability is important (Sale et al., 2002). These concepts will be discussed later in Chapter Four which focuses on the results of the quantitative study. The qualitative research stems from interpretivism and constructivist paradigms (Altheide & Johnson, 1994), and its design and results will be discussed in Chapter Five. Finally, the research will be brought back together to be cross-examined and triangulated in Chapter Six, improving the study's overall validity (Morgan, 1998).

3.3.3 Limitations of Mixed Methods

Whilst some of the strengths of mixed methods design were discussed above (Section 3.3.1), it is appropriate to consider its possible limitations and the attempt to mitigate these where possible in this program of research. Whilst some researchers suggest that one benefit of mixed methods is that it fits within a pragmatic paradigm, others suggest that the approach combines positivistic and constructivist theory, and yet others state that it is fundamentally positivist (Giddings, 2006; Johnson & Onwuegbuzie, 2004; Leech & Onwuegbuzie 2008). Giddings (2006) warned that if researchers consider mixed methods as adding to constructivist knowledge, then researchers risked losing a rich research culture. Instead, researchers should consider mixed methods as a way of strengthening positivist paradigms. He also suggested that research in mixed methods fails to use and analyse qualitative research in the way it was intended and is only descriptive at best.

Another limitation of mixed methods research occurs through the large body of data that it yields. While this can be a positive in providing a better basis for more triangulation, it can be time-consuming and complex to conduct and analyse (Johnson & Onwuegbuzie, 2004; Youngs & Piggots-Irvine, 2012). It is recommended that a team conducts this research rather than an individual experimenter (Youngs & Piggots-Irvine, 2012), so, in the context of this thesis, such a solution will be addressed through use of a supervisory team of experts.

As a concurrent design of mixed methods is used where both qualitative and quantitative data is collected at the same time, there needs to be careful consideration of how any integration of the methods occurs. As triangulation is an important part of any mixed methods approach and needs to be carefully addressed so that the research is truly one of mixed methods, and not two separate studies (Johnson & Onwuegbuzie, 2004; Teddlie & Tashakkori, 2006). According to Teddlie and Tashakkori (2006), the design should include mixed methods in at least two of the following four stages: conceptualization (research ideas); experimental-methodological (steps in the method); experimental-analytical (data generation and collection) and/or inferential (generalisations and finding meanings). This thesis involves the use of mixed methods at the conceptualization, experimental-analytical and inferential stages.

In summary, the current research program adopts a multi-paradigmatic stance to design and analysis, which is pragmatic overall in approach. This multi-paradigmatic approach has been used in empathy research before (Brown et al., 2022). Essentially, it involves adopting a positivist approach when designing and analysing the quantitative research and a constructivist approach for the qualitative research, which is considered a complementary strengths approach (Tashakkori & Teddlie, 2003).

3.3.4 Use of Survey for Mixed Methods Data Collection

Questionnaires can be an integral part of the mixed method data collection as they can allow for intra-method mixing. Intra-method mixing refers to the integration of qualitative and quantitative elements within the questionnaire, such as providing both open and closed questions/answers. This can happen at a single data collection time point. Given the design of this research is concurrent mixed methods, intra-method mixing will be adopted for data collection due to time and opportunity of access constraints. This rationale is underpinned by the pragmatic approach the research follows.

In empathy research, surveys are a common form of data collection. Leiberg and Anders (2006) found that most empathy surveys examine both affective and cognitive empathy through rating scales, demonstrated by one of the first measurements of empathy by Truax (1961). Early research in empathy also included physiological measurement and qualitative responses to pictures (Vanderpool & Barratt, 1970; Iannotti, 1975). In modern research, most measures of empathy involve self-report surveys, and few measure empathy in a different way (Ilgunaite et al., 2017). Of these self-reports, most involve a rating or Likert-type scale for measurement, although some self-reports involve qualitative techniques such as completing a story, which is referred to as a method of empathy-based stories (MES) (Eskola, 1998).

Other measures used to assess empathy include fMRI and medical measurements; however, these have been criticized as not actually being a measurement tool for empathy, as well as having issues related to difficulty of access to data (Ilgunaite et al., 2017). The reason for the popularity of self-report surveys in empathy research is that they tend to be cost effective, easy and fast to use, and are generally

reliable and valid (Ilgunaitė et al., 2017). Another reason that this approach is usually adopted is because questionnaires and surveys have a range of strengths, such as efficiency in measuring attitudes, and the ability to be easily administered to large samples (Johnson & Turner, 2003). Surveys also allow collection of both qualitative and quantitative data. Hence, this research will also adopt a self-report survey for data collection.

It is important to note that surveys can have weaknesses in validity, with missing data and open-ended questions increasing the degree of vague conclusions (Johnson & Turner, 2003). They are also subject to social desirability bias. Thus, care will be taken to ensure the surveys selected for the data collection have good reliability and validity and are administered in a way to reduce social bias.

3.4 Proposed Research Design and Procedure

Australian school students in Year 8 (aged 13-15 years) at an independent school will be shown an emotive documentary (*Clouds over Sidra*), which was designed by the United Nations to invoke an empathetic response and increased understanding of the Syrian Refugee Crisis. *Clouds over Sidra* (<https://www.with.in/watch/clouds-over-sidra/>) is an 8-minute film where the viewer experiences a Syrian Refugee Camp whilst a story about the experience is being narrated by 12-year-old Sidra. During the story, the viewer can see Sidra and a range of her encounters with her family, school and friends. Sidra occasionally talks into the camera, as though talking to the viewer. In the film Sidra expresses a range of emotions such as sadness and hope. Some reported emotions by viewers from previous studies include sadness, surprise, and hope (Durnell, 2018).

There are a number of reasons to choose this particular experience. Firstly, the age group of participants and Sidra is similar, which could improve possible empathetic

responses; secondly, it was designed to invoke an empathetic response; thirdly, it has been used in past research with similar aims (Trudeau et al., 2023); and fourthly, it offers the perspective of being in a refugee camp, thereby providing perspective-taking opportunities (albeit without as much interactivity or full embodiment as modern-day experiences). Thus, it is an appropriate choice as a virtual reality program for the context.

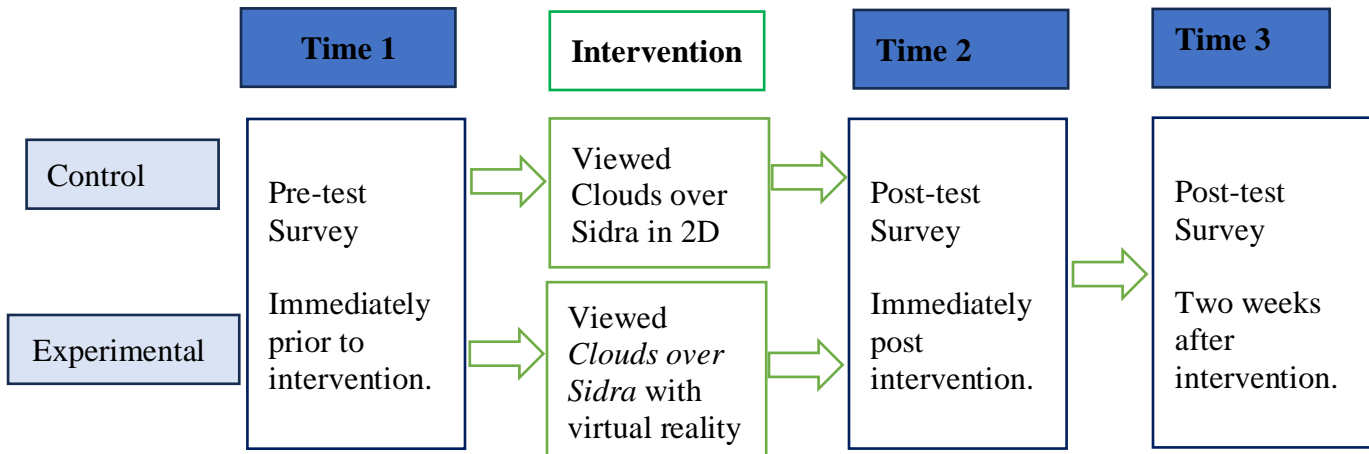
The study will set up one group of participants to view the *Clouds over Sidra* in 2D as a normal movie, the form that they would traditionally watch in class. This involves the documentary being projected to a bigger screen, with sound coming through the screen. The documentary will be viewed as a group and controlled by the researcher and teacher.

The second group will view the same documentary through virtual reality headsets, which includes audio headphones, to increase sensory fidelity. These participants will be able to choose where to look around the documentary in a 360-degree view. Presence in virtual reality is said to be increased with emotional arousal (Riches et al., 2019). Thus, by using an emotion-provoking documentary like *Clouds over Sidra* in both conditions, there will be greater similarity in the basic parameters between the two conditions, minimizing the effect of differences in differing emotions produced by the film itself, between groups. Equally, both groups will be offered a perspective-taking opportunity, by viewing the same film.

Both groups will complete an adolescent empathy survey, described in further detail in Chapters Four and Five, before viewing the documentary (time 1), immediately after viewing (time 2) and two weeks later (time 3). Figure 7 provides an overview of how the research will be conducted.

Figure 7

A Diagram Showing the Proposed Research Design



3.5 Ethics Statement

In March 2018, ethics approval was obtained from the University of Melbourne Human Research and Ethics Committee (Ethics ID: 1749956), with further approval being obtained from the principal of the school with the source of participants. Participant involvement in the study was voluntary and students could choose not to participate without any ramifications.

The principal, participants and their parents/carers were provided with detailed information as to what was expected of them during the study through curated plain language statements. For the principal, this involved an outline of the broad aims of the study, participant data security and confidentiality, and contact points. For participants and their parents/carers, this document clearly explained aims, broad procedures, contact points and ethical provisions, such as withdrawal rights and voluntary participation. Signed consent was obtained from both the participants and the

parents/carers of the participants prior to the research being conducted. A sample of the informed consent form can be found in Appendix B.

This consent obtained online through the school's parent permission form system (CareMonkey.) Each time they were involved in the research, participants were reminded that they were free to withdraw from the study at any time with no consequences. Those not participating were involved in an alternate activity with similar content. All students had the opportunity to use the virtual reality headsets after the research was completed. After the end of the research, participants were given a debriefing statement that reiterated the project aims and reminded participants of its data storage and ethical guidelines, including a reassurance that their responses were not identifiable. It also included contact points for the participants and their carers if they had further questions regarding the study.

3.6 Summary of Chapter

This chapter outlined the reasons for choosing mixed methods as a methodology and viewing the research through the lens of a pragmatic paradigm. Section 3.2 described the research questions and hypotheses, including the justification of these. Section 3.3 described how the mixed methods approach will be used throughout the research, and the literature that supports such a design. Section 3.4 gave a basic overview of the procedure, whilst Section 3.5 described the approved ethics considerations relevant for the study.

The next chapter, Chapter Four, will describe the design, implementation, collection and analysis of the quantitative aspects of the research. Chapter Four has been accepted for publication as a journal article (noted in this thesis's preface, section I).

This chapter is identical to the journal article. Extra information that was not able to be included in the submitted article due to word restrictions can be found in Appendix A.

The set of qualitative data will be then examined and discussed in Chapter Five, using a constructivist lens. Finally, Chapter Six will consider both the qualitative and quantitative data together through triangulation, before summarising the project findings and synthesising the results in line with the research questions and literature, as well as making recommendations for future research.

Chapter 4: Publication of the Quantitative Research

Article Title: A study of Virtual Reality and the Empathetic Experience in Australian Secondary Students

Abstract

Empathy is a key contributor to moral, pro-social behaviour and an important element of socio-emotional learning (SEL). Schools deliver SEL programs during adolescence to develop a range of skills including empathy. As education becomes increasingly digital, more research is needed to understand the role digital technologies may play in students' empathy development. Virtual reality (VR) has been touted as a possible way to provide more realistic experiences to enhance empathy. To investigate this, an intervention of an empathy-provoking documentary (*Clouds over Sidra*) was shown to adolescents aged 13 to 15 years using either virtual reality ($n = 63$) or 2D projection ($n = 53$). Participants completed the Adolescent Measure of Empathy and Sympathy (AMES survey) before (time 1), immediately (time 2), and two weeks (time 3) after viewing the documentary. There was no difference in empathy between the 2D and VR conditions. However, for both conditions there was an increase in empathy immediately after viewing the documentary but not at the two week follow up. The results suggest that whilst empathy could temporarily increase when one is exposed to a novel emotive experience, a one-time intervention does not appear to produce a lasting change. This is an important consideration for schools in considering virtual reality technology for use in SEL.

Keywords: affective empathy, cognitive empathy, empathy, digital technology, socio-emotional learning, virtual reality.

4.1 Introduction

Empathy is widely considered to be an important element in pro-social, moral, altruistic behaviour (Barbot & Kaufman, 2020; Eisenberg, 2003). Empathy has long been considered a multidimensional capacity, ability or skill. Empathy enables people to perceive the emotions of others, resonate with others emotionally and cognitively, and to take the perspective of others (Davis, 1980; Eisenberg et al., 1997; Reiss, 2017). More recently, the multi-dimensional elements of empathy have been supported by studies in neuroscience highlighting key differences between the pathways in the brain for different empathetic reactions (e.g., Decety & Jackson, 2006). Although there is dispute in the literature about the composing facets of empathy, there is an agreement that there are both cognitive and affective elements (Decety & Jackson, 2006; Eisenberg, 2000). Broadly, cognitive empathy is considered the ability to understand and recognise the way another feels (Preston & Hofelich, 2012). Affective empathy is considered the capacity to experience (or share in) the emotions of another (Jolliffe & Farrington, 2004). These two concepts are often linked with sympathy, which is a related but different construct, referring to feelings of sorrow and concern for another's misfortune (Vossen et al., 2015).

The three constructs vary in their definition despite being related and sometimes used interchangeably. As mentioned above, cognitive empathy is the capability to *understand* another's feelings, whereas affective empathy is focused on the *experience* of another's feelings. Sympathy, or concern for another's misfortune, is often confused with affective empathy, particularly as both experience feelings of sorrow, and there is subsequent pro-social behaviour (Vossen et al., 2015). Consequently, research on empathy has been occasionally problematic, as measurement of affective empathy can overlap with various features of sympathy (Vossen et al., 2015).

Experiencing sympathy does not rely on a ‘sameness’ between self and other in the way experiencing affective empathy does. Affective empathy can be described as an ‘emotional resonance’ between the self and other that is not necessary for sympathy (Keum & Shin, 2016). That is, to feel sympathy, you do not need to experience the same emotion as the other elicits (e.g. one feels sorry, the other feels anger). Some empathy theorists clarify the differentiation in terms of the behaviours they elicit: Chismar (1988) suggests sympathy involves an egotistic motivation to help (conscious) and thus cannot lead to true altruism (unconscious) like empathy can.

Empathy and sympathy are separate, but related, constructs (Decety & Michalska, 2010). Reiss (2017) explains the distinction through this example:

You look out your office window and see a man in the cold rain, shivering, no raincoat. You feel sorrow for this person. This is sympathy. Empathy is the capability to imagine as if oneself is next to the man, out there in the rain. It’s the capability to experience their specific discomfort as if it was all your own; without losing the sense of the ‘as if’. If we lose the ‘as if’ we are unable to move beyond our own self-interests; and it is with the ‘as if’ that motivates a caring empathetic response (e.g. taking down an umbrella). (p. 13)

Table 1 below highlights some of the key demarcations between these three concepts.

Table 1

Key Points of Demarcation Between Cognitive Empathy, Affective Empathy and Sympathy

Cognitive Empathy	Affective Empathy	Sympathy
Self and other are related	Self and other are related	Self and other are distinct; self is possibly considered to have advantages to other
Capacity to understand and recognise feeling <i>of</i> and <i>with</i> the other	Capacity to experience feeling <i>with</i> the other	Capacity to experience sorrow <i>for</i> the other
Range of emotions for and with other	Range of emotions with other	Sorrow as key emotion for other
Associated with pro-social behaviour, possibly <i>unconscious</i> (e.g. Lockwood, 2014)	Associated with pro-social behaviour, possibly <i>unconscious</i> (Lockwood, 2014)	Associated with pro-social behaviour, likely <i>conscious</i> (e.g. Trommsdorff, Friedlmeier and Mayer, 2007)

With these concepts now clearly demarcated, we now turn our attention to how they play out in the school environment.

4.1.1 The Development of Empathy and the Role of Schools

Empathy can be considered a developmental, malleable skill (Ratka, 2018). Preschool children begin to show capability to take another person's perspective which leads to a development in cognitive empathy (Bensalah et al., 2016). Throughout childhood and adolescence, cognitive and emotional empathy increase through a combination of biological and environmental influences (Allemand et al., 2015; Heyes, 2018). The range of environmental influences that can influence empathy include

parenting styles and relationships (Feldman, 2007; McDonald & Messinger, 2011) and social media (Vossen & Valkenburg, 2016).

Whilst affective empathy is sometimes considered less influenced by the environment and a more stable and inherited type of empathy (i.e., trait, dispositional empathy) there is current evidence that both affective and cognitive empathy undergo a period of growth in adolescence that can be stimulated (Bunge et al., 2002; Decety, 2020; Decety & Jackson, 2004; Frith & Frith, 2003; Johnson, 2012; Schwenck et al., 2014). Furthermore, adolescence tends to be considered a time where any developmental changes have a long-term consequence; there is a predictive element between empathy development during adolescence and social outcome variables (such as perceived social integration and relationship satisfaction) in adulthood (Allemand et al., 2015).

The ability to ‘feel and show empathy’ is one of the key characteristics of the ‘social awareness’ skill and can be explicitly taught in schools (CASEL, 2019). There is evidence that both cognitive and affective empathy can be improved in this age group with programs that can be delivered in an educational environment (e.g. Castillo et al., 2013). Some research suggests that these programs can improve empathy for short periods of time, and although it may then decline, there tends to be a lasting awareness of others, or an overall improvement in a related ‘empathetic response’ (Herrera et al., 2018). Other research (Doreille et al., 2021) has found empathy training programs show a sustained improvement in empathy that are retained months later.

Whilst in Australia there are a range of programs and resources for socio-emotional learning (SEL), and direction from the Australian curriculum to implement such programs, it is largely the school's responsibility to define where SEL fits into their

curriculum (Bowles et al., 2017). The investment in these programs can be significant for schools and deciding how to implement such programs requires careful thought. However, the research base does not focus on the adolescent period where empathy developmentally increases, with only 13% of studies being on high school students (Years 9-12), and 31% on middle school (Years 6-8). Additionally, most studies were completed in the United States (Durlak et al., 2011).

Given schools use SEL programs to develop empathy during the adolescence developmental period, we now turn to the role digital technologies might offer given their increasing use in the education system.

4.1.2 The Role of Virtual Reality as the ‘Ultimate Empathy Machine’

Social emotional learning programs in schools over the last decade have embraced the use of digital technology. Theorists have suggested that to experience empathy we need to see and gain empathetic cues (such as facial expressions, body language, tone of voice) from the other, and that only a truly interactive experience can promote empathy (Hassan, 2020; Reiss, 2017). As digital technologies improve, they have the potential to provide these cues more authentically.

The idea of psycho-social skill development using technology is closely linked to the technology’s ability to change an individual’s presence. Two key terms are important here. Firstly, *immersion* which refers to the extent that an individual physically experiences the virtual world (Slater, 2003). For example, if sounds and sight are limited to the virtual world and effectively block out the real world (referred to as sensory fidelity), then this would be a greater immersion than an experience that does not. Secondly, *presence* refers to the extent to which one is involved in human experience. Improving immersion levels (with increased attention to sensory modalities)

may increase presence (Baños et al., 2004). There is also a connection between empathy and presence. Nicovich et al. (2005) suggested that empathy refers to the individual connecting to another person whereas presence is the individual connecting to another environment. Experiencing empathy uses similar perceptual tools to experiencing presence. However, this research posits the relationship such that without presence you cannot have empathy; that is, if you do not see someone shivering in the rain, you cannot empathise. As Brinck (2018) suggests, it is this presence that provides a platform for the experience of empathy.

Virtual reality offers a higher level of immersion (and presence) than traditional methods of viewing media content such as 2D-projected films (watching on a screen) (Makransky et al., 2019; Sanchez-Vives & Slater, 2005; Vesisenaho et al., 2019). Someone using virtual reality can see a full 360-degree environment, choose where they look, and completely block all sounds from the external world. It follows that if virtual reality increases immersion and presence, there is a possibility it may also increase empathy compared to 2D media forms, and this has been supported by research (Alberghini, 2020; Barbot & Kaufman, 2020; van Loon et al., 2018). However, there is also research to suggest virtual reality does not improve empathy, but possibly can improve related constructs such as pro-social behaviour (e.g. signing petitions) and attitude change (Hargrove et al., 2020; Herrera et al., 2018; Ventura et al., 2020). Others have found no significant difference between 2D-projected film and virtual reality (Bang & Yildirim, 2018). The perspective-taking element to (cognitive) empathy appears key in research involving virtual reality and subsequent improved empathetic responses or behaviours associated with empathy (Barbot & Kaufman, 2020; Herrera et al., 2018).

More recently, research has shown using virtual reality can increase both types of empathy. Schutte and Stilinović (2017) found that virtual reality headsets can increase engagement compared to 2D projected films, which was associated with a greater overall experience for both affective and cognitive empathy. Similarly, Alberghini (2020) found improvements in empathy when comparing the virtual reality and 2D experience with adolescents. Martingano et al. (2021) found that empathy can be improved using virtual reality, although there were no differences in charitable donations to a relative charity compared to their control conditions. The films used in these studies included *Clouds over Sidra* and *Step into a Refugee Camp* and were designed to promote empathetic responses.

Therefore, empathy can elicit pro-social behaviour and may be influenced by external factors and programs. Given the sensitivity of adolescence as a time of important development of empathy, and the past confusion of measurement and definitional clarification in types of empathy and sympathy, it is appropriate that research is conducted with this adolescent age group that investigates both forms of empathy and sympathy as a comparison. This research aims to add to the body of literature in understanding the role virtual reality plays in improving empathy in adolescence.

In summary, there are critical periods of empathy development in adolescence that are associated with positive social outcomes. There is also a possibility that virtual reality can improve empathy, and a potential to use this technology, during this period for SEL, when face-to-face learning is not always feasible. The next section considers the research questions posed for this research.

4.1.3 Research Questions and Hypotheses

The following research questions were investigated in this study:

- 1) Do adolescents receiving the same information from different mediums with different immersion levels (virtual reality vs 2D projected film) have different empathetic and sympathetic reactions?
- 2) Does the use of a virtual reality medium affect adolescent empathy and sympathy?

In the current study the following hypotheses were examined:

- 1) That 13-15 year-old students who experience the documentary *Clouds over Sidra* in any condition (VR or 2D) will show an increase in affective and cognitive empathy and sympathy.
- 2) That 13-15 year-old students who experience the documentary *Clouds over Sidra* using virtual reality (VR) will experience a larger increase in empathy after viewing the documentary compared to those viewing the 2D projected format.
- 3) 13-15 year-old students who use virtual reality (VR) to watch the film *Clouds over Sidra* will experience a larger increase in sympathy after viewing the documentary compared to those viewing the 2D projected format.

4.2 Method

4.2.1 Participants

Research took place at an Australian independent, co-educational school in Melbourne's south-eastern suburbs. Year 8 (aged 13-15 years) was the chosen population for the following reasons. Firstly, school administrators felt this year group would benefit from the curriculum link of the film used and their regular classwork as they covered the topic throughout their regular coursework. Secondly, the virtual reality headsets manufacturer recommended they not be used with children under 12 years old. Thirdly, the period of adolescence shows a tremendous growth in empathy. Finally, the documentary used (*Clouds over Sidra*) is about a 12-year-old. Therefore, participants are of a similar age, which potentially enables a more authentic empathetic reaction.

A total of 116 participants enrolled in the study and were involved in the experiment at time 1. There were two individuals who dropped out, meaning there were 114 participants left at time 2, which was approximately 8-10 minutes after viewing the film. After further dropouts and absences, there were 77 participants who completed the research two weeks later at time 3 resulting in an attrition rate of close to 30%.

Adolescents surveyed near the end of middle school or secondary school are especially prone to attrition (Murray & Xie, 2024). Thus, steps to minimise attrition for this age group were taken, including using digital tools (online survey), using existing relationships with teaching staff as rapport, and reducing barriers such as time to do the task (Murray & Xie, 2024). This rate is somewhat expected and consistent with psychological research involving adolescents over a time period of two weeks (Graham, 2009; Chin et al., 2021; Farris et al., 2020). The reasons for this rate of attrition include possible absences from class and the lack of presence of the researcher during the survey at time 3. Higher attrition rates affect the power of tests and generalisability.

From the initial 116 participants, the experimental group (time 1, $n = 63$) consisted of single-sex girls and boys classes (males = 35, females = 28). The control group (time 1, $n = 53$) also consisted of both girls and boys classes (males = 29, females = 24). In total, students from nine classes in the school participated in the research; all participants were aged between 13-15 years.

4.2.2 Procedure

The regular classroom teacher invited students to take part in the research during their regular humanities class by handing them the plain language statement. As participants were under 18, caregivers were emailed via the school's administration software regarding their involvement including the plain language statement, withdrawal rights and consent form (for students and parents). If students did not want to participate, they were informed that it would have no effect on grades or reports, and a similar alternative activity was offered. No participant incentives were offered. Students who did not consent to being part of the research were invited via email to have a turn using headsets later, as were participants in the 2D condition. The research was approved by the University of Melbourne ethics committee in March 2018.

To protect privacy and minimise any experimenter effect, a third-party generated code was used to match participant responses over time. These codes were emailed to participants by the third party. The code consisted of a letter (indicating condition) and three numbers (indicating the individual). Those coded with A### were in the virtual reality condition, and those coded with B### were in the 2D film condition. At each time, participants were asked to enter the code to match their responses over time.

At the chosen school, Year 8 classes were stratified by gender: four girls' classes and five boys' classes. The participants completed the tasks in their usual class time and were allocated to the experimental (VR) or control (2D) condition depending on the constraints of the school timetable and resources. For example, the virtual reality headsets had to be charged after each use, so classes were allocated based on whether the previous class had used them or not. This meant that the allocation to the control/experimental groups was not truly random (thus classified as quasi-experimental).

4.2.2.1 Experimental condition.

In the experimental (VR) condition, the researcher (with support of the classroom teacher) asked the participants to complete the survey below online, prior to any experience which was recorded as time 1. The participants then watched the documentary *Clouds over Sidra* using the VR headset and headphones. Immediately after viewing, they completed the survey for a second time (time 2). The time between time 1 to time 2 was approximately 10 minutes; they completed the survey immediately before and after watching the documentary. Approximately two weeks later, participants were asked to complete the survey a third time (time 3) in the same class, with the same classroom teacher. At all times participants were reminded they could leave the research at any time.

4.2.2.2 Control condition.

Participants in the control condition were surveyed the same three times as the experimental group participants. The only difference was that in the control condition participants watched a 2-dimensional (2D) viewing of the documentary *Clouds over Sidra* projected onto a whiteboard, instead of via a virtual reality headset.

The participants completed the research over a period of three weeks. This allowed measuring change in empathy and sympathy across time; and to measure changes in empathy between conditions (VR or 2D). Therefore, the design of the research was ‘within-between’.

4.2.3 Materials

4.2.3.1 The film.

Developed in 2015 by the United Nations, *Clouds Over Sidra* (<https://www.with.in/watch/clouds-over-sidra/>) is an eight-minute documentary developed to raise awareness of the Syrian Refugee Crisis. It follows a ‘day in the life’ of Sidra, who is a female 12-year-old refugee who narrates the program. It was filmed using a 360-degree camera for use in virtual reality and is available in 2D form. This film was shown due to its specific development by the United Nations to improve empathy and understanding by gaining the perspective of an adolescent refugee in the Syrian Refugee crisis. This film has also been used in previous research studies on changes to empathy using virtual reality (Alberghini, 2020; Martingano et al., 2021; Schutte & Stilinović, 2017). Some of these changes to empathy include improved empathetic reactions when watching the film in virtual reality compared to other 2D films; including short-term improvements in altruistic behaviour (Alberghini, 2020); improvements in empathy (using the Davis empathetic scale; 1983) and improvements in engagement in the VR condition compared to 2D version of the same film.

4.2.3.2 The virtual reality headset.

In the experimental condition, participants used virtual reality headsets. The headsets are fully adjustable for individuals, with focus dials for each eye and an overall ‘depth’ focus dial. Headphones were used to provide auditory immersion. In the alternative condition, the 2D version of the film was projected onto a whiteboard to form a large screen; typical to how they watch classroom films. The room and seating were the same for both conditions.

4.2.3.3 The survey measurement.

Empirical research and measurement in this area offers varying definitions of various subsets of empathy and sympathy (Jolliffe & Farrington, 2006; Reniers et al., 2011; Vossen et al., 2015; Vossen & Valkenburg; 2016). One of the most popular tools used to measure empathy is the *Interpersonal Reactivity Index* generated by Davis in the 1980’s (Melchers et al., 2016). This Index measures empathy over four subscales: perspective-taking, fantasy, empathetic concern, and personal distress. Whilst widely used, this tool has been criticised for not making a clear distinction between empathy and sympathy or accurately measuring both types of empathy (Chrysikou & Thompson, 2016; Vossen & Valkenburg, 2016). Specifically, the empathetic concern (EC) subscale (commonly associated with affective empathy) has been criticised as not differentiating between sympathy and empathy (Jolliffe & Farrington, 2006; Vossen & Valkenburg, 2016). The EC subscale aims to measure ‘the tendency of the respondent to experience feelings of warmth, compassion, and concern for others undergoing negative experiences’, which refers more closely to the definition of sympathy than empathy (Davis, 1980, in Vossen & Valkenburg, 2016, p. 120). In close analysis of the subscale, the items tend to be more associated with feelings of sympathy too, for example: ‘sometimes I don’t feel very sorry for people when they are having problems’ (Davis,

1980, p. 2). Davis (1983) later acknowledged that the EC scale assesses other-oriented feelings of sympathy which further supports Vossen and Valkenburg's (2016) analysis. However, there is still disagreement in these definitions as some modern empathy research suggests that the empathetic concern scale is perhaps more a 'motivating' call to action for pro-social behaviour; otherwise called 'motivational empathy'.

Along with demographic and coding questions, this research used the Adolescent Measure of Empathy and Sympathy (AMES) Survey (Vossen et al., 2015) at each time point to measure empathy and sympathy. The AMES survey was developed by Vossen et al. (2015) after analysing key issues in the measurement of cognitive empathy, affective empathy, and sympathy (as described above). Vossen et al. (2015) developed and validated the AMES survey as a measure to 'differentiate between empathy and sympathy and to balance emphasis of cognitive empathy and affective empathy' (Vossen et al., 2015, p. 2.). According to Sesso et al. (2021) the AMES survey is one of few empathy measures that has assessed test-retest reliability. The scores for test-retest reliability were satisfactory according to the authors with $r = .56$ for affective empathy, $r = .66$ for cognitive empathy and $r = .69$ for sympathy (Vossen et al., 2015). The AMES survey has internal consistency ($\alpha = 0.75$ to 0.86) (Sesso et al., 2021). The AMES survey is appropriate for adolescents and its language is simplified from adult surveys. Vossen et al. (2015) suggest the validation and reliability confirmation indicates the survey is appropriate for those aged 10-15 years.

The AMES survey offers four statements each on cognitive empathy, affective empathy, and sympathy. The measure uses a Likert-type scale with the options of (1) never, (2) almost never, (3) sometimes, (4) often and (5) always. An example of a cognitive empathy statement is 'I can easily tell how others are feeling' and an affective

empathy statement example is ‘When people around me are nervous, I am nervous too’ (Vossen et al., 2015). Sesso et al. (2021) advise the context and setting is the most important element in choosing the right survey for empathy and sympathy, proposing for example that the Interpersonal Reactivity Index is perhaps more suited to clinical conditions. Given the current research was conducted on 13–15-year-olds with the clear purpose to differentiate sympathy from empathy, the AMES survey was the most suitable choice for our study.

4.2.4 Data Analysis Procedure

The data was analysed in SPSS. To compare the difference in cognitive empathy, affective empathy and sympathy between the three time points a repeated measures MANOVA was used as it measures between and within subject effects. Between subject effects involve measuring differences between the control (2D) and experimental (VR) condition. The between-subject effects analysis assists in answering Research Question 1: Do adolescents receiving the same information from different mediums (virtual reality vs 2D projected film) that have different immersion levels have different empathetic and sympathetic reactions? That is, is there a difference between the control group (2D) and the experimental group (VR)?

Investigating within-subjects effects directly addresses Research Question 2: Does the use of a virtual reality program affect adolescent empathy and sympathy? This is because a within-subjects design investigates changes before and after an experience (such as watching a film using virtual reality headsets). The design is repeated measures as the participants were asked to complete the survey at three different time points. The three dependent variables measured are cognitive empathy, affective empathy and sympathy.

4.3 Results

4.3.1 Descriptive Statistics and Reliability

Table 2 shows the descriptive statistics of cognitive empathy, affective empathy, and sympathy at each time it was measured (time 1, time 2 and time 3). The first correlations are between cognitive empathy, affective empathy and sympathy at time 1. This is followed by correlations between cognitive empathy at time 1 and 2, affective empathy at times 1 and 2 and sympathy at times 1 and 2 which are presented, as well as correlations between each concept (cognitive empathy and affective empathy). Finally, correlations of cognitive empathy, affective empathy, and sympathy; between themselves and each other at times 1, 2 and 3 are presented.

Table 2*Descriptive Statistics and Cronbach's Reliability Co-efficient*

	1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2	3.3
Mean	3.82	3.06	4.29	3.91	3.21	4.35	3.76	3.02	4.16
Standard Deviation	.56	.70	.55	.62	.84	.59	.66	.82	.63
Cronbach's Alpha	.72	.73	.62	.84	.87	.74	.83	.84	.74
1.1 Time 1 Cognitive Empathy (.1)									
1.2 Time 1 Affective Empathy (.2)	.39**								
1.3 Time 1 Sympathy (.3)	.35**	.45**							
2.1 Time 2 Cognitive Empathy (.1)	.81**	.36**	.31**						
2.2 Time 2 Affective Empathy (.2)	.39**	.82**	.46**	.47**					
2.3 Time 2 Sympathy (.3)	.37**	.54**	.84**	.40**	.65*				
3.1 Time 3 Cognitive Empathy (.1)	.78**	.47**	.44**	.75**	.41**	.42**			
3.2 Time 3 Affective Empathy (.2)	.34**	.76**	.48**	.37**	.73**	.50**	.46**		
3.3 Time 3 Sympathy (.3)	.38**	.51**	.87**	.31**	.51**	.83**	.48**	.55**	

Note: **. Correlation is significant at the 0.01 level (2-tailed); *. Correlation is significant at the 0.05 level (2-tailed); n at $t_1 = 116$; n at $t_2 = 114$; n at $t_3 = 77$. Bold indicates high positive correlation. Dark shaded represents high correlation (which is between .7 and .9), medium grey shaded represent moderate correlation (between .5 and .7), and light grey shaded represents low correlation (between .3 and .5) according to Mukkaka (2012).

4.3.1.1 Correlation and Means

The following descriptions of each correlation interpretation come from Mukaka (2012). Each factor had a strong positive correlation with itself at each of the time points.

Cognitive empathy. There was a high positive correlation between time 1 and time 2 cognitive empathy ($r = .81, p < 0.01$); time 1 and time 3 ($r = .78, p < 0.01$); time 2 and time 3 ($r = .75, p < 0.01$).

Affective empathy. There was a high positive correlation between time 1 and time 2 affective empathy ($r = .82, p < 0.01$); time 1 and time 3 ($r = .76, p < 0.01$); time 2 and time 3 ($r = .73, p < 0.01$). Affective empathy at time 1 had a moderate positive correlation with sympathy at time 2 ($r = .54, p < 0.01$) and time 3 ($r = .51, p < 0.01$). Affective empathy at time 2 had a moderate positive correlation with sympathy at time 2 ($r = .65, p < 0.01$) and time 3 ($r = .51, p < 0.01$). Affective empathy at time 3 had a moderate positive correlation with sympathy at time 3 ($r = .55, p < 0.01$).

Sympathy. There was a high positive correlation between time 1 and time 2 ($r = .84, p < 0.01$); time 1 and time 3 ($r = .87, p < 0.01$); and time 2 with time 3 ($r = .83, p < 0.01$). Sympathy at time 3 had a moderate positive correlation with affective empathy at time 3 ($r = .50, p < 0.01$).

All other relationships had a low positive correlation.

Means. The mean scores of sympathy (time 1 $M = 4.29$, time 2 $M = 4.35$, time 3 $M = 4.16$) were higher than both of the empathy scores at each time. For all factors the mean scores increase between time 1 and 2, and subsequently decreased between time 2 and 3. Average scores for each factor at times 3 were the lowest recorded for each factor.

4.3.1.2 Reliability

Cronbach's Alpha found good internal consistency in most of the items at each time for each factor, except for time 1 sympathy items ($\alpha = .62$). This is considered a questionable score according to George and Mallery (2003). According to George and Mallery (2003) the items used in the study had good reliability over time for cognitive empathy ($\alpha = .80$) and affective empathy ($\alpha = .81$). The items to investigate sympathy had acceptable reliability over time ($\alpha = .70$). Overall, the average of all items over time had acceptable reliability ($\alpha = .77$).

4.3.2 Between and Within-subjects analyses

An *a priori* power analysis was conducted using G*Power (Faul et al., 2007). Results indicated the required sample size to achieve 80% power for detecting a medium effect, with a significance criterion of $\alpha = .05$, was $N = 78$ for the MANOVA. The obtained sample size at time 1 of $N = 116$ met this criterion.

All assumptions were accounted for except for normality of data. The Shapiro-Wilks test of normality was used as this is the recommended test in terms of power and can be used in up to 2000 cases (Hernandez, 2021). In all cases the data appeared not to be normally distributed. We additionally ran a Kolmogorov-Smirnov test to check for normality, which demonstrated a non-normal distribution for all except five of the 18 cases. However, some researchers suggest that, assuming a large enough sample size (>30 in each condition); if skewness and kurtosis is within acceptable range makes MANOVA robust to this violation (Blanca et al., 2017). Table 3 shows that skewness and kurtosis were within normal ranges (Brown, 2015).

Table 3

Skewness and Kurtosis for Cognitive Empathy, Affective Empathy and Sympathy Across Time and Condition

	Virtual Reality					
	Time 1		Time 2		Time 3	
	Skewness	Kurtosis	Skewness	Kurtosis	Skewness	Kurtosis
Cognitive Empathy	-.20	-.60	-.09	-1.08	-.12	-.61
Affective Empathy	.09	-.35	.08	-.55	-.52	1.18
Sympathy	-1.02	.94	-.95	.14	-.76	-.14
	2D format					
	Time 1		Time 2		Time 3	
	Skewness	Kurtosis	Skewness	Kurtosis	Skewness	Kurtosis
Cognitive Empathy	-.29	-.39	-.15	-.32	-1.34	1.12
Affective Empathy	.07	<.01	.21	.01	-.04	-.75
Sympathy	-.49	-.57	-.74	.13	-.38	-.79

4.3.2.1 Change in Empathy and Sympathy over Time

Table 4 shows that there is an effect of time on cognitive empathy, $F(2, 150) = 3.51, p < .05$. There was an effect of time on affective empathy $F(2, 150) = 3.41, p < .05$. There was also an effect of time on sympathy $F(2, 150) = 15.23, p < 0.001$.

Table 4

The Comparison of Means of Cognitive Empathy, Affective Empathy and Sympathy Across Time

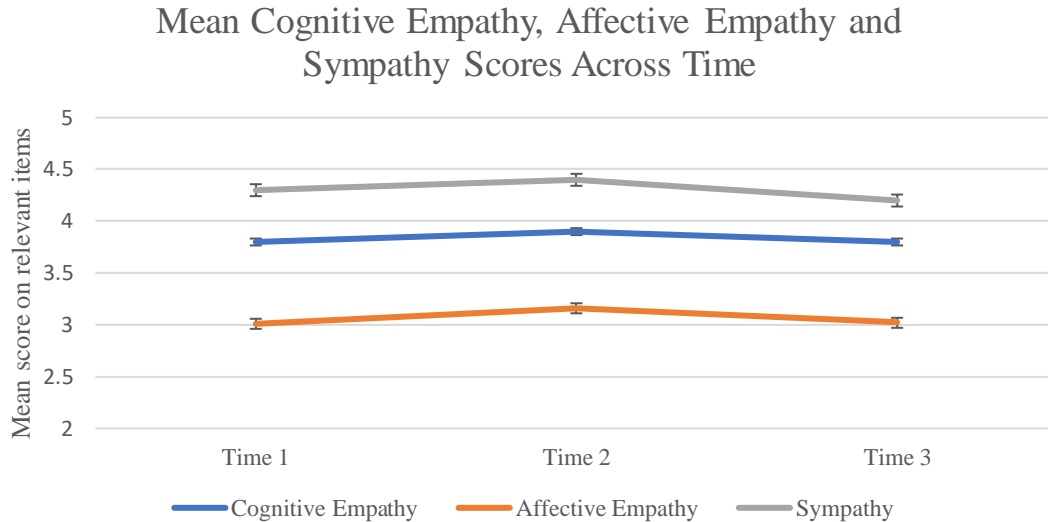
	Time 1		Time 2		Time 3		<i>F</i>	<i>p</i>	η_p^2
	Mean	<i>SD</i>	Mean	<i>SD</i>	Mean	<i>SD</i>			
Cognitive Empathy	3.80	.55	3.90	.61	3.80	.66	3.51	.03	.05
Affective Empathy	3.01	.66	3.16	.83	3.02	.82	3.41	.04	.05
Sympathy	4.30	.53	4.40	.58	4.20	.63	15.23	.01	.17

Note: Bonferroni's post hoc analysis showed that all pairwise comparisons of means were significant at least to .001; $n = 77$.

Given the main effects on time for all measures of sympathy and empathy, a closer analysis for each time and each measurement was conducted using ANOVA with a Bonferroni correction to minimise Type 1 error.

Figure 8

Mean Cognitive Empathy, Affective Empathy and Sympathy Scores Across Time



Noting the scale was 0-5, there was an increase in cognitive empathy after watching the movie by .08 ($p = .03$). Cognitive empathy also decreased by .13 after time from 2 to 3 ($p = .02$). Affective empathy increased by .15 immediately after watching the film ($p = .05$). Affective empathy also decreases after time 2 to time 3 by .13 ($p = .46$). Sympathy decreased overall between time 1 and 3 by .14 ($p = .01$) with a drop between times 2 and 3 by .21 ($p < 0.001$).

4.3.2.2 The Interaction between Condition and Time

There was no significant main effect on the interaction of the condition and time for cognitive empathy, $F(2, 150) = 1.48, p > .05$. There was no significant main effect on the interaction of the condition and time for affective empathy, $F(2, 150) = .17, p > .05$. There was no significant main effect on the interaction of the condition and time overall for sympathy, $F(2, 150) = .03, p > .05$. The analyses are shown in Table 5 below.

Table 5

Comparison of Means of Cognitive Empathy, Affective Empathy and Sympathy Across Time and Condition

	Virtual Reality (<i>n</i> =61, 43)						2D (<i>n</i> =53, 34)						<i>F</i>	<i>p</i>	η_p^2	
	Time 1		Time 2		Time 3		Time 1		Time 2		Time 3					
	Mean	<i>SD</i>	Mean	<i>SD</i>	Mean	<i>SD</i>	Mean	<i>SD</i>	Mean	<i>SD</i>	Mean	<i>SD</i>				
<i>Cognitive Empathy</i>																
	N=114	3.82	.58	3.94	.63			3.83	.55	3.87	.62			1.69	.2	.02
	N=77	3.79	.55			3.82	.66	3.81	.55			3.68	.67	2.69	.11	.03
	N=77			3.93	.6	3.82	.66			3.82	.64	3.68	.67	.08	.78	.01
Overall	N=77	3.79	.55	3.93	.6	3.82	.66	3.81	.55	3.82	.64	3.68	.67	1.48	.23	.02
<i>Affective Empathy</i>																
	N=114	3.16	.66	3.32	.83			2.97	.73	3.08	.84			.27	.61	.01
	N=77	3.18	.66			3.17	.75	2.80	.60			2.82	.87	.03	.87	.00
	N=77			3.29	.80	3.17	.75			2.99	.85	2.82	.87	.14	.71	.01
Overall	N=77	3.18	.66	3.29	.8	3.17	.75	2.8	.60	2.99	.85	2.82	.87	1.48	.23	.02
<i>Sympathy</i>																
	N=114	4.34	.54	4.41	.54			4.24	.56	4.27	.63			.35	.55	.01
	N=77	4.37	.49			4.23	.60	4.21	.57			4.07	.67	.00	.99	.00
	N=77			4.24	.53	4.23	.60			4.29	.64	4.07	.67	.04	.09	.00
Overall	N=77	4.37	.49	4.24	.53	4.23	.60	4.21	.57	4.29	.64	4.07	.67	.03	.97	.00

4.3.2.3 Gender Differences

There was a significant between-subjects effect with gender for each measure, initially in the pre-test (time 1) shown in Table 6. However a closer look at gender differences indicated that there was no significant main effect on the interaction of the condition, gender and time for cognitive empathy, $F(2, 150) = 1.33, p > .05$, affective empathy, $F(2, 150) = .18, p > .05$. or sympathy, $F(2, 150) = 1.79, p > .05$.

Table 6

Between Subject Effects for Gender

	Males		Females		<i>F</i>	<i>p</i>	η_p^2
	Mean	<i>SD</i>	Mean	<i>SD</i>			
Cognitive Empathy	3.63	.59	3.99	.44	11.41	.01	.98
Affective Empathy	2.73	.64	3.33	.53	25.91	.00	.26
Sympathy	4.12	.52	4.5	.46	14.43	.00	.16

4.4 Discussion

The discussion will first address key results relating to the hypotheses and the subsequent implications for schools and socio-emotional learning (SEL), then explore how and where the current research supports and contradicts existing research. Next, the discussion will address how the results support the conceptualisation of empathy and sympathy. Finally, future directions and limitations are addressed before the conclusion.

The first hypothesis was that 13-15-year-old students who experience the documentary *Clouds Over Sidra* (in either VR or 2D) will experience an increase affective and cognitive empathy and sympathy. Results indicated that for both conditions, there was a one-time, immediate increase in both cognitive and affective empathy after viewing although this change did not exist after two weeks. Sympathy decreased over time.

These results suggest that an empathy-provoking stimulus/film can generate a small short-term improvement in empathy. This result is consistent with limited past research suggesting that any form of (perspective-taking) intervention to promote empathy tends to have a short-term improvement in empathy before a decline, although there may be an improvement in valuing or attitudes (Herrera et al., 2018). With this result in mind, it is suggested that future empathy-invoking research is investigated over a course longer than three weeks to investigate the extent of this change with additional research questions on attitude.

As a socio-emotional teaching tool, these findings suggest that one-time emotional experiences are not likely to have a lasting effect at improving empathy for adolescents. The results support the idea that even well-implemented SEL programs have the largest positive wellbeing effects immediately after the program, and their effects fade later (Sklad et al., 2012). Further, SEL research in schools has suggested that without combining a range of socio-emotional competencies there may be lack of long-term change (Durlak et al., 2011). Thus, the drop in empathy between times 2 and 3 may be explained by the lack of focus on empathy and related constructs within these times. This suggests socio-emotional learning in empathy is more likely to be successful within an embedded whole-school program that is maintained, rather than one-time experiences focusing on a single

skill or an externally provided program. As such, schools could use these programs and interventions as a platform for further discussion or engagement within a comprehensive program.

Results also indicated that exposure to the documentary through the different mediums (VR and projected 2D) generated no difference in producing empathetic and sympathetic reactions. This means that using virtual reality did not improve empathy any more than watching a documentary in 2D format. Therefore, hypotheses Two and Three are rejected and the null hypothesis is accepted. That is, there was no difference in empathy or sympathy between 13-15-year-olds who used virtual reality to watch the film *Clouds over Sidra* compared to those who watched the film projected in 2D format. Given that the film *Clouds over Sidra* did by itself produce a change in empathy, this result suggests that increasing immersion by adding the element of virtual reality and increasing sensory fidelity does not provide a better way to develop empathy, even in the short term compared to 2D format. This particular result is important to consider given expenses to schools and communities considering investing in virtual-reality programs for the purposes of empathy building in their SEL programs for adolescents.

Our current research supports the findings of Herrera et al. (2018) who found that there was no significant increase in empathy between 2D and virtual reality interventions, and that immersion levels did not have a direct effect on empathy. According to their research, provided a perspective-taking task was engaged, there was no effect of immersion levels on empathy. In other research, Bujic et al.'s (2020) study found that virtual reality was more significantly associated with positive attitudinal change than empathy (e.g., donation to a United Nations fund).

The results challenge the assumption that with improved immersion using virtual reality (compared to 2D films), there may be improved empathy. Digitally ‘being in another’s shoes’ may not equal the improved understanding or shared experience that is so important in empathy. Perhaps empathy is less reliant on immersion, and instead reliant on other factors such as perspective-taking and storytelling. This suggests the improved technical immersion as measured by increased sensory fidelity and autonomy, may not always improve the psychological capacity. Some theorists (Hassan, 2020) have suggested that digitisation can only produce a shallow experience of the true interactive experience required for empathy. Hargrove et al. (2020) found that virtual reality did not improve empathy more than an embodied or ‘lived’ experience, and thus investigations using more embodied stimuli within immersive virtual reality could possibly be investigated in future research. However, this research suggests the more important element in developing adolescent empathy is engaging in different perspective-taking stories over time; and less important is the level of immersion in the story itself.

These results have implications for schools that are considering the investment of virtual reality for widespread use across the school. There are also implications for those wishing to run SEL programs remotely, as schools and teachers need not utilise expensive technology tools to improve empathy and sympathy amongst their adolescent student body. Instead, long-term well-structured and embedded SEL programs, with perspective-taking tasks, are more likely to assist developing empathy. Virtual reality could potentially be used to promote engagement or as a novelty tool as part of the SEL program, not in and of itself a technique; although this was not the focus of this current research and investigation of engagement levels are recommended in future research.

The current findings also contradict the most recent work in this area by Schutte and Stilinović (2017) and Alberghini (2020). Some reasons for this difference may be the different measures and stimuli used. Schutte and Stilinović (2017) used adjusted items from Davis's (1983) IRI measurement of perspective-taking and empathetic concern which has been criticised by some researchers (e.g. Chrysikou & Thompson, 2016) as measuring elements of sympathy and stating them as a subtype of affective empathy. Therefore, any differences in empathy levels may, in actuality, be differences in sympathy levels. Alberghini's (2020) research was based on self-report and (as they described) had a sample which demonstrates possible social desirability bias based on the sample from a liberal school. Furthermore, the research by Schutte and Stilinović (2017) and Alberghini (2020) was conducted over two time points rather than three. To account for any novelty effect, and to test whether any change in empathy could be a one-off experience, the current research measured three time points.

4.4.1 Empathy and Sympathy as Concepts

The current research highlights the importance in making the distinction between empathy and sympathy. There were differences in the results between (cognitive and affective) empathy and sympathy. Sympathy was rated highest across all three times with a significant drop between times 2 and 3. Both cognitive and affective empathy showed similar trends. Both cognitive and affective empathy increased between times 1 and 2, and then both significantly dropped between times 2 and 3, while sympathy decreased over time. This supports researchers who have suggested that empathy and sympathy are related but distinct concepts in socio-emotional learning. Considering the importance of the

distinction in these concepts, this research also supports using tools that clearly define and distinguish between these concepts, and close examination of tools and results used in previous studies in empathy.

Additionally, given that these concepts all had strong positive correlations with themselves across time, there is indication that those with higher baseline empathy and sympathy maintain this higher level across time. This possibly shows support for the inherit stability of empathy, especially over two weeks. This supports past research pointing to both affective and cognitive empathy being relatively stable with overall increases over adolescence (Davis & Franzoi, 1991).

As sympathy levels in this research appear to have had a ceiling effect and perhaps this occurred through social desirability it would be prudent to investigate whether adolescents understand the difference between empathy and sympathy as concepts, and if they do, investigate why sympathy is seen to be more socially desirable in adolescents. This could help inform SEL programs and gain an understanding on empathy development in adolescents.

4.4.2 Gender and Empathy

The research also adds to the body of research on the differences between girls and boys in empathy development. There were significant between-group effects between boys and girls in the initial survey across each of the three measures. This supports research that suggests girls are more empathetic than boys in adolescence (Mestre Escrivá et al., 2009). Future research in this area could consider whether social desirability in adolescence may add to this difference.

4.4.3 Limitations

This research aims to build on the current body of research investigating how empathy can be developed through different mediums with a particular focus on schools and adolescent development of empathy. However, the sample was based on convenience, and was quasi-experimental in design, limiting generalisations. The large independent school in Melbourne from which the sample was recruited could account for a possible ceiling effect in relation to sympathy due to social desirability, impeding results.

Participants knew they were watching a film about refugees, and the first survey ($M = 4.29$, $SD = .55$) had high results; and students from this school may have (before seeing the film) wanted to show high levels of sympathy. This situation may also account for the drop in empathy at time 3. Future research may consider a broader sample group and ensure the same researcher is available over the entire research period.

A second limitation is the conditions in which the survey at time 3 was undertaken. The significant decrease across all three measures could be explained by novelty effect and social desirability bias present for the first two surveys. The third survey was given in their regular classroom (not the senior school library), for 10 mins of allocated time in an otherwise 'normal' lesson. There were no researchers, headsets or trip to the library and the experience was amongst other teaching. There was no novelty and instead, something they needed to do on request of the teacher. Therefore, the decrease across concepts by time 3 could be explained by the (lack of) novelty effect and survey fatigue.

A third limitation was that few pre-questions on exposure to virtual reality outside of school were asked which may lead to differences in the effect of novelty. To attempt to mitigate any novelty effect, the surveys were conducted a third time, which did show a

short-term increase in empathy from watching the film (although not from virtual reality). Thus, it is recommended that future research on virtual reality allows for an element of longitudinal design, to build on the limited research in this area, and have a pre-test question on amount of virtual reality experience. We also recommend that a qualitative approach be considered, particularly after viewing the film given the complexity of the concept of empathy.

Another limitation is related to the stimulus and technology used. Whilst the control condition had less sensory fidelity and autonomy (and less subsequent immersion) than the virtual reality condition, we acknowledge that there was no further interactivity and autonomy other than being able to look at a chosen direction in the virtual reality condition. Additionally, *Clouds over Sidra* places the viewer within the refugee camp, allowing for a first-person perspective of a refugee, but the embodiment of Sidra itself does not fully occur due to inability to walk and interact with surroundings as Sidra. Although Bowman and McMahan (2007) suggest that sensory fidelity is key to immersion more than interactivity, other researchers suggest autonomy and embodiment are important (Gall et al., 2021; Ijaz et al., 2020). Due to technical constraints due to the school's finances and limited options for appropriate stimuli for embodiment experiences for 13-15 year-olds available at the time of the research, it is acknowledged that the virtual reality condition was not as immersive as it could be, limiting scope, and we recommended that future research consider the stimuli chosen and using a range of immersive techniques such as embodiment.

Finally, although there was a control and experimental condition, a non-perspective-taking task as an inclusion would provide more scope to explain any differences and to

investigate if the change in empathy is about task rather than immersion levels, as suggested by Herrera et al.'s (2018) research.

4.4.4 Conclusion

This research aimed to investigate the effects of virtual reality on empathy. Findings suggest that for adolescents, an emotion-provoking film (Clouds over Sidra) can invoke a short-term improvement in both cognitive and affective empathy but not in sympathy, highlighting the differences between these constructs. However, the medium of the film, virtual reality compared to the control condition of projected 2D film, had no effect on empathy or sympathy. This research supports some past research indicating that virtual reality does not improve empathy compared to other conditions (Herrera et al., 2018).

This work has built on the body of emerging research on virtual reality and empathy and contributes to the broader question on whether virtual reality is the 'Ultimate Empathy Machine'. More specifically, it adds to the discussion in schools and policy groups on SEL 25 and the use of technology, particularly in a time where off-site/online learning is occurring more readily.

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Chapter 5: Qualitative Data and Analysis

5.1 Introduction

The previous chapter described the findings of the quantitative study, which indicated that an emotion-provoking digital story can improve both cognitive and affective empathy immediately after the intervention, even though this improvement was not sustained through to the two-week follow up. In addition, regardless of whether the story was delivered via 2D projected film or virtual reality, there was little differential effect between empathy and sympathy levels.

In this chapter, the qualitative results will be presented and discussed. Section 5.2 provides an overview of how the survey was developed and administered, followed by Section 5.3, which focuses on the analysis of the data. More specifically, it describes the thematic analysis method using Braun and Clarke's (2006, 2012) six-phase process of identifying patterns and themes within qualitative data. Section 5.4 describes the emerging themes and subthemes from the data, the story of which is then discussed in Section 5.5, along with the implications of these themes in the context of the research questions and possible future research are also addressed. Finally, conclusions for the qualitative part of the research are outlined in Section 5.6.

5.2 The Use of Qualitative Research

5.2.1 A Review of Past Qualitative Research

Previous literature on virtual reality and empathy in a qualitative research context is limited despite past recommendations that collecting and analysing qualitative data can provide a deeper understanding of these concepts (Cole, 2022). Even then, the qualitative

research conducted on empathy and virtual reality that has been conducted has tended to focus on training in nursing and the medical sciences, not education *per se*. One such study that investigated the potential of virtual reality in nursing education, with a sample cohort of 26 individuals, found that empathy could be improved by using virtual reality, particularly during the practice of identifying a patient's emotions (Saab et al., 2021). This is an important first step in cognitive empathy, as a perception of the other person's feelings must occur as the starting point, along with an understanding of why they might feel that way.

In another intervention study, again in the medical field, a mixed methods study ($n = 34$ medical students) by AlBasri (2019) also determined that virtual reality improved empathy. Through randomization, 17 students were trained in the control condition, which involved clinical interactions and communication skills. The intervention group included two supplementary virtual reality sessions of 20 – 45 minutes in length, plus a debriefing session. These virtual reality experiences involved the participants 'becoming the patient' throughout the process. Whilst the quantitative data obtained from the Toronto Empathy Questionnaire (Spreng et al., 2009) suggested that virtual reality did improve empathy in a pre- and post- test analysis, the qualitative interviews demonstrated that it was the experience of virtual reality that triggered emotional responses in the self, thereby promoting empathy, which itself suggests a potential for affective congruence. In addition, the student interviews reported an increased empathetic concern towards their patients and better intentions towards pro-social behaviour. It was recommended that a longitudinal approach be employed in future qualitative studies to see if any effects were sustained.

Together, these two studies suggest that virtual reality may elicit elements of both cognitive and affective empathy.

There are a few studies that have explored virtual reality, empathy and education that were not conducted in the medical field. In one of these studies, Patterson et al. (2022) uses both qualitative and quantitative research, noting the importance of using a qualitative design to provide a holistic interpretation of the empathetic experience. In this study of 36 students, the researchers investigated whether historical empathy could be developed using virtual reality. Historical empathy is related to an experience of general empathy towards an historical figure (Kohlmeier, 2006). Using the same convergent-parallel mixed methods approach as this thesis, the findings indicated promising signs that virtual reality could be used for the specific purpose of education in the context of historical empathy. The use of qualitative research allowed the researchers to notice a higher emotional (affective) and imaginative (cognitive) retelling of the historical story for those who used the immersive virtual reality, compared with those watching the same documentary on iPad with headphones (the control condition). In addition, the researchers described that it was the qualitative research, and not quantitative measures, that provided an opportunity to illustrate the humanity and complexity of a participant's experience of historical empathy. The use of quantitative measures has been criticised by those in the field of researching historical empathy (Endacott & Brooks, 2018), but it should be noted that this research was not classroom-based and did not use school-aged participants. As a result, Patterson et al. (2022) recommend that future research with school-age participants is required if practitioners wish to apply virtual reality in their classrooms.

In another mixed methods study on the historical empathy of 44 ninth graders, Riner et al. (2022) have argued that there are positive benefits of virtual reality in a Social Studies/Humanities classroom. Whilst the quantitative research found no significant effect of greater engagement, it did find an effect of improved historical empathy compared to a control group who used a 3D website as part of their Social Studies work. Moreover, it was the qualitative work that showed that there was strong classroom engagement using virtual reality.

This is one of just two pieces of research, to the author's knowledge, that investigates the qualitative relationship between virtual reality and empathy with adolescents. However, both studies focus on historical empathy which does not explicitly investigate cognitive and affective empathy as different processes; indeed, the purpose of including historical empathy is usually related to conceptualisation, not necessarily socio-emotional learning.

Shin (2018) also conducted mixed methods research on virtual reality, empathy and learning with 30 adults who had experience in virtual learning environments. The findings suggested that virtual reality could stimulate empathy. Shin suggested that a possible reason for this was that virtual reality provides an embodied experience, enabling an individual to follow a set story. It was argued that the embodied experience occurs through engagement and increased usability (due to immersion) that influences empathy. This is an important finding of qualitative research as it allows researchers to see that it is possibly the engagement and immersion factor that helps contribute to understanding how or if any relationship exists between virtual reality and empathy. Theoretically, this study also contributed to the affordance theory, in which the concept is a characteristic of the

environment that, when perceived, affords or provides an opportunity for some action (Gibson, 2014). In this case, it is the antecedent variables such as immersion in virtual reality that contribute to greater engagement, which is a necessary precursor to eventual improved empathy. In these circumstances, there is a possibility of empathy affordance through using virtual reality.

Finally, Alberghini (2020) conducted a mixed methods study on empathy and virtual reality with 107 adolescents. To do this they designed a questionnaire with a combination of Likert-type questions and open-ended questions for pre- and post- testing that allowed for quantitative and qualitative data to be collected. The collective data in this study suggested that empathy could be improved by using virtual reality to watch the documentary *Clouds over Sidra*, when compared to a screening of a similar documentary, *Step into a Refugee Camp*. All participants experienced both conditions via a within-participants design. The level of immersion for each condition, and whether headsets were actually used for the virtual reality condition, were not specified. Nonetheless, the research found three themes related to the experience of virtual reality. The first was that virtual reality was able to foster better understanding of refugee life through immersion. The second was that the story itself of Sidra was ‘relatable’ to participants, and thus increased empathy on its own, compared to the more generic film, *Step into a Refugee Camp*. Finally, the experience of ‘being there’ was considered to be a platform for empathetic experiences.

This third theme was an important reflection on the experience of empathy and virtual reality. As the authors noted, simply feeling like one is ‘being there’ does not necessarily mean participants experienced empathy; the participant needs to communicate an empathetic experience more explicitly.

The use of qualitative methods in such research demonstrates the importance of the qualitative element of researching empathy and virtual reality. Moreover, these data provide practical insights for educators in terms of best practice in using virtual reality as a learning tool. For instance, if students are not engaging in socio-emotional learning and empathy courses, they could consider using virtual reality, as engagement is a precursor to empathy. Thus, the research underlying this thesis aims to investigate how virtual reality and empathy interact, to provide insight into the adolescent experience of virtual reality and empathy, as well as offering practical ideas to teachers and their students to improve socio-emotional learning. To the author's knowledge, no other qualitative research on adolescents, virtual reality and empathy in education has been published.

The first two research questions of the thesis were addressed in the quantitative section of the data collection and explored in Chapter Four. The third research question was posed to explore the participants' subjective experience and was: *How does the use of a virtual reality program affect adolescent empathy and sympathy?*

5.2.2 Method

5.2.2.1 Participants.

All participants were from the Year 8 cohort (aged 13-15 years) at a co-ed independent school in South-East Melbourne. Participants and their parents/guardians read a plain language statement and signed a consent form using the school's online system. The intervention of *Clouds over Sidra* and the associated surveys took place during the scheduled class time in the subject of Humanities and was linked to their school curriculum unit on *Displaced People*.

All participant responses were coded and anonymous. The coding was done by a third party who was an administrator at the school. This administrator emailed each participant's unique code to them prior to the research. The coding was AXXX for virtual reality condition, and BXXX for the control condition. Participants were instructed to enter their unique code each time they did the survey. By doing this, researchers could track the same participant responses across time, and differentiate the responses into each condition. Participants could leave at any time and their teacher was present throughout the experience and the survey completion.

As a convergent-parallel mixed design was adopted, the qualitative research questions were asked at the same time and under the same conditions as the quantitative research questions. Participants were allocated by class to experience the film *Clouds over Sidra* through either virtual reality (using Google Cardboard and headphones) or through 2D format; projected on a screen to the group. A survey with both options was presented to participants before the film (time one) immediately following (time two) and two weeks later (time three). More details on the procedure are described below in the Section 5.2.2.4 (p. 123).

5.2.2.3 Survey.

To answer the research question and to gain additional insight into the empathetic experience, three open-ended questions were designed. The survey questions asked participants to describe their experience of the program (the documentary *Clouds over Sidra*) and of using virtual reality (or 2D control) and aimed to highlight additional insights that were not evident in the quantitative data. This method also provided relevant

information to help educators make decisions about why and when to use virtual reality for promoting empathy.

The rationale for these short statements was in keeping with the recommendations for conducting qualitative research using surveys. Specifically, the design focused on making open statements that were short and expressed as clearly and un-ambiguously as possible (Braun & Clark, 2013). Most qualitative survey questions based on a topic tend to be up to four to six statements, but the length of the overall survey also needed to be considered (Braun et al., 2021). Thus, given that these questions were presented immediately following the administration of the quantitative questions, only three were asked. Whilst not always used in qualitative research, survey questions can often elicit excellent data in certain situations, such as mixed methods research and in investigation of sensitive topics such as refugees and empathy (Braun et al., 2021).

The three open-ended questions were as follows:

1. Watching movies about refugees is...
2. Watching films in this way is....
3. What similarities and differences do you see between your life and Sidra's?

The questions provided an opportunity for participants to answer openly. Question One prompted the participant to consider the *content* of the film, but not necessarily the experience of virtual reality, or 2D. Using the word *refugee* and focusing on the topic offered an opportunity for participants to respond with their feelings about the content (affective domain) or their thoughts about the situation (cognition) for refugees, Sidra, or other elements of the documentary. Question Two was focused on the practical experience in viewing the documentary. For this question, participants were prompted to consider the

format in which they viewed the documentary (2D or virtual reality). The final question asked the respondent to consider themselves and Sidra, and then to think about links between the ‘self’ and ‘other’. The consideration of self and other is an important element of empathy and was included to highlight the participant’s thinking about ‘self’ and ‘other’ in the context of the refugee crisis, and to provide clarity for analyses in addressing whether the participant was more likely to be describing sympathy (clear ‘self’ and ‘other’) or affective empathy (a potentially blurring/sharing between ‘self’ and ‘other’). Having said that, as past researchers have suggested, it may be that viewing affective empathy in its most primitive form is a form of emotional contagion, allowing us to differentiate other forms of empathy as being more other-oriented (Read, 2019).

5.2.2.2 Procedure.

At time one, immediately before the intervention of *Clouds over Sidra*, no qualitative questions were asked. At time two, immediately after viewing *Clouds over Sidra*, the demographic questions, AMES survey, and the three open-ended questions were presented. The three questions were asked again at time three (two weeks after viewing *Clouds over Sidra*). Presenting the qualitative questions at both times two and three allowed analysis of any longer-term effects, as recommended by AlBasri (2019). The open-ended questions allowed participants to freely express their ideas after viewing the documentary (time two) and again two weeks later (time three). The outlined procedure can be seen in Figure 7 (p. 72), and how the research questions, instruments and timing can be found in Appendix A, Table 9 (p. 236).

Participants typed their answers to these questions at the end of the survey, after the quantitative section of the survey, and had unlimited typing space. It was not mandatory to

answer every qualitative question to submit the survey, and participants could withdraw from the study at any time. Overall, there were 114 participant responses at time two and 76 participant responses at time three.

5.3 Thematic Analysis

A thematic analysis was conducted on the qualitative data. Using a combination of inductive/deductive approaches is common in thematic analyses, although a predominance of either an inductive or deductive approach tends to occur (Braun & Clarke, 2012). In this research, a predominantly inductive thematic analysis was used. However, to answer the research question, an element of deductive analysis was undertaken, to ensure the meanings generated were relevant to the research question on empathy and virtual reality.

According to Braun and Clarke (2006, 2011, 2021) there are six steps for thematic analysis: 1) familiarizing self with data; 2) generating initial codes; 3) searching for themes; 4) reviewing themes; 5) defining themes; and 6) producing the report. Each of these steps will now be discussed in relation to the current study.

5.3.1 Familiarizing Self with Data

Initially, the raw data were organized into a table by participant code. As suggested by Braun and Clarke (2006) an initial reading of the comments without coding was undertaken. As this first step did not involve any coding, but focused on ensuring familiarity with the responses, it provided insight into emerging themes and events in the text (Thomas, 2006). A second reading of the text then occurred, and some initial ideas

relating to themes and codes were put into an added final column titled 'Ideas and Thoughts'. This reformatting and rereading are said to establish a level of trustworthiness (Nowell et al., 2017). Table 7 shows an example of the layout of a single participant's response and some ideas that the researcher had during the secondary reading of the data.

Table 7

Example of 'Familiarizing Self with Data' Using a Participant Response to the Three Qualitative Questions

Code	Condi tion	Gende r	Question 1 Watching movies about refugees is...		Question 2 Watching films in this way is....		Question 3 What similarities and differences do you see between your life and Sidra's?		Ideas and thoughts
			Time 2	Time 3	Time 2	Time 3	Time 2	Time 3	
xxxx	1	F	It's heartbreaking, it makes you think what your world is like and how their world is like, it makes you take things not for granted.	Sad and makes you feel guilty.	Interesting it makes us able to see more, it has a greater impact on our thinking.	It gives you a better feeling and makes you feel like you are there.	We are able to have any food we want, we are able to go to school with a great education.	We live different lives.	-negative emotional reactions (sad, heartbreaking) -guilt -social norms -thinking and learning -privilege -increased engagement with story due to VR -self-reflection

Note. This table demonstrates an example of the emerging ideas (final column) in the second read through of the raw data for a de-identified participant (of 76 participants). This second reading process occurred over three months.

5.3.2 *Generating Initial Codes*

After the initial reading, the initial codes were formed. To create these codes, the final column shown in Table 7 above was changed to a coding column and the data were coded for the first time. As each reading was done, the codes changed. For example, in an initial reading, there was a code of “sadness”. This needed to be clarified and split into three codes as it was too generic. By the third reading, there was a code of “sadness *for/sympathy*”, which referred to when a participant indicated a feeling of sorrow specifically about Sidra, and which aligns with the definition of sympathy. There was also a code of “generic sadness”, if they wrote something brief; indeed, many participants simply wrote ‘sad’, but there was no indication of the specific reason for the sadness. A third code of ‘sadness *with*’ was used for participants that wrote ‘she is sad and so am I’. There was also a final code of ‘sadness *because*’ as this indicated a different view, and possibly cognitive empathy (understanding another’s perspective). An example of the codes is given in Table 8 (below). The codebook can be found in Appendix C. These coding stages were completed by the primary researcher alone.

Table 8*Examples of Codes, Data and Definitions from the Codebook*

Code	Definition	Example in data
New Learning about Syria/refugees	A statement that shows that they've learnt something about the environment/Syria/Refugees. Enlightening. Not necessarily related to an emotional statement.	"Eye-opening as we don't learn about this in any subjects so far" "Sidra has very basic education, basic living and is constantly in fear.
Cognitive Empathy	A statement that demonstrates either perception of another's emotion, and/or Understanding of the other's emotion and "why" or perspective-taking	"You can tell how they are actually feeling as they all wanted to feel safe and go home." "You see how bad their life situations are."
Need to help	A statement that expresses a need for action about the situation, specifically seeking to help, or motivation to help.	"It makes you feel like you want to help" "We need to help"
Sympathy (Sadness for)	Feeling sad or sorry for Sidra or refugees more generally	"It makes me feel sad to see people suffering" "sad that people in the world have to live like that." "sad, makes me feel really sorry for them."
Generic Sadness	An expression of sadness with no specific detail of how/what it relates to. Just sadness in itself	It makes me feel ... "sad"

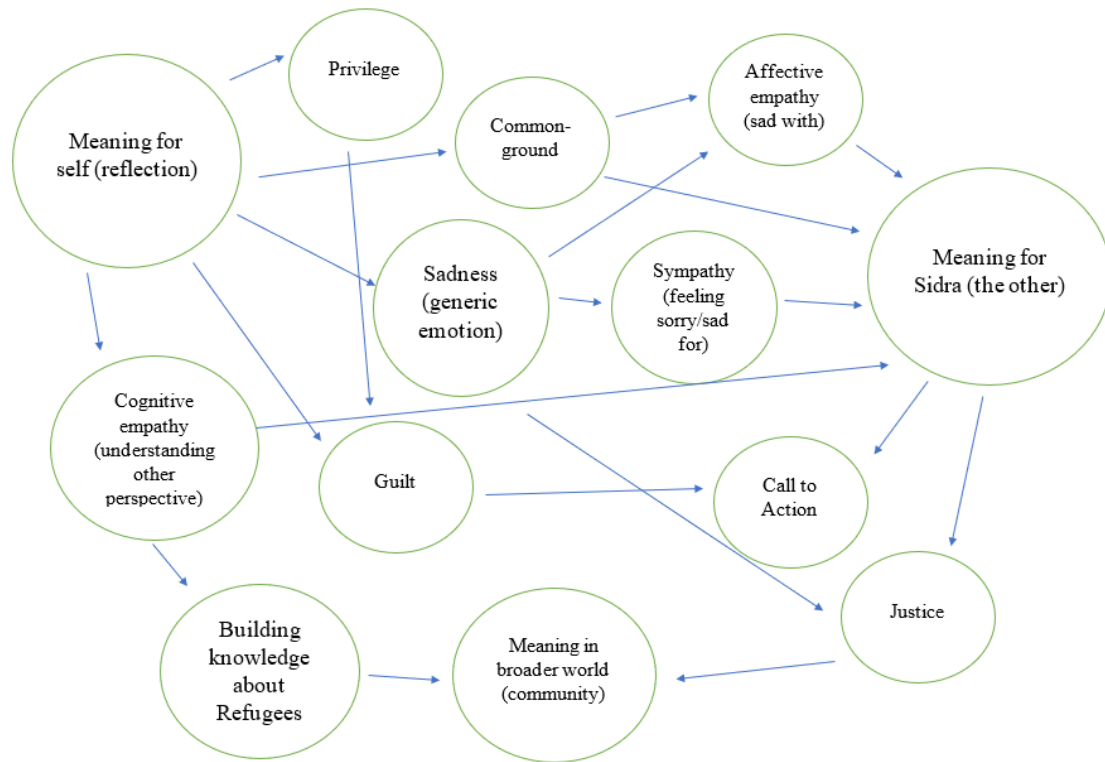
5.3.3 Searching for Themes

A theme “captures something important about the data in relation to the research question and represents some level of patterned response or meaning within the data set” (Braun & Clarke, 2006, p. 82). Broad themes were found through collating codes that had been refined in Phase Two (Braun & Clarke, 2006). Keeping in mind the broader research question, “*How does the use of a virtual reality program affect adolescent empathy and sympathy?*”, thematic maps were produced to explore patterns in the data.

Based on the codes, two thematic maps were initially produced. A thematic map is generated to explore emerging themes and their relationships to each other. Through the process of diagramming to make sense of theme connections and keeping hierarchical notes, the research is said to be gaining trustworthiness (Nowell et al., 2017). Figure 9 is an example of an early thematic map that focused on the key themes and subthemes relating to self and others, which is key to understanding empathy and sympathy. The second thematic map in Figure 10, focused on the two delivery formats of using virtual reality, or normal 2D screen.

Figure 9

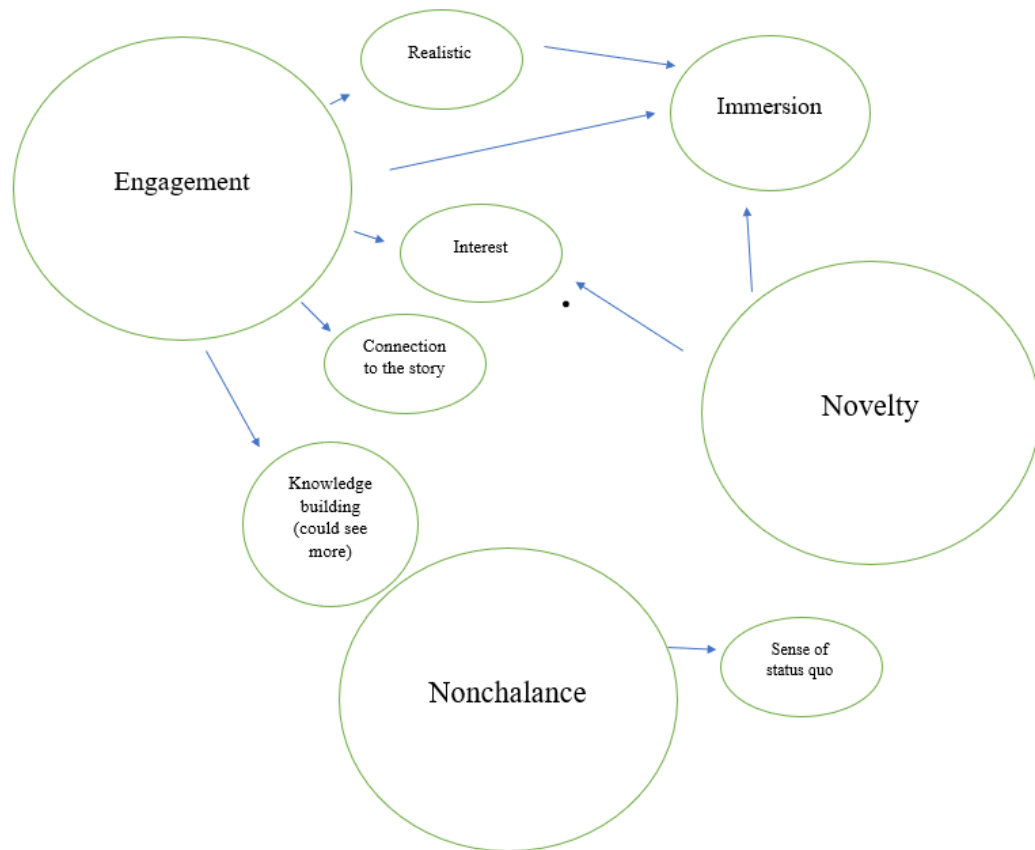
An Early Thematic Map Identifying Main Themes Relating to Self, Other Knowledge, Community and Emotion (Sadness)



Note. The size of the circle indicates frequency or depth of responses. For example, finding meaning for self was seen in many responses, and described in depth. In addition, the arrows refer to links between themes. For example, some responses that started with searching for meaning for self (self-reflection) would also describe privilege that the individual felt, a comment on understanding another person, guilt, sadness and a searching for common ground.

Figure 10

An Early Thematic Map Identifying Main Themes Relating to Technology Use (Virtual Reality or 2D)

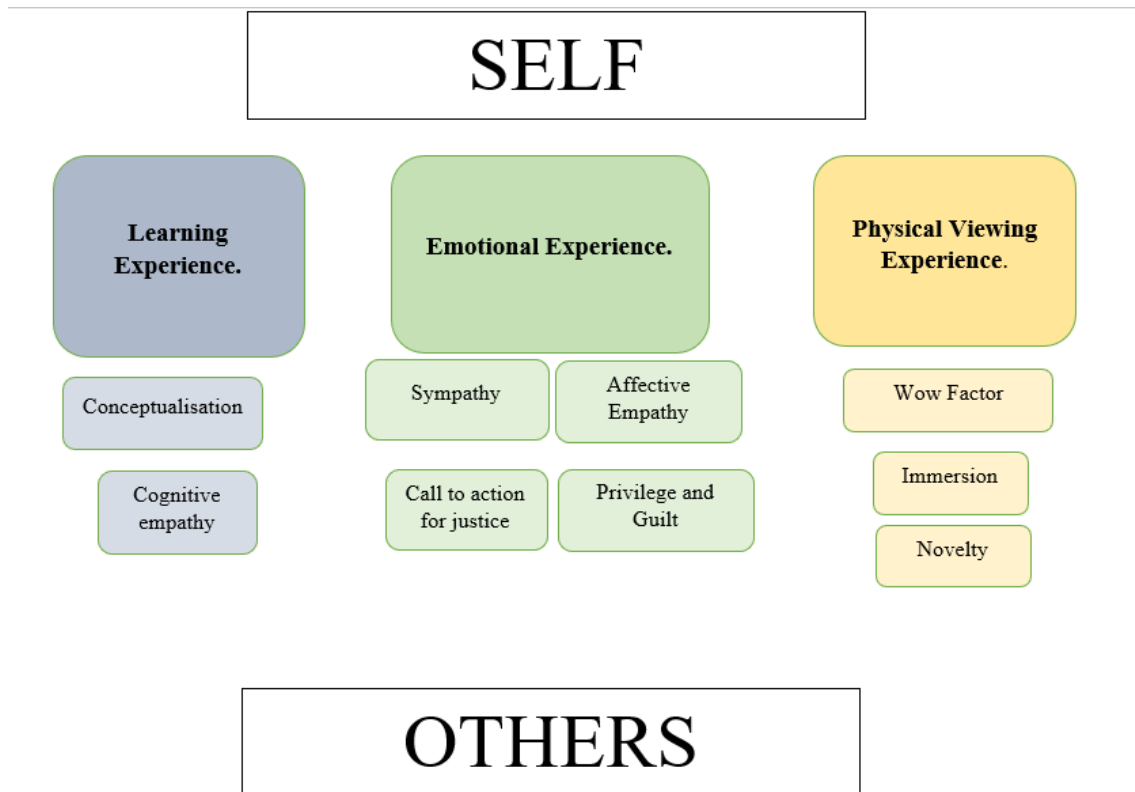


Note. Like Figure 9, the size of the circle indicates frequency or depth of responses. For example, engagement, novelty and nonchalance were commented on in depth, and they are represented by the larger circles. The arrows refer to links between themes.

Over time, these themes were integrated to create an overall thematic map that could be related to both the delivery format (virtual reality or 2D) and the sense of self and others. Figure 11 shows the three main themes that were initially found: the learning experience; the emotional experience; and the physical experience. The headings of ‘self’ and ‘others’ were threaded throughout the themes, as indicated in Figure 11.

Figure 11

Three Main Themes Generated Through Phase 3 Thematic Mapping



Note. The three main themes are in bold; and sub-themes are listed underneath.

5.3.4 Reviewing Themes

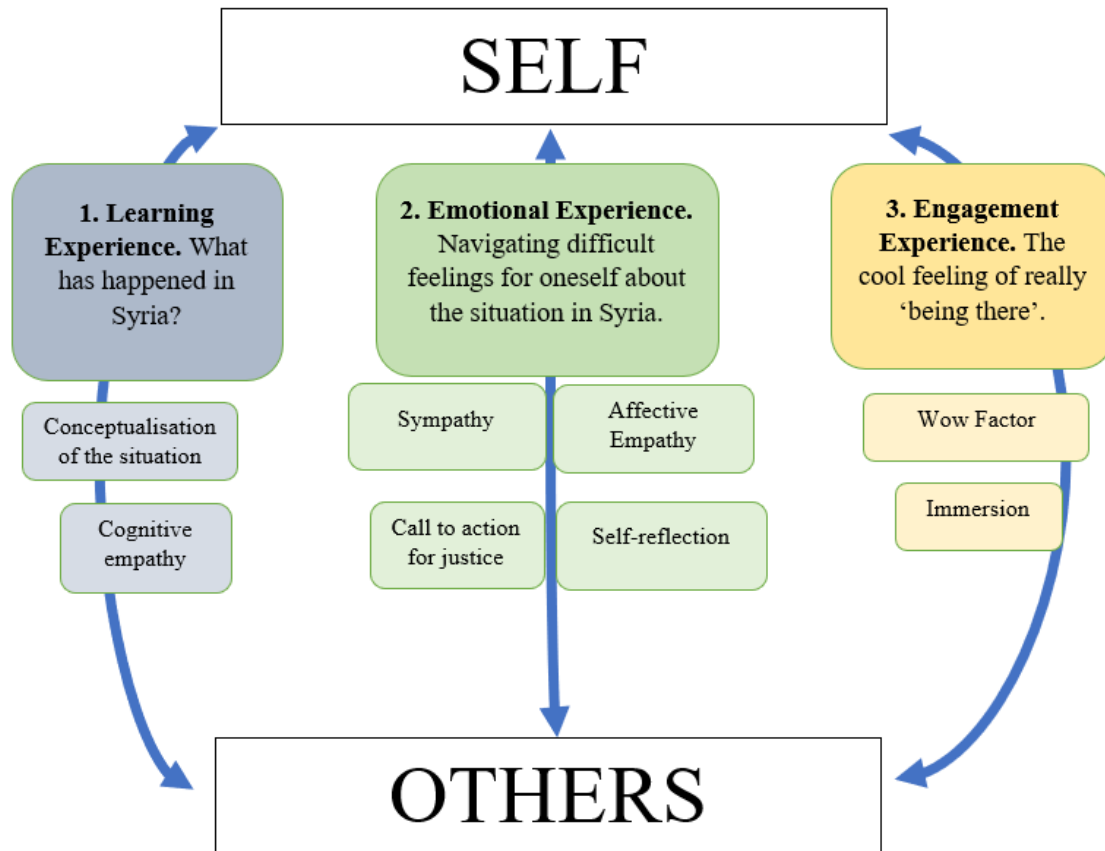
In this phase, the themes were reviewed, and a second researcher examined the coding and thematic maps. As Braun and Clarke (2012) suggested, the first step in this phase is checking the themes back against the data extracts. To do this with consultation, the colour-coded highlighted data were printed. These were then cut out and placed together under the existing themes, as recommended by Maguire and Delahunt (2017). Important in this stage is considering whether the themes still work in the context of the entire data set, and whether the themes make sense, overlap, or try to do too much.

These questions were considered with the second researcher in consultation and refinements were made. For example, rather than the theme of the *physical viewing experience*, the theme of *immersive experience* was trialled in order to capture more than the physical. The physical experience seemed to be more limited to the sensory fidelity of the experience for participants, and only limited to viewing. It did not encapsulate other elements, such as interactivity or the other elements of sensory fidelity that were described by participants. In the first draft, having *immersion* as a sub-theme of physical viewing did not work, as immersion would be more likely to encapsulate physical viewing, not the other way around, so this seemed a better fit. However, when the process of re-organizing the data occurred again, the *immersive experience* did not seem to fully encapsulate the data in terms of how participants felt during the experience beyond the contributing factors of sensory fidelity and interactivity. It was decided the sub-theme of *novelty* did not really fit under *immersive experience*. In consultation, *engagement experience* was included to describe the whole experience of the documentary and to capture the overall experience of virtual reality. This seemed a better description, and the sub-theme of *wow-factor* was also added in to encapsulate notions of novelty and engagement relating the documentary and/or virtual reality that was present in the data set.

The idea of each of these themes being located within/and influencing a broader understanding of oneself and the other were also included in the re-worked model, as shown with arrows (Figure 12).

Figure 12

Final Themes Generated Through Phase 4 of the Thematic Analysis



Note. The three themes are in bold; and sub-themes are listed underneath. The arrows indicate the nature of self and other being threaded throughout each individual experience, considering the constant idea of investigating self and other. These themes were then discussed with one of the supervisors of this research, to build trustworthiness and gain feedback.

5.4 The Emergent Themes

The purpose of Phase Five was to name and define the themes (Braun & Clarke, 2006). Nowell et al. (2017) described this stage as identifying the story that *each theme* told in the data set. During this stage, evidence from extracts provides an example of the

analytic point (Braun & Clarke, 2006). This is not a retelling of the data, but a direction as to why specific data are important and how they are being interpreted and analysed (Braun & Clarke, 2012). In what follows, each theme is defined, using evidence extracted from the data by the primary coder. The subsequent sub-themes are described below each theme.

5.4.1 Theme 1. Learning Experience. Gaining insight about Sidra and refugees.

The participant experience in the research generated new learnings about the world, environment, war, poverty, Syria, refugees and specifically about Sidra. Participants demonstrated new knowledge through comparison. Note, that for the participant quotes virtual reality will be abbreviated to (VR) throughout.

“Interesting to see how different their lives are to ours” (VR, male).

“(I’m)...learning about the troubles and problems refugees have to go through” (VR, male).

It became apparent that there was an important story here, regardless of condition, that would ‘stick’ with the participants. The nature of what ‘stuck’ to form new meanings was broadly categorized into two sub themes: conceptualisations (or making meanings) of new knowledge; and their general empathetic learning, in the form of understanding the other persons situation (e.g. cognitive empathy).

Sub-theme 1.1 Conceptualisation.

Conceptualisation about new knowledge can be considered a significant step in empathy building. Participants demonstrated learning something new in the overall experience, usually about the environment of the refugees or about Syria in general:

“Makes me ... realise how bad... their living conditions are” (2D, female).

“(I learnt) how kids and families in Syria spend their days and what they have to deal with” (VR, female).

Some new learnings were gender based and involved comparison; demonstrating separation of self and other but also, showing an ability to see another’s point of view in relation to self:

“There are some things that boys are allowed to do that girls aren’t and in the film it was mentioned that girls aren’t allowed to play soccer depending on where they are. I don’t have those restrictions in my life and I can do the things that boys do and there aren’t any rules about it” (VR, female).

Another simply described the learning as being significant:

“This was a very big learning curve for me” (VR, male).

Sub-theme 1.2 Cognitive empathy.

There were new learnings that framed cognitive empathy. As cognitive empathy refers to the capability to understand another’s emotions/feelings and the reasons they feel/ behave a certain way, one step in showing cognitive empathy is to try to understand another person’s viewpoint. Therefore, these new learnings are an important first step. The other step in cognitive empathy is to be able to understand the affective cues (e.g. that they are sad), and how that may be caused by that newly understood viewpoint. In cognitive empathy, there is a clear difference between the individual and the other person.

Cognitive empathy was a sub-theme of the learning experience theme because participants used phrases that demonstrated an attempt to understand Sidra/a refugee’s situation and the viewpoint of the ‘other’:

“It helped me to understand what the refugee is going through.... Gives me insight into their story” (VR, female).

Other participants addressed this first step and gave an additional step of the (affect) emotion:

“Saddening as ...you can see what they gave up”. (VR, female).

This participant gave yet another step in cognitive empathy and was able to explain why/how the situation might make the refugees feel, which involves perspective taking with affect:

“You can see how much they [want to go] home, but they can’t go back because it’s dangerous” (VR, female); and

“I can kind of understand how they’re feeling and what they’re feeling when they’re away from their homes for an almost indefinite period of time” (VR, female).

Some participants described this understanding of a new perspective through comparison; showing that they saw similarities between themselves and Sidra, including participants of a different gender:

“I can see they have the same similar interests and that they might not be as different to me as I thought they would be” (VR, male).

There is a strong link between sub-theme 1.2 and sub-theme 1.1. Understanding someone else’s perspective involves the new learning of their broader situation. When cognitive empathy occurs, there needs to be a clear demonstration of the other person’s perspective (new learning) and then an understanding of the subsequent emotional impact for them. For example, if a participant shows that they understand that someone is ‘living rough’ (new learning of the other person’s perspective) and therefore they feel ‘sad’ (emotional impact), they could be showing cognitive empathy. Connecting the

emotional impact to the perspective taken is important in this subtheme. For example, a participant who states “The houses are small” shows a new learning that would be grouped in sub-theme 1.1, but someone who states “Her house is dirty and it doesn’t seem like she’s very happy; mine is larger”, shows comparison and a distinction between self and other, as well as an indication of perspective -taking and emotional understanding: this example would therefore be in sub-theme 1.2. Some participants were able to link emotions to the situation, using the new perspective gained to subsequently understand how Sidra must be feeling. This demonstrates the importance of learning and perspective taking in cognitive empathy:

“I can kind of understand how they’re feeling and what they feel when they’re away from their homes for an almost indefinite period of time” (VR, female).

5.4.2 Theme 2. Emotional Experience. Navigating difficult feelings for oneself

There was a range of emotional reactions of the participants that were expected to arise from an emotion provoking documentary like *Clouds over Sidra*. Whilst there tended to be commentary around sadness, some participants were able to articulate further detail. Participants identified the sadness somewhat easily; what was more difficult was articulating why, and what to do with it, or how to navigate an uncomfortable feeling.

Considering this difficulty and the research study’s focus on empathy, Theme 2 has four sub-themes. The first two address the general ‘sad’ emotions relating to the content in the documentary, encapsulated by the comment: “heartbreaking to see what they go through”. These are considered through the lenses of sympathy and affective

empathy, both important concepts to the research. What makes these two sub-themes different is the way the participant describes the concept of 'self' and 'other'. Read (2019) suggested that there may be a blurring of the 'self' and 'other', and thus a distinction is not easily evidenced in self-report measures. However, there may be a clearly shared experience, which indicates affective empathy. On the other hand, if there is a clear element of sorrow for the other, this is considered sympathy.

The third and fourth sub-themes relate to consequences of this sadness and ways participants tended to describe actions they might take. The third sub-theme describes the call to action caused by the emotional experience that participants felt compelled to describe, whereas the fourth sub-theme relates to the emotional self-reflection on the experience and specifically looking at 'self' and 'other'. Threaded throughout this theme is the distinction of 'self' and 'other' and the way participants described that relationship. This helped enable differences to be identified between sympathy and affective empathy.

Sub-theme 2.1 Sympathy.

Participants demonstrated sympathy for either Sidra or the plight of refugees after watching the documentary and this seemed to contribute to a sadness that was sustained for weeks after:

“I feel very sorry for Sidra and hope she is able to go home soon” (VR, female).

“I feel sad for all refugees” (VR, female).

This form of sympathy had a clear distinction between the self and the other; there was no confusion in responses from participants that explained their sense of 'sorrow'. Participants described feeling very sorry for Sidra, but also having sympathy for the broader refugee plight. Whilst sadness overall was described by participants, most

feelings of sadness seemed to be generated by sympathy, rather than by forms of empathy, as a shared affect was not commonly reported across groups.

Sub-theme 2.2 Affective Empathy.

This sub-theme identifies the moments that the participants tended to share in the feelings of Sidra, finding a common ground in their emotions (affective empathy). Whilst this was limited in terms of expression, it is important to consider both types of empathy where it is apparent if the research question on empathy is to be answered fully. The sharing of experiences was limited, but evident in the responses. Some found similarities between themselves and Sidra in terms of feelings, which could be considered an important first step in affective empathy.

“We both love our families, miss home when away, go to school, learn, have fun, and hang out with friends” (VR, male).

“(Similarities are) that Sidra and I both go to school and home each day, (and) is excited about the smell of good food wafting from the bakery... we both have dreams and ambitions that we want to achieve” (VR, female).

“Both Sidra and I do not like violence and warfare” (VR, female).

These examples demonstrate a shared affect such as the shared feeling of being excited. It was also clear that some of the emotions felt were because Sidra and the refugees were also feeling a certain way, demonstrating a ‘sharing in’ the feeling:

“I feel (sad) because they are sad they are not in their homes” (VR, male).

This statement is an indication of affective empathy rather than sympathy because the sadness in the participant’s self is ‘because they (the other) are sad’ rather than ‘because they feel sorry for’ (the other); a sharing in emotions is therefore evident.

Empathy is a difficult feeling to express and measure for adults as well as for children, as it depends upon development of the required self-awareness and language skills (Batson, 1990). Thus, it was interesting to note the affective empathy comments were only from those who watched the virtual reality format of the film. Finally, participants did not tend to describe a sense of ‘blending of selves’ in terms of the emotion that can occur with affective empathy; rather, the responses that tended to show affective empathy continued to keep ‘self’ and ‘other’ separate, despite a sharing in the feelings. However, as described in Chapter Two, the blending of self and other was not a focus of the current research, as it is empirically difficult to distinguish (Read, 2019).

Sub-theme 2.3 Call to Action/ justice.

When confronted with the emotional experience, it was clear that some participants sought to make sense or meaning in what they saw in their responses. One way participants made meaning in what they saw was demonstrated by a call to action, for example:

“(It) makes me want to get all the people living like that and bring them back to Australia” (2D, female).

“I should do something to help” (VR, female).

Possible reasons for this are demonstrated by comments that showed an observation of unfairness, or injustice:

“The world... was not meant to be a place for unfairness” (VR, female).

“Our life is... fair for everyone, but theres (sic) isn’t” (VR, male).

This call to action is expected, given that the United Nations aimed to incite this response in viewers when producing the documentary. These sorts of actions are sometimes considered the pro-social result of empathy and sympathy. However, in this case, because this study is not actually investigating or following up whether

participants engaged in pro-social behaviour, these statements were themed under a broader ‘call to action’ as a motivation to help.

Sub-theme 2.4 Self-reflection.

As previously described, the refugee crisis can cause uncomfortable emotions for adolescents. This sub-theme describes the awareness of the privilege the participants have:

“Makes me feel lucky to be where I am” (VR, female).

As part of self-reflection, participants also described an associated guilt and gratitude (for self) with seeing another in a position of misfortune.

(Watching the film) “makes (me) feel guilty” (VR female).

“I’m thankful that I don’t have to deal with those issues” (VR, male)

This sub-theme relates to sympathy (sub-theme 2.1) as these thoughts can be the consequence of these sorts of feelings. Different to sub-theme 2.3, this type of response is concerned less about the actions caused by the emotions, and more about the cognitive process of comparison between self and other; an important element of empathy and sympathy, as demonstrated by this participant:

“Schooling is less stressful in Sidra's life (than mine) even though it's much more important for her” (VR, female).

5.4.3 Theme 3. Engagement experience. The cool feeling of really ‘being there’.

This theme considers the experience of the documentary, including the nonchalance that participants had due to a variety of reasons. Participants were very

vocal about their allocated experience recognizing the novelty and immersive elements of the research. One participant summed up the engagement level of virtual reality:

“Interesting it engages me more than say just watching it on the tv” (VR male).

The immersive experience of virtual reality, compared to the relatively ‘normal’ experience of watching the documentary on the big screen (2D), was important to participants:

“It’s (virtual reality) more captivating. We can see way more than we can in 2D” (VR, male).

Sub-theme 3.1: Wow factor

Participants thought it was a great novelty to use the virtual reality headset:

“It’s pretty cool because it’s new” (VR, male).

Some were thrilled to use the headsets and explained it was due to a level of immersion:

“It’s kind of dizzying but actually extremely exciting as it doesn’t only give a first-person frame but shows the entire surrounds as well” (VR, female).

Others described the increased engagement of the class:

“It makes everyone focus more” (VR, male).

The combination of excitement due to novelty can improve engagement, but interestingly, it can also make it difficult to navigate emotions that may arise, particularly if there are positive emotions associated with using something new and exciting that are mixed with sadness about the story:

“Exciting but also feels like you are there so is also somewhat sad” (VR, female).

For those who watched the 2D version of the documentary, there were factors of nonchalance present varying from a satisfactory experience to stating that it was the same as the status quo:

“(Watching it this way was) ok I guess” (2D, male).

“Normal because I have watched many movies on a screen before with my peers” (2D, female).

Sub-theme 3.2: Immersion

This sub-theme describes the immersive elements of virtual reality that, as participants describe, “make you feel like you are there” and let you “see their life under a microscope”. Past research has suggested that this is a significant factor in potentially improving empathy, as a more fully immersive experience involves blocking out the sounds and the external environment so you feel more ‘as one’ with the situation and the other person. This immersion was important to the participants and contributed to their engagement experience:

“You feel more part of the moment because you see no other surroundings, just what’s on the screen in the headset” (VR, male).

Reasons why the immersion level enabled an engaging experience were offered by the participants. Firstly, it seemed to encourage a call to action: “You feel like you’re among them and it makes you want to do something about it more” (VR, male); secondly, it made them feel a part of the story and a part of Sidra’s experience more: “Makes you feel like you’re not watching a report, but a life” (VR, female); thirdly, participants suggested that it created a first-hand experience: “I’m in the moment” (VR, male) and “More personal” (VR, female); and finally, participants suggested it builds connections between the self and other and a sense of relatedness: “It creates a closer

connection between the viewer and the person” (VR, female). For those who did not have virtual reality, the lack of immersion meant other factors potentially impeded their natural response:

“You can see the (other people from the) class’s reactions and emotions unfold around you” (2D, female).

These three overall themes - the learning experience, the emotional experience, and the engagement experience - each impacted the way the participants engaged with the research, the story of Sidra, and the refugee crisis in Syria. They capture, through three different lenses, their understanding of self and other in the context of Sidra.

The aim of the final step in the thematic analysis process is to tell the story of the data through the themes and the research question (Braun & Clarke, 2012). In telling the story there needs to be an intricate integration of raw data excerpts within the analytical narrative (Braun & Clarke, 2006). The purpose of this step is to move beyond a description of the data and towards an acknowledgement of the legitimacy of the analysis (Braun & Clarke, 2006). This step (Phase 6) is addressed below in Section 5.5.

5.5 A Discussion of the Themes Through the Lens of the Self, Others and Virtual Reality

This section will discuss the story of the participants through the context of the research question: *“How does the use of a virtual reality program affect adolescent empathy and sympathy?”*. Firstly, it will discuss how the virtual reality experience impacts adolescent empathy and sympathy through the mediating factor of engagement (and immersion). Secondly, the connection between empathy, sympathy and pro-social behaviours (such as the call to actions and justice) and associated feelings of guilt after viewing this documentary will be analysed. Thirdly, the discussion will address how the

program (over time) impacts empathy and sympathy for those who viewed the documentary in virtual reality compared with 2D. Finally, limitations pertaining to this qualitative data analysis will be addressed.

5.5.1 Engagement and Immersion as Mediating Factors for Empathy and Sympathy

Engagement and learning. Although research in this field is still emerging and the findings are not always consistent, virtual reality experience has been shown to be engaging and immersive for students, although it can potentially distract from the task at hand (Allcoat & von Mühlenen, 2018; Guan et al., 2023). These preliminary findings have prompted recommendations that schools use virtual reality as an engagement tool for learning (Alberghini, 2020). Indeed, the link between engagement and improved learning is a key element of educational philosophy, and thus, engagement tools offer an important benefit to practitioners (Zepke, 2015). These suggestions from past researchers are supported by the findings in the current research.

Regardless of the format in which the documentary was shown (virtual reality or 2D), students showed similar types of learnings about the difficulties refugees face; however, there was a noticeable depth and detail of learning for students in the virtual reality condition. For example, this statement from the control (2D) condition suggests that new learnings occurred:

“I found this really enlightening because it gives a greater insight into hardships they have in their lives and how their society works” (2D, male).

This comment demonstrates that the documentary provided new knowledge that this may have led to new (potential) socio-emotional learning, regardless of the format used.

However, it is important to note that there tended to be more detail in these descriptions when watching the documentary using virtual reality. For example, one participant who used virtual reality stated when prompted with the same question:

“We both have to go to school, play sport and we both eat dinner with our families but she doesn't have any freedom and she is stuck inside a refugee camp with little resources. Sidra has spent the last year and a half outside her own country due to the bombing, which the little kids don't understand. Sidra and I both don't like warfare and violence”
(VR, female).

The depth in the second answer provides elements of cognitive empathy and a clear explanation of Sidra's perspective, plus an understanding of how the refugee situation would make Sidra feel. This same participant describes the engagement experience in terms of both novelty and immersion as being a significant factor in gaining that perspective:

“(Virtual reality was) amazing because you can really see everything and you feel as though you are there with them. Unlike a movie, you can see everything in their home, school and even outside and experience it for yourself” (VR, female).

Certainly, engagement was a key factor for those who watched *Clouds over Sidra* using virtual reality, and for those who did not use virtual reality, there was less engagement. One participant who did not use virtual reality described the process of watching the film in 2D with their peers as, ‘distracting’. These responses indicate that, whilst new learning can occur with a story regardless of digital format, there are participant experiences that demonstrate a deeper perspective with virtual reality, possibly connected to engagement.

Engagement and empathy. Previous research has suggested that virtual reality can improve empathy, and that greater engagement was the process connecting the two factors (Alberghini, 2020; Shin, 2018; Shutte & Stilinovic, 2017). Given the increase in potential learning and engagement using virtual reality described above, it was of interest to note elements in the current research that mirrored these findings when it came to empathy.

The current research suggests that engagement could be a mediating factor for improved empathy. There appeared to be links between the new learning using virtual reality and an empathetic experience. One participant linked the heightened engagement directly with cognitive empathy:

“It’s a kind of eye-opening experience, like how now, after so long, I can kind of understand how they’re feeling and what they feel when they’re away from their homes for an almost indefinite period of time” (VR, female).

This response indicates strong cognitive empathy that is linked directly with engagement. Another participant described the virtual reality experience as being ‘cool’ but that it also made them feel ‘empathetic’ and ‘sad’. There appeared to be a link between engagement and empathy.

Another showed affective empathy and cognitive empathy based on their new learnings:

“You can feel sorry... as they are sad that they are not in their homes, and they are living in tough and poor condition” (VR, male).

This participant drew links between the perspective and understanding the other person’s emotions when watching *Clouds over Sidra* using virtual reality, with elements of affective empathy too. This link between engagement and empathy reflects Shin’s

(2018) research, which suggests engagement is an antecedent to empathy in learning environments.

Immersion and empathy. The increased learning and empathy also occurred due to immersive factors. This was similar to previous research that suggested a link between immersion and empathy (Fonesca & Kraus, 2016). Some research has suggested that, without being ‘the narrative character’, but instead, being an observer, even in virtual reality, there will not be a significant impact on empathy/sympathy (Bindman et al., 2018). However, in the current research, it appears that immersion did help individuals understand the perspective of another a bit more easily. As one participant reported:

“It makes you realise how bad it actually is because you can see it and it feels like your (sic) there so you get a better understanding of how bad it actually is” (VR, female).

There was also a clear link between increased immersion and a subsequent improved ability to understand:

“I can really take in my surroundings which makes the information more clear” (VR, female);

“(Virtual reality) is much better than 2D because it gives a real-life perspective of the (refugee) environment” (VR, female).

These are important steps in trying to understand another person’s situation, which is a vital component of cognitive empathy. Therefore, it could be that cognitive empathy can be enhanced using virtual reality, with the most influential factors being improved engagement and immersion, as suggested by Han et al. (2022). Evidence of affective empathy in virtual reality appeared more limited. Whilst there was some evidence of this, many participants did not describe feeling sad because Sidra was sad.

A possible reason for this is that the engagement and enjoyment of virtual reality may impede a (negative) affective empathy element (Barreda-Ángeles et al., 2020). This was reflected in the current data and reflected in the following statement:

“It’s exciting (to use) and you also feel like you are there, so it is also somewhat sad”. (VR, female).

It is also possible that this could be explained by the affect shown by Sidra. Whilst she implies sadness, she does not say it directly, but instead describes being hopeful. Although she is shown wiping tears towards the end, she smiles during her introduction. When she states that she is frustrated; she is not openly angry. The narrator also uses a neutral tone, which may send mixed messages to those watching. This may make it difficult for younger people developing empathy to fully experience affective empathy of sadness, as so many other emotions are depicted. Considering affective empathy towards the refugee plight more generally, the children in the film are often depicted laughing whilst playing soccer or computer games; and we only see glimpses of sadness and crying. Since this is not explicit, it may be hard for adolescents to feel the ‘sadness with’ that is necessary for affective empathy, whatever the level of immersion. This ‘mixed messaging’ is demonstrated in the participant comments below:

“Sidra says she is enjoying it, but she still wants to go back to her home” (VR, female).

“Although she says there are some things that are better about the camp than back home in Syria, it must be very scary and traumatizing to learn that your home is no longer safe” (VR, male).

5.5.2 *Empathetic-responding to Clouds over Sidra*

Past research has suggested that virtual reality can be used to increase pro-social behaviours, and that empathy and sympathy are important mechanisms in these behaviours (Bailey et al., 2019; Shoshani, 2023). Pro-social behaviour is defined as any voluntary behaviour intended to benefit another person, such as helping or comforting (Eisenburg et al., 2006). In the current research, pro-social behaviour itself was not measured, but the participant responses tended to have strong themes of motivation or intent for pro-social behaviours through call to actions and sense of justice, especially immediately after viewing.

When watching *Clouds over Sidra* (in both virtual reality and in 2D form), participants expressed a strong desire to assist or help Sidra and the refugee plight, even though these were not measured through actual actions. Nonetheless, given the proposed link between pro-social behaviours and empathy as described in the empathy-altruism hypothesis proposed by Batson et al. (1991), these responses could be an indicator of empathetic-responding. One participant using virtual reality showed cognitive empathy in terms of the cause of their call to action:

“(It was) thought provoking as it gives an insight into what they experience and makes (me) feel as if I should do something to help” (VR, female).

Another linked a call to action to the sympathetic experience:

“Sad to watch as it makes you feel bad for them and you want to help them” (VR, female).

The current research suggests that the call to action and wanting to help is an important outcome of viewing the documentary, regardless of whether they watched it in virtual reality or not. For example, a participant who watched the documentary without virtual reality stated:

“It's quite sad to see how these people live and how they don't get what we have and what they deserve. Its (sic) heartbreaking to see that, it makes me want to get all the people living like that and to bring them to Australia and help them to have a life we have” (2D, female).

This description shows the power of the documentary, in and of itself. The response reflects empathy, new knowledge and call to action. One participant linked the virtual reality experience with engagement, learning and then made a call to action:

“Interesting and changes my mind set and makes me want to help them out” (VR, male).

This suggests that, whilst the medium seems irrelevant compared to the documentary in considering sympathetic responses, the virtual reality experience may offer greater empathetic response when the engagement and new learnings factors are considered. Guilt is sometimes linked to pro-social behaviours and is made up of two dimensions, awareness and sympathy (Basil et al., 2006; Vaish & Grossman, 2022). However, other studies, such as that of Hoffman (2008), have suggested that empathy contributes to higher guilt. The statements of guilt in self-reflection are likely to suggest some sympathetic and empathetic responding.

Privilege lends itself towards sympathy over empathy. Sympathy is more often linked to a clear delineation between the self and other, to the point of power relations existing between self and other (Davis, 2004); that is, there is a victim, and someone in a more privileged position feels ‘sorrow’ for that victim. Therefore, if a student ‘feels sad’ and indicates their privilege in self-reflection, that is likely to be an indication of sympathy. For example, privilege and sadness is described by this participant, indicating that the documentary can invoke sympathy:

“It makes me feel like sad for them and it makes me realise how lucky I am”
(VR, female).

Participants in *both* the virtual reality condition and the 2D condition both showed sympathy, privilege, and guilt. This indicates the documentary alone provided strong sympathetic reactions, and some empathetic responses, likely due to raised awareness (indicating cognitive empathy). The emotional reactions of sympathy about the story of Sidra remained similar between conditions, whereas empathy differed between conditions, based on a sense of perspective and new learnings. An explanation may be that, whilst sympathy may not necessarily be mediated by immersion and engagement, it appears empathy might be.

5.5.3 Empathy and Sympathy Over Time

The participant responses did not tend to indicate a residual empathy/sympathy towards Sidra and the refugee cause over time. In analysis of the participant responses, there tended to be three key points participants described in the two weeks after their experience that were retained.

1. New learnings about the documentary. For those who used virtual reality they could repeat some new learnings that had stuck with participants. For example, they could recount specific detail such as:

“I could go on a computer (and she can’t)” (VR, female).

“I live in an actual two-story furnished house whilst Sidra [lives] in an almost shack-like dwelling. Along with things like education and the gender-gap [are different]” (VR, female).

These observations mostly remained in the form of comparison. This comparison could indicate a benefit to knowledge retention as it could be linked to schema building.

Importantly, retaining an understanding about the situation Sidra is in can be considered an element of cognitive empathy, and so virtual reality can provide traces of cognitive empathy which either remain, or that are ready to be revisited. This would support a continuous, whole-school approach to empathy development. In addition, the new learnings were strongly linked to the engagement experience of virtual reality, which supports existing research that suggests that engagement will improve learning.

2. It was fun. Participants remembered the engagement experience and the novelty of the virtual reality experience. For example, some participants described the experience weeks later as follows:

“Interesting as there was a sense of involvement in the story (VR, male).

“Personal, it adds a layer of something akin to personality into the documentary” (VR, female).

As noted above, this could indicate a useful benefit of virtual reality where it can be built into the socio-emotional learning program. This may enable students to remember what happened and to build empathy, especially if supported with a whole-school approach.

3. It was sad. One participant later recounted the virtual reality experience as “Sadder than movies” and many participants left their answer as simply ‘sad’ although this was similar for those who watched 2D and those who used virtual reality. Whilst there was some limited residual commentary from participants about guilt and privilege two weeks after the survey, only one participant mentioned intended pro-social behaviour in their response. This indicates that any call to action was short term in effect. This is important for not-for-profit and charity groups looking for donations using this type of experience. The actions need to be enacted very quickly after stimulating empathy or the motivation to act will fade away or be forgotten.

These comments suggest that any longer-term change in empathy due to the virtual reality (and the documentary itself) was minor; rather, what existed later for some participants was a general feeling of sadness and an increased understanding of the situation. This is somewhat expected in any learning that is not re-visited regularly throughout a child's schooling. Figures 13 and 14 show a possible model for how this retention may occur in relation to empathy and sympathy across the conditions of virtual reality and 2D viewing, based on these experiences, that could be studied in the future.

Figure 13

The Participant's Experience of Using Virtual Reality to Watch Clouds Over Sidra Over the Study Duration

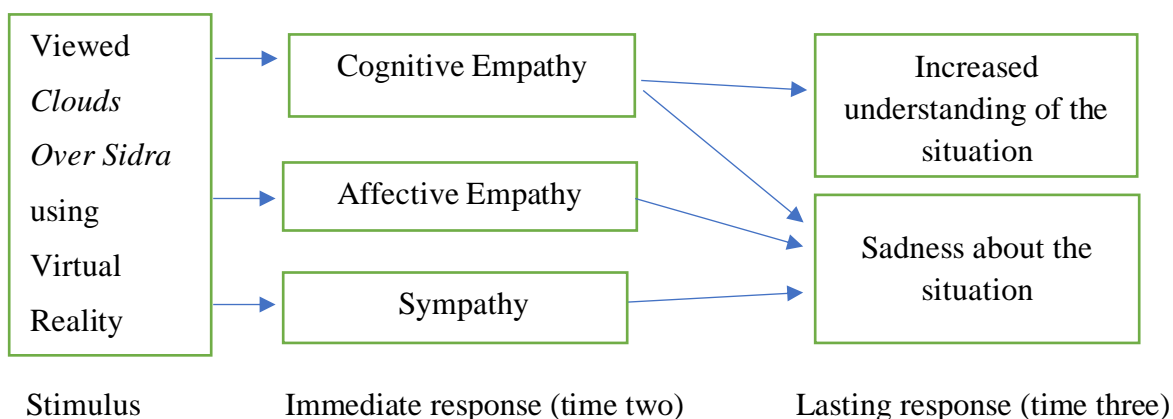


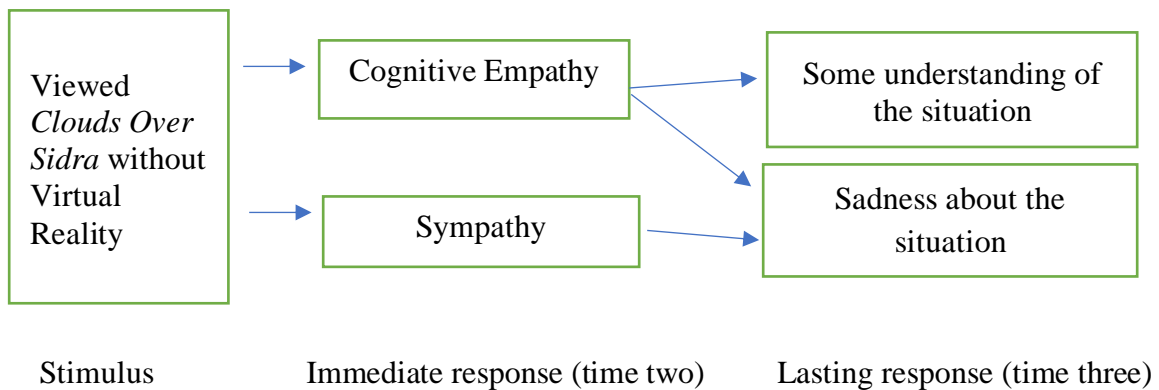
Figure 14 models less understanding of the situation under the 2D condition than the virtual reality condition over time, but that a similar sadness persisted, highlighting what the documentary itself could produce over two weeks. This diagram also proposes how cognitive empathy and sympathy can foster an enduring understanding and sadness. Whilst elements of cognitive empathy and sympathy were expressed immediately after viewing *Clouds over Sidra*, affective empathy was not described.

Furthermore, the initial expressions of cognitive empathy and sympathy were not sustained over time, other than a broader improved understanding of the situation and as a general sadness.

Figure 14

The Participant's Experience Watching Clouds Over Sidra in 2D Over the Study

Duration



In summary, it appears that the experience of virtual reality may elicit some strong empathetic reactions and improve affective empathy in some; however, any changes that emerge tend to be temporary and limited. What persists is a lingering emotion and understanding. This suggests that virtual reality may improve elements of empathy but would be better used as a tool amongst many differing teaching options for socio-emotional learning. The importance of consistent opportunity to engage with varying elements and stimuli of socio-emotional learning is also highlighted.

5.5.4 Limitations and Recommendations

This section will discuss three limitations within the qualitative study. The first was that adolescents completed these qualitative elements as a self-report questionnaire. Participants tended to give deep descriptions of their feelings of sadness, but, without

the possibility of a follow-up interview due to practical constraints with the school used, it was difficult to ascertain if these feelings were related to sympathy or affective empathy. Many participants just wrote 'sad'. Furthermore, as described in previous chapters, although empathy is commonly assessed using self-report methodologies, there are several limitations to the process, including biases such as presentation (especially in schools), motivation, social desirability and response biases (Lovett & Sheffield, 2007; Neumann et al., 2015). Finally, a level of self-awareness is required when considering empathy and self-reports, along with adequate language to pinpoint and describe an empathetic experience; this may be difficult for adolescents (and indeed, some adults) (Batson, 1990). Whilst this research attempted to mitigate the issues of developmental self-awareness by not focusing on participant evidence of 'self' and 'other' descriptions for affective empathy, and instead focused on a sharing in feelings with Sidra or the other refugees, this limitation should be noted.

A second limitation was that the coding was completed only by one researcher as part of the thesis program. It would be ideal to have more than one coder as this can improve trustworthiness and data quality (Church et al., 2019). Whilst a second researcher investigated themes, data and the codebook, and provided their thoughts and feedback, they did not formally complete the coding process, due to constraints with timing and availability.

Another limitation was that due to practicality issues, the qualitative questions were not piloted prior to surveying. This is considered an important step in conducting online qualitative surveys and meant that changes could not be made to the questions after they were developed (Braun et al., 2021). However, it should be noted that participants appear to have responded well to the open-ended questions, with 100% of participants entering a response for at least one open ended question at time two, and

98% of participants still in the research entering a qualitative response at time three. This high response rate yielded a range of data that were able to be analysed, indicating that there does not seem to be any evidence of students struggling to understand the questions. Moreover, the high response rate by participants in answering these three open-ended questions, though they were optional, suggests that the questions were well received and understood.

It is recommended that future research studies of this type facilitate post-interviews to ask follow-up questions on participants' feelings in order to give an indication as to whether these comments of 'sadness' are related to affective empathy or sympathy. Whilst some participants were able to use language that demonstrated a 'feeling with' that occurs with affective empathy, more detailed data investigating affective congruence may be able to be gathered with interview or focus-group style questions.

It may also be beneficial to give participants an opportunity to show pro-social behaviour, rather than just stating their desire, and interviewing them in the process. This could shed light on the reasons for the call to action and justice responses that were determined in this research.

5.6 Conclusion

Virtual reality provides opportunities to demonstrate empathy and sympathy for the individual (in this case, Sidra) and for groups in need (in this case, refugees). Schools investing in virtual reality and using it for socio-emotional learning in terms of empathy development are recommended to use this tool occasionally, as an opportunity to engage adolescents in a novel way. With this kind of engagement, students are more

likely to 'take-in' the story of the refugee plight, which is an important first step in the development of (cognitive) empathy. The story of Sidra and the refugee crisis elicited similar sympathetic and some similar empathetic reactions when it was shown in 2D in this qualitative study. In terms of potential social justice or pro-social behaviour, the current research indicates that the story of Sidra was as important as the media format in which the story was delivered, although it is recommended that this trend be investigated further in future research. One way that this could be done is by measuring pro-social behaviour intentions and actions after the intervention (virtual reality or 2D); for example, using a pro-social survey and self-report on actions taken after the intervention.

In terms of socio-emotional learning, this qualitative work appears to demonstrate that there are benefits to using virtual reality for socio-emotional learning and for empathy, and that using virtual reality does not appear to hinder acquisition of empathy and sympathy. If a face-to-face program is not available, virtual reality may provide some opportunity to build empathy in adolescents. However, its use is perhaps limited as the advantage of engagement through novelty may wear off. Therefore, rather than being used as a standalone tool, virtual reality may be better used by schools as a means of sparking a conversation around empathy and thereby contributing to a longer, sustained program of socio-emotional learning.

Chapter 6: Discussion and Conclusion

6.1 Introduction

This chapter brings together the results from both the quantitative and qualitative studies. Given the divergent results, a triangulation in the context of the research questions is first provided in Section 6.2. This section also addresses the hypotheses posed in the context of considering both the qualitative and quantitative data. Section 6.3 considers the place of the current research within the existing previous research on virtual reality, empathy and adolescents. Section 6.4 highlights key contributions which are considered within the context of past research. This section also discusses practical implications of the thesis for the broader context of schools and policy makers. Section 6.5 describes limitations and some recommendations for future research. It also outlines the overall significance of the thesis. Finally, Section 6.6 provides a concluding summary of the thesis.

6.2 Research Questions

6.2.1 Question 1: “Does the use of a virtual reality program affect adolescent empathy and sympathy?”

The findings suggest that both cognitive and affective empathy can be improved using a novel, emotion-provoking virtual reality program, at least in the short-term. However, there is not a significant improvement in these concepts compared to 2D viewing of the same documentary, which also raised cognitive and affective empathy. Thus, it appears that overall, it was the program that impacted empathy, rather than the use of virtual reality itself. However, in considering both data sets together, the findings do provide support for the use of virtual reality as an engaging option available to

educators to improve empathy. The findings indicate that empathy can be improved with an intervention, which is helpful for schools and policy makers investing in SEL programs, and behaviour management programs. As described in Chapter One, it is part of both the Australian Curriculum and Victorian Curriculum to develop empathy in students, and thus this finding may be useful for practitioners and schools seeking to adopt or who are currently adopting an empathy-provoking intervention into these curriculum frameworks.

In considering longer term effects, the qualitative data suggested that there were some lasting impacts of a virtual reality program on empathy, but, in concordance with the quantitative data, empathy itself was not sustained over the longer term. Rather, there were new learnings and understandings and feelings of residual sadness. Therefore, the use of a virtual reality program can improve empathy, but this improvement is not long-lasting. This indicated a clear similarity in the qualitative and quantitative data that there was no clear long-term change in empathy after the intervention. In both the data sets, there tended to be more effect on empathy immediately after the intervention. This suggests that any intervention for empathy development needs to be sustained or embedded in a whole-school program.

The virtual reality program had a different effect on sympathy. First, considering the quantitative data, sympathy levels followed a different path to empathy. At time three, two weeks after the intervention, sympathy levels were at their lowest, when compared with baseline levels pre-intervention. However, a possible ceiling effect for sympathy at time one must be considered. At the commencement of this study and pre-intervention, the quantitative data showed evidence of strong feelings of sympathy within both groups. This suggests that the high levels of sympathy at this point were not a direct effect of the virtual reality program or the documentary itself.

A possible reason for this ceiling effect prior to the intervention, is social desirability bias, as discussed in Chapter Four. Although steps were taken to minimize the risk of this bias occurring, such as by reminding participants that their answers would remain anonymous, and the qualitative questions being optional, the increased risk of social desirability bias for research investigating personal and socially value-laden topics such as empathy is noteworthy (Grimm, 2010). The issue of empathy and refugees that are described in this research would be considered personal and value-laden topics, and so students might want to respond in a socially acceptable light, particularly in the school context. Furthermore, the presence of a researcher may also increase social desirability bias (Grimm, 2010). This may also explain why the degree of sympathy was higher the first two times that it was measured (quantitatively), as the researcher was present for both these assessment periods, but absent for the final measurement, which is where sympathy levels declined. This will be discussed further in the limitations and future research recommendations section of this chapter.

The high levels of sympathy indicated by the quantitative data may also reflect some of the limitations of measuring empathy through forced choice scale responses. Forced choices may lead to poor respondent experience or lack of accuracy. This may be because the participant may feel annoyed that they have to choose from a set of pre-set responses that may impact their ability to respond to their feelings truthfully, so they rate sympathy 'high' throughout the study. To mitigate this, the current research includes the qualitative research as it is important because there is a need in any forced choice response survey to include open responses (Kintzer, 1977). By doing this there may be evidence or verification of forced choice responses, or there may be a different appraisal required (Kintzer, 1977). This shows the strength of the mixed methods design of this thesis research as it can use the qualitative research and expansion of the

participant response to see that some possible sympathy for Sidra did exist at time three (two weeks later), demonstrating a possible residual sympathy that the forced choice responses from the quantitative research did not detect as significant. This supports the idea that future research may need to utilise interviews for further insight, which will be discussed in the future research recommendation below in this chapter.

As discussed in Chapter Five, there was an overall sense of ‘sadness’ indicated in the qualitative data at time three that was not highlighted in the quantitative data. This is important to know, as there may be residual emotions that may be retained after an intervention, even if empathy is not sustained. These residual emotions may be related to sympathy, and there were certainly indicators of sympathy, such as expressing sorrow at the misfortune of Sidra. Thus, although the quantitative data showed a decrease in sympathy by time three, the qualitative data shows that there is a potential that some sympathy may be retained. Overall, the expression of sadness and sorrow specifically for Sidra at time three was evident, and the language around the sadness was linked to sympathy over clear empathy after two weeks at time three. This shows the strength of conducting qualitative empathy research, as the data is richer and more in depth than the quantitative measurement. The design of the qualitative research in the thesis was such that it allowed the participants to answer open questions, enabling the participants to answer honestly rather than in a pre-determined way (Grimm, 2010). Thus, it is reasonable to suggest that the qualitative data were able to show that there was some sympathy directed specifically towards Sidra that was longer-lasting; however, the causes for this sympathy remain unclear.

Another explanation for these contrasting findings is that the quantitative and qualitative questions were measuring different types of sympathy. For example, the qualitative recordings of sympathy observed at time three in the virtual reality group

appeared to be directed to Sidra, rather than displaying ‘sympathy’ as a general concept of increased sympathy. This could be explained by the fact that the AMES (Vossen et al., 2015) measures generic sympathy, whereas the qualitative data did not describe generic sympathy, but a more directed and specific sympathy related to the refugee experience. This could be further explored in future research as it is important to understand and seek to clarify whether an intervention such as *Clouds over Sidra* is enhancing empathy (and sympathy) more generally, or whether it can instead enhance empathy targeted towards a particular group or individual. Given the current research was designed to look at overall empathy (as measured in the AMES survey), rather than specific contextual empathy, it is important to note that there is much that could be uncovered here in future research, which will be discussed later in this chapter.

It is also important to note that overall sympathy levels were higher than both empathy types at time three, despite the decline in sympathy over time. Whilst this demonstrates the importance of mixed methods, and in particular, the importance of including the qualitative element in the research, it is also important to highlight that the current research indicates a key demarcation between each of these concepts and is consistent with past theoretical understandings in this area (Lamm et al., 2019). Whilst the current research is not directly investigating the relationship between the two, these concepts should continue to be carefully measured and researched as separate concepts, due to the differences found in both the qualitative and quantitative data. The AMES survey (Vossen et al., 2015) as a quantitative measure produced differing results for affective empathy and sympathy, further supporting the theory that empathy and sympathy are different concepts. Considering the differences in the pattern of responses from the data for empathy compared to sympathy, the findings support theorists who

argue that future measures need to have a clear delineation between affective empathy and sympathy (Reniers et al., 2010; Vossen & Valkenburg, 2016).

Although there is limited longitudinal research in this area, the few studies that have investigated sustained benefits have found that empathy interventions did not tend to have long-lasting effects on empathy (Hasler et al., 2021; Herrera et al., 2018). The results of the current research are consistent with this past research. The short-term change in empathy experienced in the current research could be explained by conceptualising forms of empathy as state or trait empathy. Some theorists suggest variation in empathy generally occurs due to relatively stable individual-difference factors referred to as trait empathy (Cuff et al., 2014). There are also situational or state factors that impact empathy, which is why empathy can be stimulated by one-off interventions as described in Chapter Two (Cuff et al., 2014). It is possible that the short-term increase seen in empathy provoked by the film could be explained by conceptualising the change due to state or situational empathy, rather than trait empathy. Provoking a change in situational empathy also explains the decline in empathy at the third time point, where empathetic responses would be due to trait empathy. Conceptualising empathy in this way suggests that one-off interventions may invoke an empathetic state response, rather than impacting relatively stable trait empathy. The approach of using a one-off intervention is a similar design to most research on empathy interventions (Durlak et al., 2011). Recommendations of investigating the effect of an embedded program of empathy are explored later in Section 6.5.2.

In summary, both the qualitative and the quantitative data suggest higher levels of sympathy for the plight of refugees more broadly throughout times two and three than empathy, but whilst the quantitative data suggests sympathy decreases over time, the qualitative data suggests that there is a more long-lasting sympathy. One possible

reason for this difference is the ceiling effect, due to the social desirability bias in the quantitative data, whereas the qualitative data could not have the same ceiling effect. Thus, the results suggest that adolescents can experience high levels of sympathy using a virtual reality program, however, this result may be confounded by the content of the film and levels of social desirability bias. Overall, in answer to RQ1, a virtual reality program can improve both affective and cognitive empathy in the short-term.

6.2.2 Question 2: “Do adolescents receiving the same information from different mediums with different immersion levels (virtual reality vs 2D projected film) have different empathetic and sympathetic reactions?”

Whilst the quantitative data suggested differing immersion levels did not lead to differences in empathetic reactions; the qualitative data indicated there was a difference in empathetic and sympathetic reactions in terms of immersion. In the qualitative data, there was some evidence of participants articulating affective empathy in the virtual reality condition. Whilst this evidence was limited to a few participants, this was not observed at all in the 2D condition. Moreover, there were responses indicating a call to action or a guilt response in the virtual reality condition, indicating a different form of empathetic responding. Affective empathy can provoke these types of empathetic responses. For example, affective empathy may provoke a response of personal distress, that may lead to guilt and thus, these could be indications of affective empathy, although this pathway would need to be further investigated in future research (Stevens & Taber, 2021). On the other hand, given the qualitative data indicated that there were limited elements of possible affective empathy only shown in the virtual reality group, it

could suggest that the experience of immersion provided through virtual reality may provide an opportunity for affective empathy that otherwise may not occur, although this needs to be investigated further. It could be that this difference between the findings of the qualitative and quantitative data is because the affective empathy described by participants was very targeted to the experience of the individual, in this case, Sidra, whereas the quantitative research was broader in its scope of measuring affective empathy levels overall.

It could also be that virtual reality provides a way to enhance affective empathy to an individual or the group they belong to, but not to a broader group or in terms of overall empathy development. This might explain why it is reported in media that the United Nations gets more donations to the plight of Syrian Refugees specifically after individuals use virtual reality to view *Clouds over Sidra* (Gaudiosi, 2016). In other words, there is not improved empathy overall that is developed by using virtual reality; instead, it is a short-term affective empathy targeted to the plight of Sidra and Syrian refugees. Given the increased donations that the United Nations have found, it may also be prudent to investigate whether it is affective empathy that is more likely to increase pro-social behaviour, such as charitable donations and helping, rather than cognitive empathy, as indicated by the qualitative data of both the virtual reality and 2D groups. Some initial research in the area has indicated that virtual reality can improve potential charitable donations (Gürerk & Kasulke, 2022; Nelson et al., 2020). Interestingly, the study by Nelson et al. (2020) found that a negative framing of the message was more likely to elicit donations than a positive framing, suggesting that affect could be a mechanism that is worth investigating further. In the study by Gürerk and Kasulke (2022), there was higher empathetic concern (empathetic- responding linked to affective empathy) in the virtual reality condition, one that was linked to more charitable

donations. This further suggests that it is affective empathy that is elicited by virtual reality that leads to donations. This insight could benefit a range of not-for-profit organisations and charities in guiding how they fundraise in the future. Not only is virtual reality experience fun, engaging and novel, but it may also provide an enhanced (affective) empathy experience that could encourage greater donations. Other ways of improving affective empathy towards a situation may also be researched to improve donations to not-for-profit organisations.

In terms of cognitive empathy, the qualitative findings showed a strong understanding of Sidra's perspective, regardless of whether the story was watched in 2D or virtual reality. This is consistent with the quantitative finding that cognitive empathy improves in the short-term, based on an intervention of an emotion-provoking documentary, regardless of condition. However, the qualitative data also indicated there was a greater understanding of Sidra's perspective in the virtual reality condition, where there was higher participant immersion. Theorists generally consider cognitive empathy to be made up of both perception and understanding of another's position (Feshbach, 1997; Preston & Hofelich, 2012). Through the qualitative data, it was apparent that it was not necessarily the perception of emotions of the other person (one part of cognitive empathy) that was enhanced, but rather, the improved understanding. Moreover, the qualitative finding that showed that there was more residual understanding for those in the virtual reality condition two weeks later, was different to the overall finding of the quantitative data, which suggested that any improvement in cognitive empathy was short term, and consistent across conditions. This is an important finding because it might be considered difficult to perceive Sidra's feeling of sadness within the documentary, as they are sometimes laughing, and talk of hope. Therefore, if improved understanding of another's situation is important in cognitive empathy, and this

understanding is retained, this may indicate that virtual reality can be used effectively with those who have less developed cognitive empathy because they have more difficulty in understanding another's perspective. This is especially relevant for any sustained empathy development, as shown in the qualitative data, and warrants further investigation.

There were similarities within the two immersion levels when it came to sympathetic reactions. For example, as previously described, overwhelmingly, there was an emotional reaction of sadness, regardless of level of immersion in the qualitative research. Feelings of sympathy also appeared to be similar between the groups (virtual reality or 2D) in the quantitative research. This suggests that when considering both data sets, the immersion levels do not elicit different sympathetic reactions when exposed to an emotion-provoking film.

The results align with recent research and theory that suggests that virtual reality does not improve empathy over other interventions with less immersion (Hasler et al., 2021; Sora-Domenjo, 2022). In terms of the debate on whether virtual reality is the "Ultimate Empathy Machine" this research differs from other past research that suggests virtual reality may improve empathy in the short-term compared to control conditions (Alberghini, 2020; Shutte & Stilinovic, 2017; Trudeau et al., 2023). These differences may be due to the variation in measures used. For example, the research by Alberghini (2020) used a self-designed questionnaire, and Shutte and Stilinovic (2017) used a version of the Interpersonal Reactivity Index (IRI). These measures have sometimes been criticised for not clearly delineating between empathy and sympathy, as previously discussed in Chapter Two.

Overall, quantitatively, different immersion levels do not lead to different empathetic and sympathetic reactions, although there are some nuanced differences

between the conditions as illustrated by the qualitative data that should be further explored in future research.

6.2.3 Question 3: “How does the use of a virtual reality program affect adolescent empathy and sympathy?”

This question, in particular the ‘how’ aspect, was aimed at guiding the qualitative research, and so is answered by this data predominantly. As mentioned in Chapter Five and previously, a virtual reality program can elicit a short-term increase in both affective and cognitive empathy, but it does not seem that immersion of virtual reality is key to this improvement. The qualitative research indicated there may be other mechanisms of virtual reality that have led to improved empathy beyond just the program. Factors such as increased engagement in the program using virtual reality could mediate the improvement in empathy in the short-term. This is an important consideration for researchers and educators and is in line with past research. Considering the quantitative research as well, it is apparent that the increased understanding seen in the qualitative data is possibly not enough to say that adolescents will improve *overall* cognitive empathy when using virtual reality compared to 2D, but it does show that facets of cognitive empathy (understanding and perspective-taking) may be improved to some degree.

6.2.3 Hypotheses

The first hypothesis was that 13-15-year-old students who experience the documentary *Clouds over Sidra* would experience an increase in affective and cognitive empathy and sympathy. Results indicated that for both conditions, there was a one-time,

immediate increase in both cognitive and affective empathy after viewing, but this change was not sustained after two weeks. Sympathy decreased over time to its lowest point at time three. Therefore, whilst this hypothesis was supported for both cognitive and affective empathy, it was not supported in the case of sympathy. The effect sizes for these changes were small.

The second hypothesis was that 13-15 year olds who experience *Clouds over Sidra* using virtual reality would experience a larger increase in empathy after viewing the documentary, compared to those who saw it in 2D. Results from the quantitative research suggest that this is not the case. However, the qualitative research highlighted elements related to cognitive empathy in the virtual reality group that did not exist in the 2D group, and empathetic-responding associated with affective empathy, thus indicating that there could be more to explore in this area.

The final hypothesis was that 13-15 year-old students who use virtual reality to watch the film *Clouds over Sidra* would experience a larger increase in sympathy after viewing the documentary, compared to those viewing the 2D projected format. This was not supported. Quantitatively, sympathy levels increased similarly for both groups at time two and decreased at time three, a pattern somewhat supported by the qualitative data. As previously described, these results highlight a similarity in both forms of data; that is that sympathy was evident throughout the research, but that it followed a different pathway to empathy, supporting literature that argues that empathy and sympathy are distinct concepts. Although sympathy is not the focus of the current research, it is still important to measure and consider the concept, due to its repeated conflation with empathy (Vossen & Valkenburg, 2016).

In conclusion, when triangulating the two data sets, it seems that a targeted emotion-provoking documentary can improve both short-term cognitive and affective

empathy in adolescents. The question as to whether virtual reality and the subsequent increased immersion can improve cognitive and affective empathy, however, had an inconclusive response. It can be concluded from the data sets that, whilst using virtual reality may not have a more significant impact than 2D film on both types of empathy by itself, it also does improve empathy at similar levels to a 2D film version.

Importantly, it could be that virtual reality enhances affective empathy towards a targeted group over the short-term and, in the case of cognitive empathy, improves understanding of another's situation, which may itself be longer-lasting. This is a fruitful area for future research to investigate.

6.3 Comparison with Past Key Studies

The following section considers the main findings of this research in the context of key studies in the research literature. Most studies on virtual reality and empathy have been conducted within adult populations, focussed on medical uses, or have not been focussed on empathy as a key concept (e.g. Herrera et al., 2018). This section addresses these studies first. To date, there have been only four published studies like the current project, similar in that they measured virtual reality, empathy and used adolescents. Given the aims of this project, these provide ideal points of comparison in respect of empathetic development and socio-emotional learning.

This thesis's findings support the research of Hasler et al. (2021) and Herrera et al. (2018), who suggested it was not the virtual reality as such that increased empathy, but rather the greater opportunity for perspective-taking. In the current research, participants in both the 2D and virtual reality condition improved empathy overall for the short-term, and this was observed through both qualitative and quantitative data.

This may be because both conditions had a perspective-taking intervention and offered a first-person perspective. The results could also be explained by the perspective-taking opportunity provided by the film, and simply demonstrate that immersion is not the key mechanism to experiencing empathy. On the other hand, as Hasler et al. (2021) suggest, it could be that emotional arousal through an emotional film that has perspective-taking elements is better at inducing empathy.

It is recommended that more research be undertaken to investigate this aspect, to see if a series of perspective-taking experiences could be used to improve empathy, possibly as part of a program on empathy development. Herrera et al., (2018) argued that any change in empathy due to virtual reality was not sustained over time. However, this study did find that some enduring positive attitudes for the virtual reality condition, which were not experienced in the other condition. In addition, the virtual reality condition had higher self-reported empathy immediately after the intervention.

Other than using adults, an important difference between the wider research and this project, is that the virtual reality experience by Herrera et al. (2018) involved much more interactivity and autonomy, and a greater sense of embodiment. There was an option of ‘clicking’ and interacting within the environment. It should be noted that this study used the Interpersonal Reactivity Index (IRI) as a measure. Researchers suggest that a perspective-taking task will lead to empathy improving in the short-term, but in considering this finding with the current perspective-taking research plus that by Hasler et al. (2021), perhaps it is the interactivity and embodiment intervention that leads to an attitude change.

Previous research focussing on adolescents has indicated larger empathy improvements with a video shown through virtual reality than a 2D format. In a study on 107 middle school students, Alberghini (2020) found that the video *Clouds over*

Sidra had greater empathy benefits for those in the virtual reality condition, compared with participants who viewed the video in a 2D format. The current program of research does not support these particular findings of Alberghini. However, it should be noted that there are some key differences between these two studies in measurement, design and materials. Alberghini used a within-design only, where participants were exposed to both the virtual reality condition with *Clouds over Sidra* and the 2D experience of *Step into a Refugee Camp*. Although carryover effects were intended to be minimised by alternating the presentation of questions, it may have been the case that the impacts of these carryover effects only happened after both films were viewed, and there did not appear to be a counter balancing of groups. The authors themselves note the possible threat to the validity of their research (Alberghini, 2020).

Moreover, the two documentaries presented to participants were not just different in immersion levels, but also in content. *Step into a Refugee Camp* is an information-based documentary with interspersed audience questions to the refugees, who answer them. This was the documentary presented in 2D, whereas *Clouds over Sidra* was presented through virtual reality. Thus, it may be the different content presented rather than the different immersion levels or virtual reality experience that influenced the degree of empathy.

Also, whilst a thematic analysis was undertaken, no statistical analysis beyond that of percentages was completed on the quantitative research, limiting possible generalisations. Finally, given the study does not focus on the impact of sympathy, and asks questions related to ‘responsibility’, there is a possibility of confounding the meaning of these terms, and whether sympathy or another concept is increased by virtual reality. Without any inferential statistical analyses, it is difficult to ascertain the

meaning of the results of the quantitative work in order to draw a fair comparison between the two data sets.

The impact of the novelty factor of virtual reality is important to consider as it can risk trivialising the data (Alberghini, 2020). However, the previous research suggests that, rather than being problematic, such characteristics can promote engagement and interactivity, a finding consistent with this current study. Alberghini suggests that engagement found within the qualitative data may be an important element that promotes empathy. The current findings tend to support these conclusions, as the qualitative data theme that emerged in the current data, *the Engagement Experience*, indicated the importance of engagement for participants in the current research. Finally, Alberghini's qualitative findings suggest that virtual reality may improve understanding. They suggested that whilst *Clouds over Sidra* does not explicitly seek to give information (in comparison with their control activity), participants still gained understanding through immersion (Alberghini, 2020). The current findings support and build on the finding by Alberghini that there was a longer-lasting understanding of the refugee situation for those using virtual reality.

Another similar study by Ingram et al. (2019) found that when middle school students aged 11-14 years used virtual reality for a six-lesson anti-bullying program, their empathy increased compared to students who had regular classes. Although this study used different materials to this thesis and had quite different aims (the reduction of bullying), it did show that virtual reality had a greater effect when measured on a five-point Likert scale assessing empathy, which itself was a sub-scale of the *Teen Conflict Scale* (Bosworth & Espelage, 1995).

There are a number of reasons why the current findings are not consistent with this past research. One reason may be that the empathy subscale used has five items and

does not clearly differentiate between affective and cognitive empathy in its measurement. Furthermore, some of the five items provided in the *Teen Conflict Scale* can be interpreted as referring to sympathy, such as Item Three, which states “I get upset when my friends are sad”. Similarly, Item Four, “I trust people who are not my friends”, could indicate how trusting the participant is, rather than empathy. Finally, there appears to be only one statement that relates to cognitive empathy which is Item Two: “Kids I don’t like can have good ideas”. This could also relate to other concepts such as the personality trait of openness. Given the difficulties in defining concepts such as empathy and related constructs, the use of this scale may explain the differences in results compared to the current findings. The authors state the use of the scale, with an alpha co-efficient of 0.60, does represent a threat to the study’s internal validity. Another explanation for the difference between the current study and Ingram et al.’s (2019) is that the control group did not undergo an anti-bullying program of any sort and did not have a specialist teacher. This provides support for the idea that any perspective-taking intervention might improve empathy, not necessarily using virtual reality, which is in line with Herrera et al.’s (2018) findings. However, this research, like the current program of research, does attempt to mitigate the novelty effect of virtual reality by administering the post-test questionnaire one week after the intervention.

In a similar mixed methods study on historical empathy, Riner et al. (2022) identified the positive benefits of virtual reality in a Humanities classroom. Although ages were not mentioned, the 44 participants were high-school freshmen in the United States, which suggests participants were 14-15 years old. Whilst the quantitative research found no significant effect of improved engagement, it did find an improvement in historical empathy in those using virtual reality, compared to a control

group that used an interactive website to explore the same topic and material. However, that research involves historical empathy, and not cognitive and affective empathy specifically, and as previously mentioned, the purpose of historical empathy is usually related to conceptualisation, not necessarily socio-emotional learning (Riner et al., 2022). Although the current study did not set out to investigate concepts of engagement and knowledge directly, the research by Riner et al. (2022) found that although the quantitative research did not show a significant improvement in engagement or knowledge for those using virtual reality compared to their control, the qualitative data did. This aligns with this dissertation's research finding based on the qualitative data; that increased understanding and engagement was reported in those who used virtual reality.

Finally, the most similar study to the current research was conducted by Trudeau et al. (2023) and involves 60 students aged 12-13 years. Whilst Trudeau et al. noted that both the 2D and virtual reality interventions improved empathy, they observed larger increases in empathy due to virtual reality. Like the current research, Trudeau et al. used the Adolescent Measure of Empathy and Sympathy (AMES) (Vossen et al., 2015). As the current study did not find the same marked improvement in empathy within the virtual reality group as Trudeau et al. did, compared to the control (2D) condition, its conclusions are still relevant.

Firstly, although Trudeau et al. used a different film stimulus, *The Displaced*, this documentary is very similar to the story of *Clouds over Sidra*, as it is comprised of self-told stories about refugees. One difference, however, is that there are more stories told, whereas in *Clouds over Sidra*, only Sidra's view is shown. Given the current findings showed virtual reality improved empathy towards Sidra, but not more broadly, it can be argued that showing several stories is more likely to improve empathy overall,

rather than just one story, where empathy becomes more targeted and linked to that specific case.

In addition, although there were only slight differences in the age range of the participants between these two studies, the slightly younger group (12-13 years) investigated by Trudeau et al. (2023) as opposed to the 13–15-year-olds in the current research, may also be a factor. For example, the younger group may be more influenced by the virtual reality immersion factors, either by reasons of novelty or for a developmental reason associated with gains to perspective-taking that occur throughout ages 10-12 years, which tend to stabilize or change again after this age bracket (Dorris et al., 2022). Finally, the sample size may also explain differences, given the current study investigated a much larger sample. A smaller sample with a between groups design is more likely to experience threats to validity, and it is not clear if a power analysis was done by Trudeau et al. (2023). Consistent with this concern, the researchers make the recommendation that a larger sample should be used in future research. The current study extended prior research in this area by incorporating recommendations made by Trudeau et al. (2023) including conducting qualitative research to gain depth about the mechanisms behind their findings, extending the data collection with a third time point, and using a larger sample size.

6.4 Implications of the Findings in the Broader Context

The research findings suggest that virtual reality is an enjoyable engagement tool for adolescents in school, and there is evidence from past research that such engagement would improve learning (Yap, 2016). The following section describes the significance

and meaning of the findings in terms of the broader educational context including some of the practical possibilities for schools and policy makers.

6.4.1 A Targeted Intervention Can Improve Empathy in Adolescents

The current research suggests that a targeted, emotion-provoking intervention can produce both affective and cognitive empathy for adolescents aged 13-15 years. These findings support previous research recommendations that schools use intervention programs (such as for mindfulness, arts, design thinking and anti-bullying) in order to build student expertise in a range of skills and specifically, empathy (Cheang et al., 2019; Dawbin et al., 2022; Garandean et al., 2022; Mogro-Wilson & Tredinnick, 2020). The results of this research suggest that a story-telling emotion-provoking film intervention may also be helpful in empathy development, extending the list of evidence-based options available to schools. The current findings are also consistent with earlier studies that demonstrated the benefits of storytelling for empathy (Bang & Yildirim, 2018; Hibbin, 2016). Furthermore, this research also supports the idea that people tend to be more empathetic towards an unfortunate story (Keen, 2006).

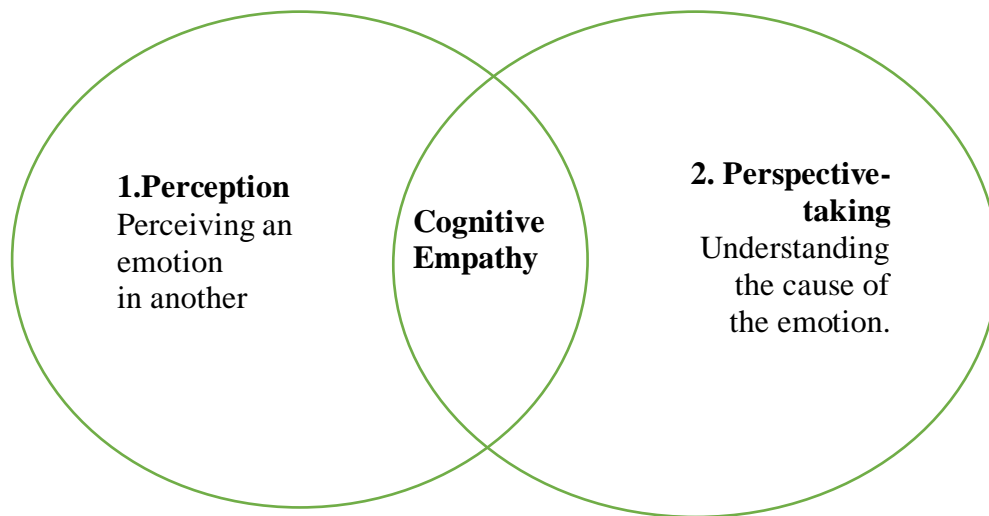
In particular, the qualitative data in the current research highlighted the impact of virtual reality in possibly enhancing targeted affective empathy and improving a longer-lasting understanding associated with cognitive empathy. The conclusion that an intervention can support empathy development is also in line with the meta-analysis by Malti et al. (2016). The meta-analysis found that if the empathy intervention was targeted towards an individual, it would be more effective (Malti et al., 2016). As such, as Malti et al. has suggested, more needs to be done to target the individual's developmental level, and not just rely on aged-based development of empathy.

The current research supports an individually tailored intervention because the quantitative research firstly showed that an experience can improve affective empathy. Although it did not show an overall increase in affective empathy in virtual reality for 13–15-year-olds (or those in Year Eight) compared to 2D the qualitative data indicated that there were some individual gains in affective empathy that were not present in 2D. This indicates that, whilst for the majority virtual reality may not be considered more helpful for improving affective empathy than 2D, there may be some benefit for specific individuals. The types of individuals who would benefit from this intervention with virtual reality (as opposed to other interventions) would need to be further investigated, but it may be those with lower baseline levels of affective empathy, or perhaps those with more disengagement in socio-emotional learning. For example, if research found that it improves empathy for those more disengaged, students could complete a self-evaluation or quiz on engagement.

The notion of individually tailoring empathetic interventions can also be applied to cognitive empathy. As with the findings on affective empathy, the quantitative data did not demonstrate significant longer-term gains in cognitive empathy using virtual reality, nor significant gains compared to 2D. However, the qualitative data highlighted a residual understanding, which may assist cognitive empathy. If cognitive empathy is considered a two-step process, where perception is Step One, and understanding is Step Two, this finding suggests that targeting those with limited understanding may benefit from virtual reality interventions. Rather than targeting a specific age range, it may be more beneficial to tailor an intervention to the individual according to their developmental levels of empathy or progress through these steps. Within the qualitative research from the current findings, virtual reality could help with this second step of cognitive empathy as displayed in Figure 15.

Figure 15

A Representation of the Two Steps Involved in the Experience of Cognitive Empathy



Using virtual reality to improve understanding or for new learning is not new. Past research has explored this link, describing factors such as engagement as being key to the relationship (Fabola & Miller, 2016). However, more research needs to be done to investigate if this new learning could improve the understanding element of cognitive empathy. Given that the current findings also indicate that virtual reality may help contribute to a longer lasting understanding of another's situation, there are other potential research questions that could be explored around improved engagement and cognitive empathy. For example, does higher immersion contribute to more learning or understanding of another's perspective? To what extent does engagement impact cognitive empathy development? It may be that, when using virtual reality, there is improvement in finding a common ground between self and other with higher immersion, or another factor such as greater engagement in the learning.

6.4.2 Using Virtual Reality for Engagement for Socio-Emotional Learning

Past research has suggested that increased immersion in an activity may be of benefit to school students in terms of better enjoyment, engagement, perception and understanding (Makransky & Lillieholt, 2018). The current research supports these findings in terms of virtual reality being a more immersive tool than 2D viewing in the areas of enjoyment, engagement and understanding. Therefore, if a teaching and learning goal is aiming to engage and support learning in terms of understanding, virtual reality may be a reasonable activity to undertake.

Looking at the qualitative data from the current research, it appears that enjoyment and engagement are important elements of the virtual reality condition, so virtual reality may be best used as a one-off experience, or else widely interspersed throughout a program so that novelty does not wane. Different types of experiences using virtual reality (e.g. games or more embodied experiences) may also maintain the novelty and provide a perspective-taking opportunity. Future research may involve surveying teachers in this area as well, to get their voice on engagement and enjoyment factors.

Guan et al. (2023) found that for those in seventh grade, there was increased cognitive engagement when using virtual reality in a pottery class, compared to a paper-and-pencil approach, and practical clay-based approach. This also is in line with the work by Schutte and Stilianovic (2017) that found engagement as the mediating factor between empathy and virtual reality. With future research, it could be that virtual reality used in specific contexts to engage otherwise disengaged students may produce empathy. For example, research by Mystakidis (2020) found that virtual reality and

gamification helped move students towards critical engagement when measuring engagement using a taxonomy of student engagement. However, the use of virtual reality with this sub-group of adolescent students in school has not been fully explored.

6.4.3 Virtual Reality is Best as Part of a Whole-School Embedded Program of Socio-Emotional Learning.

The current findings suggest that virtual reality could be used as one of many techniques for schools and designers of socio-emotional learning programs as it is at least as beneficial as 2D class viewing, with the added benefit of increased engagement and novelty. Considering this, virtual reality could be an effective tool for schools to intersperse throughout a program to provide variety, individualisation and perhaps choice. Students could choose to watch through virtual reality or 2D, which may increase self-autonomy in learning, and could lead to interesting future research as to whether this choice encourages greater empathy, or what sort of student might choose the virtual reality option. Regardless, the opportunity for virtual reality to be an engaging tool that educators can use to present a perspective-taking story remains a viable option for schools, so long as it maintains some novelty.

As described in Chapter Five, using virtual reality may be useful in an embedded whole-school wellbeing program as a novel activity that can provide a short-term spike in empathy. The results of this research support the idea that virtual reality could be used to assist in engagement, which may be helpful in middle school education, especially when engagement in regular classroom activities declines (Wang et al., 2015). Given that engagement in longer-term classroom-based socio-emotional learning programs is seen to be more important than adherence to lesson plans for positive outcomes, this would seem like a useful application of virtual reality in middle school

(Low et al., 2014). Especially considering that keeping engagement within socio-emotional learning programs is very important as it is the strongest predictor of positive outcomes approximately one year later (Social and Character Development Research Consortium, 2010). In addition, it is important that there is a follow-up to such an intervention if it uses virtual reality. The current research suggests virtual reality may provide a spike in empathy, but, as evident with past research, without other support mechanisms, such as a whole-school approach and teacher professional development, there is unlikely to be any sustained impact, even with one-off engagement activities (Low et al., 2016). There does not appear to be any current research on effects of virtual reality being interspersed throughout a program, and this needs to be further investigated.

The findings of the current research provide hope that digital technology can provide a vehicle for improved empathy when a targeted perspective-taking intervention is used. This is particularly useful for education, as it demonstrates that this is one format through which socio-emotional learning can occur. When COVID-19 resulted in many schools having to move to offsite learning, many wondered what would be missed for students when there was not a face-to-face opportunity for learning. Knowing that empathy can improve in the short-term using digital technology may provide support for schools and policy makers, knowing that this can be utilized, and empathy improvement may still occur.

The opportunity to provide an in-class intervention such as a novel-story telling experience like *Clouds over Sidra*, may show promise with regards to customising a socio-emotional learning program where some students complete the intervention, and other students could participate in other programs, depending on their empathy level. More research on which students would gain a greater benefit from a virtual reality

intervention is recommended (e.g. higher or lower empathy, more developed cognitive or affective empathy). To answer this, research questions could include “What is the impact of virtual reality for individuals with varying levels of cognitive empathy?”, or “How does virtual reality affect adolescents who are able to perceive emotions in others, but cannot understand why the other person feels that way?” These sorts of research questions can be explored to provide a more tailored program to socio-emotional learning for developing empathy in adolescents.

These suggestions are also in line with previous research suggesting that one-off empathy interventions tend to have short-term effects (Herrera et al., 2018). It could be that when an empathy-provoking intervention like *Clouds Over Sidra* is used, it can serve as a platform for a sustained program of empathy development within a school, rather than a one-off intervention. For example, depending on the desired learning outcomes, it could be used as an introduction to a unit on empathy, which involves a range of perspective-taking opportunities, such as reading stories about others, group discussions, student-led research and so on. This could also be regularly revisited throughout the socio-emotional learning curriculum in each grade throughout early adolescence.

6.5 Limitations and Future Research Directions

6.5.1 Limitations and Improvements

There were several limitations in conducting this research that may have influenced the results. The first limitation was that, due to time constraints, the sample was gained from an affluent private school in Melbourne, Australia. Students in Year 8 at this school had been exposed to the RULER program (Yale Centre for Emotional Intelligence, 2023), the socio-emotional learning program the school uses (up to Year

8). However, the school was at the early stages of implementation of RULER, and thus had not fully developed BLUEPRINT, the section of the RULER program that focusses on empathy (Yale Centre for Emotional Intelligence, 2023). As the students had all been exposed to a socio-emotional learning program, it would have been beneficial to compare the impact of a virtual reality approach with schools that do and do not have such a program, or whose student population was lower in SES to gain a more varied sample. Moreover, given that the sample was based on convenience and was quasi-experimental, where the allocation into different groups was not truly random, generalisations from the quantitative research is limited. Whilst there was an adequate number of participants, a broader and larger sample from a wider range of backgrounds would be recommended, which would add particular weight to the quantitative analyses. On the other hand, the use of the mixed methods approach enabled deeper understanding of the experience of the participants, addressed some of the quantitative limitations, and is encouraged for future research designs.

The second limitation was the social desirability bias arising out of the nature of the self-reporting method that was described in Chapter Four. Whilst the survey is open to social desirability bias (that is, it is obvious that '5' or '1' is most desirable option); the qualitative questions also involved the use of socially desirable responses. Moreover, due to constraints of the timetable and setting, the participants used virtual reality or watched the 2D film in groups, and subsequently completed the survey in front of their peer group and the researcher at times one and two. The social desirability of seeing their peers may have influenced their responses leading to a ceiling effect for some participants. At time three, participants completed the survey in their own classroom, and, although their peers and teacher were still there, the researcher was not present due to practical constraints. This change in setting may have influenced some

students' reactions, making it difficult to determine whether the lower scores observed at time three across all measures were due to the different environmental conditions or an actual decline in empathy. It is recommended that, where possible, the study settings remain constant across time.

A third limitation was the impact of the novelty effect. Whilst engagement (possibly due to novelty) was an outcome of the research, the impact of novelty may have impeded overall results and conclusions. This has previously been an issue with virtual reality research in education (Miguel-Alonso et al., 2023). The current research was able to minimise a between-participant effect of varying experiences of virtual reality as this was the first-time participants had used virtual reality at their school for learning. However, a consequence of this was that it was an even more engaging and novel experience for the participants. At time one, participants were excited to use the devices as well as being part of the research in a new setting. As this was also the first time they completed the AMES (Vossen et al., 2015) they may have rated the empathy and sympathy relatively highly, contributing to a ceiling effect at time one. In addition, qualitative data were not gathered at time one due to time constraints, limiting understanding on how much this may have impacted results. It is recommended that other measures should be put into place to counter this novelty effect, such as varying the virtual reality experience over a number of time points and using different documentaries (*Clouds over Sidra* and *The Displaced*) or other virtual reality programs, especially those that also utilise embodiment. Over time, novelty should wear off, and measurements of the effect without novelty may be explored. Another possibility for future research is to utilise a virtual reality tutorial, similar to that suggested by Miguel-Alonso et al. (2023), prior to any virtual reality program or use. Eventually, this may be standard practice for schools and educational settings that decide to use virtual reality.

Another limitation was related to the actual stimulus used. The film of *Clouds over Sidra* provided some conflicting emotions for the viewer, as described in Chapter Five. People require affective cues to discern and feel an emotion, and Sidra does provide a range of emotions throughout the documentary, which may be difficult to process for an adolescent who is still developing empathy to perceive and feel congruence with. For example, Sidra smiles during her introduction, although she later wipes tears of sadness away. She is not openly angry, more dully frustrated, and the narrator is neutral in tone. The lack of cues in voice may make affective empathy more difficult. Thus, it is recommended that future researchers consider a film or experience with a more clearly expressed affect for adolescents when seeking to measure empathy. Moreover, the stimulus did not encapsulate a full embodiment of Sidra or another person, but instead provided a 360-degree cinematic perspective from within the camp. There was also very little interactivity in this experience. As more virtual journeys are generated, experiences using the virtual reality headset with enhanced embodiment and increased sensory fidelity and interactivity, should be considered. It could be embodiment that leads to deeper immersion overall and greater emotional, empathetic responses (Gall et al., 2021). It should also be noted that this stimulus is a very narrow context. It is recommended that more varied scenarios that could build empathy be considered.

A further limitation was in the coding process of the qualitative data, as described in Chapter Five. Due to time constraints, a second coding of the data did not occur. Participants did not necessarily need to describe elements of empathy at all given the questions, and empathetic responses were only ascertained by the coding process. It was complex to consider whether an individual truly experienced affective empathy, as a comment of 'I felt sad for them' could not justifiably be affective empathy, and the

coding process required more detail in the response than simply because the other person was sad. Due to this, analysing affective empathy was a significant limitation in this research, particularly in the qualitative data. Moreover, it can be hard for adolescents to distinguish their experience as affective empathy or sympathy in an open-type response. Key points of demarcation between affective empathy and sympathy that arose from this research include the important distinction of ‘feeling with’ (affective empathy) or ‘feeling for’ (sympathy). As it is empirically difficult to measure a self-other distinction (as described by Read, 2019), drawing out the comments from the qualitative data allows for researchers to see if the feelings are shared with Sidra, or are for her, would be beneficial. To reduce the impact of this limitation, it is recommended that follow-up interviews and/or cross-coding occur, where possible. In coding, researchers are encouraged to look at where there was a shared emotion with the other, rather than sadness alone.

6.5.2 Future Research Recommendations

Based on the limitations and improvements above, there are a number of recommendations for future research. Firstly, as previously described in the above section, in terms of the design of the future research, the following recommendations are made:

- Researchers should continue to be careful in their measurements of empathy and sympathy as the current research supports these being closely related, but distinct concepts. This includes the opportunity in qualitative research to explore affective empathy, as self-report may not be suitable.
- Mixed methods should be adopted, and more qualitative research in this area is recommended.

- A longitudinal or longer-term intervention is needed, ideally through an embedded program when looking at socio-emotional learning interventions such as virtual reality.

In terms of future research directions, the following research examples could be more thoroughly investigated. Firstly, the impact of one- off interventions could be compared to a program that involves priming, or a repeated approach to empathy development. Priming is regularly used by educational theorists for learning and is defined by a change in the ability to produce an item due to a specific previous encounter with an item (Tulving & Schacter, 1990). Therefore, having priming lessons on empathy as a concept, perhaps by doing a reflective task on when it is easy/hard to feel empathetic and so forth, would be beneficial when used in combination with a virtual reality intervention. There is evidence that an embedded, whole-school approach to socio-emotional learning is the recommended way forward, so focused research on whether empathy development would be specifically affected if the virtual reality intervention is part of an embedded program would assist educators and policy makers. The implication of an embedded program that has the feature of priming psychology is that empathy would be improved when using virtual reality in conjunction with other empathy lessons.

Future research might also include investigating the development of empathy in a more individualised way, as it is likely that the development of empathy could vary across, and even within, different developmental stages. This could be helpful in eliciting information that could help in pinpointing where virtual reality may be more effective, especially given the differences in the qualitative and quantitative data. Whilst adolescence is seen as a time of growth for empathy, one school year-level group over two weeks may have students at various developmental stages. As previously described

in Section 6.4.1, virtual reality may be an appropriate intervention for an individual of a certain type or who is at a certain level, rather than age based. This research investigated the age range of 13-15 years, or those in Year Eight within the school environment, but it may be better to investigate students at different developmental stages and see if there is a way to make a more tailored developmental program.

Building on this idea, research that investigates the potential for cognitive empathy growth in adolescents would contribute to the literature around adolescent empathy development in schools. Considering that the findings of the current research demonstrated the improved understanding of another's perspective via a virtual reality format, this specific area of cognitive empathy warrants further investigation. Specifically, understanding how virtual reality may contribute to a tailored empathy program in bringing the 'abstract' condition of someone else's experience to the fore for those at a particular cognitive level. For example, a pre-test on an individual cognitive empathy level may show that an individual is excellent at 'perception', but not at 'perspective-taking'. An investigation of whether a targeted perspective-taking intervention may produce improved cognitive empathy for those, over others who are yet to accurately perceive other's emotions may uncover new understandings of the mechanisms and development of cognitive empathy. In addition, randomisation of participants to groups would assist generalisability.

Another recommendation for research with virtual reality and empathy is to investigate the extent of perspective-taking interventions on empathy. For example, research could include a non-perspective-taking task in the study. This would be beneficial as it would act as a control. Given that the 2D film chosen could be considered a perspective-taking film, conclusions about immersion levels can be described, but this cannot be necessarily extended to the benefits or non-benefits of

perspective-taking. Whilst the current study supports other preliminary research, which suggests that as long as a perspective-taking task is completed, empathy will improve, it would be prudent to investigate whether other tasks would also aid empathy. This could be done by comparing perspective-taking tasks to non- perspective- taking tasks, but also through comparing different mediums that can offer a perspective-taking task (such as text-based versus aural story).

Another direction could be to explore whether virtual reality can improve a targeted feeling of empathy towards an individual or their perceived group, rather than overall empathy development. Considering there appeared to be targeted affective empathy towards Sidra (according to the qualitative data), but not overall (according to the quantitative data), this could be explored in further depth. It would be interesting to determine whether targeting improvement in generic empathy is more beneficial as it can apply to more areas of an individual's life. This may be more difficult to do, as the virtual reality experiences that have been designed to improve empathy, are highly contextual and embodied within a specific environment. Moreover, researching a more generalised scenario and generic empathy levels, compared to a targeted contextual empathy intervention such as *Clouds over Sidra*, would require a broader research scope (many experiences, many ways) and possibly require a more extensive socio-emotional learning program focused on empathy. Conversely, research could investigate to what extent a specific, targeted empathy intervention towards a person/group/circumstance like *Clouds over Sidra* is able to generalise into improved overall empathy, or whether empathy is more likely to be specific to the target only (in this case, Sidra or Syrian refugees). One way of doing this might be through a comparative study of participants who have a virtual reality intervention (or not) and are then asked to describe/answer

questions about empathy more generally after the intervention compared to targeted questions about a person and/or their group.

6.5.3 Overall Significance of Study

This thesis has highlighted the impact of a perspective-taking intervention in improving empathy in a school setting. The implications of using perspective-taking to improve empathy has wide applications for both researchers and practitioners in schools who are considering best practices for socio-emotional learning programs that aim to develop empathy. This study built on previous research, adopting a mixed methods approach and measuring empathy and sympathy at three time points. The research program has provided data and insights that have extended this field of research.

The research makes a contribution to both the empathy and virtual reality literature. For empathy, this research elucidates the importance of making the distinction between the different elements of empathy, cognitive and affective, as well as distinguishing these from related concepts such as sympathy. From a theoretical perspective, the thesis supports past research that highlights the importance of this distinction when conducting research on empathy (Steitz et al., 2019). Moreover, from a research perspective, the study supports suggestions by researchers Vossen and Valkenburg (2016) about the importance of selecting a measure that differentiates these factors to avoid conflation. Whilst the context of the research should be considered, it is also important that questions clearly discriminate between different concepts and that the measures have strong internal consistency. This study has added to research and literature by using the AMES survey (Vossen et al., 2015) which meets these criteria and adopted a mixed methods approach enabling a more considered analysis of the

empathetic reactions in participants, with careful consideration of terms used by participants in coding.

The study also contributes to the debate on the use of virtual reality to improve empathy. Specifically, it supports those that suggest virtual reality does not have a significantly stronger impact on empathy compared to other interventions (Hasler et al., 2021; Sora-Domenjo, 2022). However, given the overall improvement in empathy regardless of condition, the implication is that practitioners utilize technology in ways that is relevant to their socio-emotional learning program and their context and interesting to their participants. This use of virtual reality to improve engagement with socio-emotional learning where necessary could be a strategic use of this technology, as indicated by the qualitative data, although further research is needed here. However, this study has contributed to the understanding of the mechanisms involved when using virtual reality for empathy development, which can aid educators.

Finally, a key contribution of this research is for those investing and deciding on potential socio-emotional learning programs; especially when looking at ‘empathy’ curriculum prescribed by CASEL, and in Australia, VCAA and the Australian curriculum. This research assists educators by suggesting that an emotion-provoking film that involves perspective-taking, can contribute to a short-term spike in both affective and cognitive empathy. This could provide a platform for further empathy development according to a socio-emotional learning program embedded in a school.

6.6 Conclusion

In addressing each of the research questions and hypotheses, the thesis suggests that, whilst an emotion-provoking documentary can improve both affective and

cognitive empathy in the short-term, those using virtual reality did not show higher empathy than those who watched the same documentary in 2D. This indicates that deeper immersion (with higher sensory fidelity and some increased autonomy) does not improve empathy, but other factors may be at play. When using virtual reality with adolescents this research found some evidence of increased elements of cognitive empathy, and more nuanced affective empathy effect. The research highlights the importance of distinguishing between empathy and related concepts given the differences in responses from the participants indicating differences in empathy and sympathy.

Using the AMES survey (Vossen et al., 2015), combined with the qualitative data, was a contextually appropriate and novel way to investigate empathy and virtual reality that provided new findings and built on the body of research in the area. The research suggests schools and policy makers in education could include the sporadic use of virtual reality to improve engagement levels within a whole-school embedded socio-emotional learning program. In addition, it is recommended that empathy interventions for socio-emotional learning should include follow-up measures over a minimum of two weeks in order to investigate any sustained benefits, as there is minimal longitudinal research in this area. Furthermore, this research has highlighted the importance of extending the qualitative research in this field, as it was this data specifically that was able to illuminate differences between the virtual reality and 2D group that were not apparent in the quantitative data, such as levels of affective empathy. It is this approach of using mixed methods combined with the investigation of the longer-term effects of virtual reality for adolescents in school that enables this research to contribute meaningfully to the broader and ongoing investigation of whether virtual reality is, in fact, the ‘Ultimate Empathy Machine’.

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Appendices

Appendix A Data Collection and Clean

Data collection for each time point took a full week to complete as some of the student classes were on different days. At time points one and two, the participants were in the senior library, where the film was shown. At time three they were in their classroom with their usual teacher. The times these were collected and their relation to the research questions are listed below.

Table 9

Research Questions and Methods of Data Collection

Research Questions	Instruments	Participants	Timing
1. Does the use of a virtual reality program affect adolescent empathy and sympathy?	AMES Survey	All participants (n= 116)	Times 1, 2 and 3
2. Do students receiving information from different mediums with different immersion levels have different empathetic and sympathetic reactions?	AMES Survey 3 x additional questions	All participants (n= 116)	Times 1, 2 and 3
3. How does the use of a virtual reality program affect adolescent empathy and sympathy?	3 x additional questions	All participants (n= 113)	Times 2 and 3

The data were collected using SurveyMonkey, and once transferred to the researcher's computer for analysis in Excel, these data were deleted from SurveyMonkey. After the data were cleaned (as detailed in the section below) there were 116 responses at time one, 114 at time two and 77 at time three. Given the two-week time lapse between times two and three, a number of participants dropped out

from doing the survey. For the open-ended questions, there were 113 participants who responded to those questions at times two and/or time three.

To clean the quantitative data for analysis input errors were noted. For example, one participant did not write their code but wrote “abcd” instead, another wrote they were in Year 10 (not possible) and put all 5’s and wrote FUN each time. Given it was not possible to match these participant responses across time, nor tell what condition they were in (experimental or control), these two sets of data (from Time 1) were removed.

In addition, to replace missing data that were not clearly erroneous, mean substitution was used. Mean substitution is when the mean score is used to estimate the individual’s response and is one of the most popular ways to replace missing data (Brown & Kros, 2003). In this case, there were five situations where a participant did not fully write their responses. For example, one participant filled in the entire AMES survey except for the first cognitive empathy question at time one. They completed all other 11 AMES survey questions at the other times and completed the additional descriptive questions. In this case, it seemed to be missed in error by the respondent. The mean response ($n=116$) for the first cognitive empathy question at time one (which was a score of 4) was substituted in for this participant. A total of five substitutions were made, whereby the data were replaced with the mean. As this occurred with less than 10% of the data it is a reasonable choice for dealing with the missing data (compared to other methods such as regression imputation) (Roth, 1994).

Appendix B Consent Form

CONSENT FORM

PROJECT TITLE: "Virtual Reality in Education: An investigation into effects on adolescent empathy and sympathy."

Name of participant:

Name of investigator(s): Dr Terry Bowles, Ms Emma Phillips

1. I consent to participate in the project named above, the particulars of which - including the content topic on refugees and the AMES survey - have been explained to me. A written copy of the information has been given to me to keep.
2. I authorise the researcher or assistant to use for this purpose the survey referred to under (1) above.
3. I acknowledge that:
 - (a) the possible effects of the survey have been explained to me to my satisfaction;
 - (b) I have been informed that I am free to withdraw from the project at any time without explanation or prejudice and to withdraw any unprocessed data previously supplied;
 - (c) The project is for the purpose of research;
 - (d) I have been informed that the confidentiality of the information I provide will be safeguarded subject to any legal requirements;
 - (e) Questionnaires from the survey will be stored according to guidelines at the Melbourne Graduate School of Education for 5 years after the project is completed, before being destroyed.
 - (f) participation/non-participation in the research will have no effect on grades/assessment.

Signature

Date

(Student)

Signature

Date

(Parent/Guardian)

Appendix C Code Book Examples

Codebook – Qualitative Research- Thematic Analysis- Virtual Reality/Empathy

Codes:	Definition	Examples
New Learning about Syria/refugees	A statement that shows that they've learnt something about the environment/Syria/Refugees. Enlightening. Not necessarily related to an emotional statement. Can be a comparison.	<p>“Eye-opening as we don't learn about this in any subjects so far”</p> <p>“Sidra has very basic education, basic living and is constantly in fear.”</p>
Cognitive Empathy	A statement that demonstrates either perception of another's emotion, or Understanding of the other's emotion and “why” or perspective-taking	<p>“you can tell how they are actually feeling as they all wanted to feel safe and go home.”</p> <p>“You see how bad their life situations are.”</p>
A need to help	A statement that expresses a need for action about the situation specifically seeking to help, or motivation to help	<p>“It makes you feel like you want to help”</p> <p>“it compels me to do something”</p> <p>“makes me feel like I want to do something”</p> <p>“We need to help”</p>
Unfairness	A statement that suggests that there was some sense of unfairness	<p>“the world... was not intended for unfairness”.</p> <p>“it's not fair”.</p>

		“She’s my age”
Common ground	Finding a similarity between Sidra and themselves.	“Sidra has her family with her just like I do. We both have caring parents and siblings that love us.”
Sympathy (Sadness for)	Feeling sad or sorry for Sidra or refugees more generally	“It makes me feel sad to see people suffering” “Sad that people in the world have to live like that” “Sad, makes me feel really sorry for them”
Affective Empathy	A statement showing sadness with (I feel sad because they are sad”	“It is sad because it ...terrible to go through what they are going through “
Generic Sadness	An expression of sadness with no specific detail of how/what it relates to. Just sadness in itself	“It just makes me feel ... “sad”
Guilt	A statement of either expressed guilt or within the words to the effect including wording like “feel bad”.	“Makes me feel guilty” “They are very poor compared to my daily life and I kinda feel bad for that.”
Gratitude	A statement showing one is grateful for what they have (can be comparative to Sidra/refugees)	“I feel grateful for my situation” “I’m not going to take things for granted”
Self-reflective	Thinking about oneself and own situation	“I look at the resources that I have available and then I see what little

		these refugees have and how they make do with it”
Privilege	A statement of the privilege the participant has realised they have. Does not need to be in direct comparison	“Makes you think how privileged you are” “makes you not take things for granted”
Immersion	A statement demonstrating the feeling of actually being there. Can incorporate sensory modalities (sight) or autonomy	Virtual Reality... “Makes you feel like you’re there” “it allows each viewer to focus on a part of the movie that they most feel connected to”
Engagement/Interest (medium)	A statement showing that the participant found it hard to look away and that the documentary was of interest to the participant (relating to the technology, not the documentary.)	“Interesting it makes us able to see more, it has a greater impact on our thinking”
Engagement/Interest (topic)	A statement showing that the participant found it hard to look away and that the documentary was of interest to the participant (relating to the documentary, not the technology)	“Interesting and changes my mind set and makes me want to help them out.”
Novelty	A statement indicating a new and exciting situation (related to Virtual Reality)	(Watching it with virtual reality) “Different” “Exciting”

	A statement indicating 'nothing new'	"Same as normally watching"
Nonchalance	'ok' or 'satisfactory' statements.	
	Opposite of novelty.	

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An investigation of adolescent empathy and virtual reality

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