



## **Understanding and Overcoming Intergroup Anxiety and Avoidance**

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Understanding and Overcoming Intergroup Anxiety and Avoidance

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## Thesis Abstract

The modern world offers increased connectivity and multiculturalism. In this connected world, individuals are frequently granted the opportunity to interact with others from distinct social, ethnic, and religious groups in everyday life. A large body of research suggests that intergroup contact across distinct groups will reduce prejudices and intergroup biases. However, despite the increased opportunity for prejudice-reducing intergroup contact, prejudices remain high in multicultural societies. In exploring this apparent contradiction, recent research suggests that, despite increased opportunities for intergroup contact, many people selectively interact with members from their ingroup. Thus, intergroup avoidance can impede progress in social cohesion and intergroup harmony by preventing beneficial encounters taking place.

Previous research has found intergroup anxiety, or the expectation that outgroup members pose a threat to an individual and their ingroup, is strongly and reliably linked to avoidant behaviours. In turn, the most efficacious way to reduce anxiety is through intergroup contact. The problem of intergroup avoidance is therefore circular, where the best way to reduce avoidance is to promote approach behaviours by those who are avoidant. Reducing intergroup anxiety using techniques more likely to be engaged with could interrupt this circular problem, thereby reducing intergroup avoidance.

This thesis comprises two theoretical reviews, one systematic review ( $k = 72$ ), four survey-based studies ( $N = 2,095$ ) and one experiment ( $N = 82$ ), that collectively seek to further our understanding of, and provide viable remedies for intergroup anxiety and avoidance to enhance intergroup relations. More specifically, the thesis aims to (1) integrate associative learning and social psychological theories to explain the formation of intergroup anxiety, (2) understand how intergroup anxiety can contribute to a deterioration in intergroup relations, through intergroup avoidance, and; (3) provide an acceptable form of intergroup contact using virtual reality technology.

The initial theoretical and empirical work advanced understanding of the formation, measurement, and outcomes of intergroup anxiety. It was argued that intergroup and clinical anxiety share similar properties and are formed through the same processes. Aversive conditioning processes have been observed in the laboratory and used to explain the formation of clinical anxiety. More recently, these same processes have been shown to contribute to intergroup anxiety. To measure intergroup anxiety in this thesis, a new self-report scale was created that integrated common laboratory markers of anxiety (physiological reactivity) with typical self-report inventories. In three studies, the construct and convergent validity of the Cognitive, Affective, and Physiological Intergroup Anxiety (CAP-IA) scale was supported. This new scale could also be utilised in future research.

To test the proposition that aversive conditioning processes contribute to intergroup anxiety, a retrospective method was used where participants described their first negative encounter with an outgroup member. Congruent with aversive conditioning processes, participants who reported an unpleasant event with an outgroup member reported more fear during the encounter than did those who did not report experiencing an unpleasant event. Additionally, intergroup fear indirectly predicted greater outgroup avoidance through elevated intergroup anxiety. These results showed that aversive conditioning can contribute to the formation of intergroup anxiety outside the laboratory.

Subsequent work attempted to develop an accepted and efficacious form of indirect intergroup contact using virtual reality. In a theoretical review, I advanced a temporal model of acceptability for contact-based interventions, which argued that individuals would prefer institutionally supported and indirect intergroup contact, thereby making intergroup avoidance less likely. All forms of indirect contact were argued to have these benefits, but virtual reality intergroup contact (VRIC) was

introduced as a novel indirect contact strategy because it could offer distinct benefits over existing indirect contact strategies, including increased interactivity and presence. Survey-based studies were conducted to examine the acceptability of VRIC and did not provide clear evidence that individuals would rather engage in VRIC than face-to-face intergroup contact. Furthermore, the final experimental study of this thesis did not find brief exposure to outgroup members through immersive media improved intergroup relations. Nevertheless, this work was the first to empirically assess the acceptability of an indirect contact strategy and demonstrated that immersive virtual exposure to outgroup members elicits greater physiological responses than static-images of the same.

Taken together, the findings from the current thesis provide a novel investigation of the formation of intergroup anxiety and avoidance from a learning perspective. Furthermore, the thesis provides several approaches to reduce intergroup avoidance. These include decreasing intergroup anxiety, providing institutionally supported interventions, and offering indirect contact strategies for individuals high in intergroup anxiety. The continuing levels of prejudice around the world provide an impetus to break down barriers preventing positive and intimate interactions between members of distinct groups. By examining how intergroup avoidance is formed and reduced, this body of work provides new avenues for researchers and interventionists to work toward decreased segregation and greater intergroup harmony.

### **Statement of Originality**

This work has not previously been submitted for a degree or diploma in any university. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

Alexander William O'Donnell

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Included in this thesis are published papers in *Chapter 2* which was co-authored with other researchers. My contribution to the co-authored paper is outlined at the front of the relevant chapter. The bibliographic details (if published or accepted for publication)/status (if prepared or submitted for publication) for these papers including all authors, are:

Chapter 2: **O'Donnell, A. W.**, Neumann, D., Duffy, A., & Paolini, S. (2019). Learning to Fear Outgroups: An Associative Learning Explanation for the Development and Reduction of Intergroup Anxiety. *Social and Personality Psychology Compass*, e12442. DOI: 10.1111/spc3.12442

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Included in this thesis are unpublished manuscripts in *Chapters 3, 4, and 7* which were co-authored with other researchers. My contribution to the co-authored papers are outlined at the front of the relevant chapter. The status (if prepared or submitted for publication) for these papers including all authors, are:

Chapter 3: **O'Donnell, A. W.**, Neumann, D., & Duffy, A. (*in preparation*). The Development and Validation of the Cognitive, Affective, Physiological Intergroup Anxiety Scale (CAP-IA)

Chapter 4: **O'Donnell, A. W.**, Neumann, D., & Duffy, A. (*in preparation*). Associative Learning Processes in the Formation of Intergroup Anxiety and Avoidance in Society

Chapter 5: **O'Donnell, A. W.**, A. Duffy, J. Harwood, D. Neumann, & S. Paolini (co-authors in alphabetical order). (*in preparation*). The acceptability of intergroup contact interventions: A general theoretical framework and proof of concept review.

Appropriate acknowledgements of those who contributed to the research but did not qualify as authors are included in each paper.

(Signed) \_\_\_\_\_ (Date) 25<sup>th</sup> October, 2019

Alexander W. O'Donnell

(Countersigned) \_\_\_\_\_ (Date) 25<sup>th</sup> October, 2019  
Supervisor: Prof. David L. Neumann

**List of Conference Papers from Doctoral Research**

**O'Donnell, A. W., Neumann, D. L., & Duffy, A. L. (2019).** *Learning to fear outgroups: An examination of the formation of Intergroup Fear, Anxiety and Avoidance.* Talk presented at the Society of Australasian Social Psychologists Annual Conference, Sydney, Australia.

**O'Donnell, A. W., Neumann, D. L., & Duffy, A. L. (2019).** *Virtual Reality Intergroup Contact: An examination of intergroup anxiety and willingness to approach a modern contact choice.* Talk presented at SPSSI-SASP Group Meeting on Intergroup Contact, Newcastle, Australia.

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### Chapter 1 Preamble

In my general introduction, I provide a brief theoretical overview of the literature detailing mechanisms leading to increases and decreases in prejudice. In doing so, I introduce concepts related to intergroup anxiety and intergroup contact. These concepts are introduced as a prelude to more detailed reviews in subsequent chapters (anxiety, Chapter 2; contact, Chapters 5 and 6) and to introduce the overarching aims and contributions of this thesis. I outline three overarching research aims to be addressed in two sections of this thesis. These aims are (1) to integrate associative learning and social psychological theories to explain the formation of intergroup anxiety, (2) to understand how intergroup anxiety can contribute to a deterioration in intergroup relations, through intergroup avoidance, and (3) to provide an acceptable form of intergroup contact (i.e., one that is less likely to be avoided) using virtual reality technology. In this chapter I discuss how the two theoretical reviews, one systematic review ( $k = 72$ ), four survey-based studies ( $N = 2,095$ ) and one experiment ( $N = 82$ ) address these aims.

## 1. General Introduction

Prejudice, or intergroup bias, is defined as a negative attitude toward a person who is a member of a distinct social group, simply because they belong to that group and are believed to have the qualities of that group (Allport, 1954). The negative attitude that defines prejudice also has a defined history. For example, slavery and the Holocaust were justified by prejudicial views. Prejudicial views that Black inhabitants of the West Indies and Africa could not look after themselves and were inferior to White Europeans justified the practice of slavery (Edwards, 1801). Prejudicial views that Jewish people were exploitive, without a culture, and fundamentally dangerous (Hitler, 1941) were used to justify the Holocaust.

Beyond these historical examples, prejudice still has implications for modern societies in terms of economic prosperity, judicial fairness, and health. Prejudice is an economic problem for discriminated individuals because they have reduced chances of being employed (Brief, Dietz, Cohen, Pugh, & Vaslow, 2000). It is a judicial problem, with higher levels of negative interactions between the police and discriminated individuals, as well as issues related to police violence (Nordberg, Crawford, Praetorius, & Hatcher, 2016; Ojiambo & Louw, 2015). It is also a health problem, as communities with high levels of racial prejudice also have an elevated risk of mortality (Lee, Muennig, Kawachi, & Hatzenbuehler, 2015). The economic, judicial, and health problems associated with prejudice provide a strong rationale to work towards both understanding and reducing the prevalence of prejudice in the community. Across five empirical chapters, two theoretical reviews, and one systematic review, this thesis attempts to advance our understanding of intergroup biases.

Specifically, two distinct sections are presented in this thesis. Part One details how intergroup anxiety can impede efforts to improve intergroup relations. Part Two explores a new mechanism to overcome the limitations of existing efforts to reduce

prejudice. These sections complement one another as the former identifies the problem and the latter provides a viable a solution. Both sections open with a theoretical review that relates to subsequent empirical investigations. Accordingly, this general introduction will only touch upon the history of relevant theories as a way to introduce the aims of the thesis and set the scene for subsequent chapters. These aims are outlined separately for each section of this thesis. This review will end with a justification for a new line of inquiry that seeks to identify how intergroup anxiety is formed and address intergroup avoidance as a known impediment of the prominent prejudice reducing theory, namely intergroup contact.

## **1.1 Part One Overview**

### **The Formation, Measurement, and Outcomes of Intergroup Anxiety**

The first section of this thesis explores how intergroup anxiety is formed and ultimately results in intergroup avoidance. This body of work seeks to expand upon the historical understanding of intergroup anxiety (reviewed below) by incorporating common theories, methodologies, and mechanisms observed in the clinical anxiety literature. In this thesis, the integration of clinical and intergroup approaches to the understanding of anxiety facilitated a novel theoretical review, a new self-report measure incorporating common measures of clinical anxiety, and an investigation into the relationship between anxiety and avoidance of outgroup members using principles from the clinical anxiety literature. Cumulatively, this body of work further explores how a common antecedent of intergroup biases (i.e., anxiety) impacts intergroup relations through intergroup avoidance.

#### **1.1.1 Intergroup Anxiety: Definition and Theoretical Overview**

There is a consistent body of work demonstrating that intergroup anxiety is an antecedent of prejudicial beliefs and actions (Stephan, 2014). Intergroup anxiety is used to describe the apprehensive response individuals can experience whilst engaging in or

anticipating intergroup contact (Stephan & Stephan, 1985). The origins of intergroup anxiety have been argued to stem from an appraisal that interacting with an outgroup member will produce a negative outcome (Stephan & Stephan, 1985). There are four main categories of negative outcomes theorised to produce intergroup anxiety (Stephan, 2014; Stephan & Stephan, 1985): firstly, negative psychological consequences such as embarrassment, irritation, fear, or confusion; secondly, concerns regarding negative behavioural outcomes such as discrimination, deception, contamination, or physical harm; thirdly, fear of negative evaluation from the outgroup; and finally, fear of negative evaluation from the individual's own ingroup due to a disapproval of interacting with outgroup members.

Intergroup anxiety has traditionally been understood within the wider framework of the integrated threat theory of prejudice (Stephan & Stephan, 2000). This theory consolidates decades of research focusing on the role of fear and anxiety in intergroup relations. The original theory proposed four types of threat, which were causally linked with the occurrence of intergroup prejudice. A subsequent revision of the theory reduced the number of threats to two: symbolic and realistic (Stephan & Renfro, 2002). Symbolic threat is a perception that an outgroup poses a challenge to the ingroup's worldview, because the groups have different morals, values, standards, beliefs, and attitudes (Stephan & Stephan, 2000). The foundation for symbolic threat originates from the work on symbolic racism (Kinder & Sears, 1981) and modern racism (McConahay, 1986). Based upon the work of Bobo (1988) and Sherif (1966), realistic threats were conceptualised as perceived threats originating from the outgroup, which threaten the welfare of the ingroup or its members. Realistic threats include threats to the existence of the ingroup, the ingroup's political and economic power, and the physical well-being of the ingroup's members (Stephan & Stephan, 2000). Intergroup anxiety is proposed to be a subtype or consequence of realistic threat (Stephan, Ybarra, & Morrison, 2009).

In this thesis, the theoretical understanding of intergroup anxiety is advanced by drawing similarities between clinical and intergroup forms of anxiety. Intergroup anxiety typically does not cause significant distress or impairment of everyday functioning to the anxious individual and is therefore not pathological. However, intergroup anxiety could be considered a sub-clinical form of anxiety that is specifically related to intergroup contexts (Birtel & Crisp, 2012; Plant & Devine, 2003). There are several physiological and behavioural similarities between intergroup anxiety and clinical anxiety disorders, which Part One of this thesis draws upon, to specifically apply clinical anxiety perspectives to the study of intergroup anxiety.

For example, both clinical and intergroup forms of anxiety are associated with similar physiological symptoms. Clinical anxiety disorders have been linked to physiological symptoms such as changes in cortisol reactivity (Yoon & Joormann, 2012) and cardiovascular responses (Pittig, Arch, Lam, & Craske, 2013). Similarly, intergroup anxiety has been related to higher cortisol reactivity when interacting with an outgroup member among those who do not have cross-group friendships compared to those who do (Page-Gould, Mendoza-Denton, & Tropp, 2008). Additionally, intergroup contact has been shown to prompt a perception of threat resulting in a physiological response in the cardiovascular system, in the form of higher ventricular contractility (Blascovich, Mendes, Hunter, Lickel, & Kowai-Bell, 2001). In recognition of these similarities in physiological manifestations of anxiety, a new measure of intergroup anxiety that included physiological markers of anxiety was developed as part of this thesis.

Further, both clinical and intergroup anxiety can result in behavioural avoidance. A typical manifestation and key diagnostic criteria of clinical anxiety disorder is avoidance of social situations (American Psychological Association, 2013). Similarly,

intergroup anxiety is associated with an avoidance of social interactions with outgroup members (Plant & Devine, 2003).

Due to the similarities in behavioural and physiological outcomes between clinical and intergroup anxiety, the theories, research methodologies, and interventions developed for anxiety-related disorders could be applied to intergroup relations research. Specifically, the processes underpinning anxiety learning and extinction could be utilised within intergroup relations research. Clinical anxiety is one of the most widely studied clinical phenomenon in psychological science. Laboratory-based investigations of how individuals acquire those anxieties through associative learning has been a central focus of much of this work. Drawing on this established literature should provide new avenues that advance our understanding of intergroup anxiety and improve social cohesion.

In Part One, these two literatures are integrated by reviewing associative learning theory and outlining how aversive experiences with outgroup members could lead to the formation of intergroup anxiety. Briefly stated, associative fear learning occurs when a previously neutral stimulus is paired with an aversive stimulus until the presentation of the previously neutral stimulus elicits an aversive response. Recent empirical work has been conducted that applies this theoretical approach to describe how negative feelings can be learnt in an intergroup context (see Chapter 2). This field of research is advanced by novel investigations into how fear towards outgroups is learnt (Chapter 4).

### **1.1.2 Part One: Research Aims and Empirical Work**

**Aim 1. To integrate associative learning and social psychological theories to explain the formation of intergroup anxiety.** Spurred by a realisation that clinical and intergroup anxiety share many properties (Birtel & Crisp, 2015), I sought to integrate common theoretical and methodological processes from the clinical anxiety literature with an intergroup context (Chapter 2). Experimental investigations of associative

learning typically consider fear responses toward specific outgroup exemplars. In contrast, the intergroup anxiety literature is dominated by self-report examinations of anxiety toward an entire outgroup. Following a brief review of associative learning and social psychological approaches, I advance a new framework drawing upon ideas in both fields to integrate the approaches.

In Chapter 3, I report on the development of a new measure of intergroup anxiety, the Cognitive, Affective, and Physiological Intergroup Anxiety Scale (CAP-IA). Previous validated measures of intergroup anxiety only measure affective and cognitive components of anxiety. The addition of the physiological subscale to a self-report instrument of anxiety is an effort to incorporate a key outcome measure from experimental paradigms of fear conditioning (i.e., physiological reactivity), with the main assessment tool of social psychologists (i.e., self-report questionnaire). This new measure was an important conceptual link between the two approaches that I used to further integrate the clinical and intergroup anxiety literatures. The CAP-IA is used in all subsequent empirical work presented in this thesis.

Novel research questions put forward in Chapter 2 were tested in Chapter 4, using the newly created CAP-IA scale. Chapter 4 examines associative (vs. non-associative) learning processes in retrospectively recalled negative encounters with outgroup members.

**Aim 2. To understand how intergroup anxiety can contribute to a deterioration in intergroup relations, through intergroup avoidance.** In addition to exploring associative learning processes in the formation of intergroup anxiety, I consider the impact of this anxiety on intergroup avoidance. A growing body of work suggests that negative intergroup contact can lead to anxiety (Aberson, 2015; Aberson & Gaffney, 2008; Corenblum & Stephan, 2001; Stephan et al., 2000; Stephan et al., 2002; Techakesari et al., 2015; Visintin, Voci, Pagotto, & Hewstone, 2016), which is

subsequently linked to avoidance (e.g., Plant & Devine, 2003). However, empirical investigations of negative contact are in their infancy and have rarely considered how these encounters can lead to long term outcomes, such as elevated anxiety and subsequent avoidance (McKeown & Dixon, 2017). Accordingly, research regarding the established link between anxiety and avoidance was expanded by considering associative learning processes following negative encounters. Specifically, in Chapter 4, the learning processes proposed to underpin intergroup anxiety and avoidance are empirically tested. The focus of the thesis thereafter (i.e., Part Two) turns to how to address this issue of avoidance.

### **1.3 Part Two Overview**

#### **The Development of Virtual Reality Intergroup Contact**

Intergroup avoidance has far reaching consequences, as interactions with outgroup members are the best remedy to intergroup tensions. Prejudicial and highly anxious individuals who would benefit the most from intergroup contact are also the most likely to avoid it. In the second part of this thesis, I attempt to address the problem of intergroup avoidance by developing a novel, exposure-based type of intergroup contact that was theorised to be more acceptable to those who would otherwise avoid direct, face-to-face encounters with the outgroup. This work was grounded by decades of research (reviewed below) that intergroup contact is effective in reducing intergroup biases.

##### **1.3.1 Intergroup Contact: Definition and Theoretical Overview**

In 1954, Gordon Allport hypothesised that intergroup contact, or interactions between members of different groups, should reduce prejudice and improve intergroup relations towards the group being interacted with. In the years following Allport's influential hypothesis, a range of research questions were pursued to test, explore, and apply principles from the contact hypothesis to improve intergroup relations. Initial

research focused on validating contact theory and demonstrating that positive interactions with outgroup members improve social cohesion. Substantial meta-analyses confirmed that contact does reduce prejudices (Pettigrew & Tropp, 2000; 2006). However, other research focused on *how* intergroup contact improves intergroup relations. Pettigrew (1998) identified that much of the work following the initial validation of the contact hypothesis was to (1) test how a positive interpersonal exchange could improve attitudes toward an entire group, and (2) determine what mechanisms and processes account for the effects of intergroup contact.

In relation to the first of these issues, several competing theories have emerged that refer to either eroding, broadening, or reinforcing salient social categorisations (Brown & Hewstone, 2005). Brewer and Miller (1984, 1988) advanced a *declassification* theory, whereby pleasant interactions with an outgroup member can emphasise individual differences, reduce perceptions of outgroup homogeneity, and thereby challenge people's stereotypes. Gaertner and Dovidio (2000) contended that intergroup contact allows members of opposing groups to *reclassify* social groups, whereby members from the outgroup become redefined as members of a broader ingroup. In their *salient classification* approach, Hewstone and Brown (1986; Brown & Hewstone, 2005) assert that intergroup contact is effective when interaction partners are clearly identified as outgroup members. High category salience allows individuals to consider their pleasant experience as an intergroup exchange (c.f. interpersonal), ensuring that positive thoughts and feelings toward the contact partner are transferred to the entire outgroup. Pettigrew (1998) proposed that these competing theories were not incompatible, but rather represent a dynamic process that unfolds linearly. Pettigrew (1998) asserted that initial contact could declassify the outgroup member, established contact makes the classification salient, and more intimate contact (e.g., friendships) create a superordinate ingroup through reclassification.

In addition to identifying how contact with a member of an outgroup creates positive appraisals for the entire outgroup, researchers attempted to understand the mechanisms underpinning these effects. Many mechanisms have been considered, including but not limited to, increased outgroup knowledge, increased empathy, and lower intergroup anxiety (Pettigrew & Tropp, 2008). In a comprehensive meta-analysis comparing these mediating mechanisms, Pettigrew and Tropp (2008) reported that intergroup anxiety was the strongest and most robust mediator of the relationship between intergroup contact and intergroup biases. In much the same way that intergroup anxiety can lead to the formation of prejudices, lower anxiety can reduce prejudice. Specifically, positive interactions with outgroup members are argued to reduce anxiety, which ultimately contributes to lower intergroup biases.

The historical work on intergroup contact has successfully built upon the Allportian tradition and documented how positive interactions with outgroup members improves intergroup relations. The work in this thesis seeks to address new research questions that are derived from observations in modern, pluralistic societies. Allport's influential work was penned during an era of segregation in North America and argues for the benefits of diverse societies. In contrast, modern society is multicultural, pluralistic, and diverse. The historical and current resettlement of refugees, globalisation, international travel, and the end of formalised segregation over the 20<sup>th</sup> century have created record levels of diversity in most nations around the world (Wright, Brody, & Aron, 2004). The diversity of the modern world provides a historically unprecedented opportunity for intergroup contact to occur. Nevertheless, prejudice, intergroup tension, and conflict between groups continues to impact the world we live in. Lingering prejudice, despite increased opportunities for intergroup contact, presents a key problem for social cohesion and has resulted in increased efforts to identify the barriers impeding the success of intergroup contact.

### 1.3.2 Barriers to Intergroup Contact

Recent reviews have outlined the barriers to intergroup contact (e.g., Al Ramiah & Hewstone, 2013; Dixon, Durrheim, & Tredoux, 2005). Several different issues have been suggested, including the occurrence of negative intergroup contact and that intergroup contact is often trivial (see Chapter 6 for a review). The main impediment for intergroup contact addressed in this thesis is informal intergroup segregation and intergroup avoidance (Paolini, Harwood, Neumann, & Hewstone, 2018). In brief, there is evidence that despite the opportunities for intergroup contact, individuals prefer to interact with members of their own social group and avoid the outgroup (Dixon & Durrheim, 2003; Dixon, Tredoux, Durrheim, Finchilescu, & Clack, 2008; Plant & Devine, 2003). Longitudinal and experimental studies have concluded that feelings of intergroup anxiety and perceptions of intergroup threat are established causes of intergroup avoidance. Prejudiced individuals can feel that their values, physical safety, and interpersonal connections are threatened in interactions with outgroup members (Paolini et al., 2018; Plant, Butz, & Tartakovsky, 2008; Greenland, Xenias, & Maio, 2012; Stephan, 2014). These perceptions of threat (and subsequent anxiety) result in avoidant behaviours that limit the widespread occurrence of intergroup contact.

Recently, new work has emerged that addresses informal segregation. Researchers have proposed that interventional forms of *indirect contact* are less anxiety provoking than direct contact and should therefore overcome this issue of intergroup avoidance (see Chapters 5 and 6). Indirect intergroup contact can be defined as the viewing, perception, awareness, or engagement in interactions with an outgroup member in a way that does not require face-to-face contact (Turner & Cameron, 2016). The absence of outgroup members has the potential to mitigate commonly anticipated threats (e.g., threats to physical safety) and should be more acceptable to individuals who otherwise may avoid direct interactions. The current thesis advances this literature by reviewing

and testing this idea for a new form of indirect contact: virtual reality intergroup contact (VRIC).

**Virtual reality intergroup contact (VRIC).** VRIC is the viewing of, or engagement in, intergroup contact in a realistic, immersive video or computer-generated virtual environment. The creation of the virtual environment can be achieved using two different methods: live-action filming using an immersive video camera or computer-generated animations (for a comparison between the two approaches, see Krisch, Bandarian-Balooch, O'Donnell, & Neumann, 2016). The most common presentation apparatus used in virtual reality is the head mounted display (HMD). HMDs are wearable devices with miniature visual displays that prevent the user from viewing the outside world whilst speakers provide parallel auditory information (Emmelkamp, 2005; Patterson, Winterbottom, & Pierce, 2006). In this program of work, VRIC was developed using immersive videos and administered using HMDs.

VRIC involves the use of visual and auditory media content portrayed in an immersive way. A considerable amount of research has validated the use of traditional, non-VR, multimedia (television, radio, and the internet) in the reduction of prejudice (Dovidio, Eller, & Hewstone, 2011). Traditional multimedia involves the use of visual and/or auditory information (e.g., auditory information from radio speakers, visual information from a television screen), however, it is not presented in an immersive manner (Steuer, 1992). Vicarious viewing of intergroup contact on these media platforms can change expectations and establish positive expectations for potential in vivo contact (Dovidio, Eller, & Hewstone, 2011) and reduce intergroup anxiety (Visintin, Voci, Pagotto, & Hewstone, 2016). However, VRIC is an enhanced form of vicarious contact because the participant can become immersed in the content (see Chapters 7 and 8).

### 1.3.3 Part Two: Research Aim and Empirical Work

**Aim 3. To provide an acceptable form of intergroup contact (i.e., more likely to be adopted) using virtual reality technology.** Chapter 5 evaluates the available evidence for a commonly cited solution for intergroup avoidance; that is, people will be more willing to engage in indirect intergroup contact. In a broad theoretical advancement, an acceptability approach to evaluating the practical utility of indirect contact strategies is proposed. In short, the argument presented is that individuals need to *accept* these indirect contact interventions and demonstrate a willingness to participate in them. This approach is congruent with acceptability studies that are commonly undertaken when evaluating medical interventions. It is proposed that without active involvement from people, the efficacy of these interventions are rendered ineffective to evoke social change. At the time of writing, no studies have explicitly addressed this research question. Nevertheless, the literature on imagined intergroup contact were screened for any proxy indicators of acceptance to support the hypotheses advanced in the manuscript. Imagined contact was selected as it is purely interventional and has the widest literature, but the broader theoretical implications extend to all forms of indirect contact.

The review conducted in Chapter 5 identified little evidence that individuals who avoid intergroup contact will indirectly interact with outgroup members and proposes arguments as to why future research assessing acceptability in an intergroup context is important. This theoretical argument provides the basis for the acceptability of a novel form of indirect contact that relies on virtual reality technology. Virtual reality intergroup contact (VRIC; introduced in Chapter 6) is proposed to be a viable alternative to other forms of contact. I conducted an acceptability study where I compared people's willingness to engage in face-to-face contact and VRIC (Chapter 7).

The last empirical study (presented in Chapter 8) details the development and implementation of VRIC in an initial experimental validation.

#### **1.4 Summary of Upcoming Empirical and Theoretical Work**

The theoretical and empirical work in this thesis addressed the established relationship between intergroup anxiety and avoidance. Fundamentally, the problem and solution to intergroup avoidance is logically circular (Paolini et al., 2018). The effective remedy to elevated intergroup anxiety (i.e., contact) is avoided as a direct result of the elevated anxiety. Therefore, the individuals who would benefit the most from contact are the ones most likely to avoid it. Recent work has attempted to disrupt this circular problem by introducing indirect forms of intergroup contact that are argued to be less anxiety-provoking. In this thesis, I explore the problem of intergroup avoidance from multiple angles. Initially, I explore basic processes underpinning how intergroup anxiety is formed and its consequences (i.e., avoidance). Subsequently, I developed an indirect contact intervention designed to be less anxiety-provoking (VRIC) while still achieving a significant reduction in intergroup anxiety. These two angles form the basis of two distinct sections of my thesis that collectively address three aims:

- (1) To integrate associative learning and social psychological theories to explain the formation of intergroup anxiety
- (2) To understand how intergroup anxiety can contribute to a deterioration in intergroup relations, through intergroup avoidance, and;
- (3) To provide a more acceptable form of intergroup contact using virtual reality technology.

This work culminated with one systematic review, two theoretical reviews, and five empirical studies. The theoretical developments presented aimed to explore how intergroup anxiety can be formed (Chapter 2) and how problems associated with intergroup avoidance can be overcome (Chapter 5). The ideas presented in these

reviews were then empirically evaluated across five studies (Table 1.1). In total, 2,095 participants completed self-report surveys online (Studies 1 to 4) and another 82 participants were recruited for an in-person experiment (Study 5). All studies received ethical approval from Griffith University's Human Research Ethics Committee (Appendix A).

Table 1.1

*An overview of the empirical studies included in this thesis.*

	<b>Study</b>				
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Sample Size	478	450	129	361	82
Sampled From <sup>a</sup>	Aus	USA	USA	USA	Aus
Outgroup <sup>b</sup>	Mus	AA	Mus	AA	Bl
Chapters <sup>†</sup>	3, 7	3, 7	3, 4	4	8

<sup>a</sup> Aus: Australian undergraduates, USA: American Online

<sup>b</sup> Mus: Muslims; AA: African American, Bl: Black

<sup>†</sup> The scale development (Chapter 3) utilised empirical data collected to also address other research questions.

# Part I

## **The Formation, Measurement, and Outcomes of Intergroup Anxiety**

## Chapter 2 Preamble

Pavlovian conditioning is a form of associative learning shown to contribute to the development and reduction of clinical anxiety and fear, and, more recently, intergroup anxiety and fear. Chapter 2 outlines the theoretical framework used in this thesis and provides a synthesis of the literature on associative learning of fear towards outgroups. Findings from experimental studies are reviewed that outline how fear toward the outgroup, relative to the ingroup, can be preferentially learnt and is resistant to extinction-based techniques. I reconcile these findings within the broader intergroup relations literature by considering a temporally and contextually specific model of intergroup relations.

Novel future research directions for intergroup anxiety will then be identified based upon previous research on clinical anxiety. Specifically, it is proposed that processes known to enhance the extinction of specific phobias should be investigated with social stimuli. This general argument leads to several future research questions that advance the field, but were not tested in this thesis (e.g., explore cognitive factors during extinction and extinction in multiple contexts). The chapter concludes by suggesting innovative research designs are needed to validate an associative learning account of fear towards outgroups outside of experimental conditions.

**PAPER**

This chapter includes a co-authored paper. The bibliographic details of the co-authored paper, including all authors, are:

**O'Donnell, A. W.**, Neumann, D., Duffy, A., & Paolini, S. (2019). Learning to Fear Outgroups: An Associative Learning Explanation for the Development and Reduction of Intergroup Anxiety. *Social and Personality Psychology Compass*, e12442. DOI: 10.1111/spc3.12442

My contribution to the paper involved:

*I conceived the idea for the literature review and developed its structure, found the relevant literature, and wrote the review under supervision. Two co-authors (Neumann & Duffy) are part of my supervisory team. Additionally, Paolini was an external collaborator. Their contribution to the manuscript involved providing supervisory advice and review of drafts.*

(Signed) \_\_\_\_\_ (Date) 25<sup>th</sup> October, 2019

Alexander W. O'Donnell

(Countersigned) \_\_\_\_\_ (Date) 25<sup>th</sup> October, \_\_\_\_\_  
2019 Supervisor: Professor David L. Neumann

## **2. Learning to fear outgroups: An associative learning explanation for the development and reduction of intergroup anxiety**

On September 11, 2001, the Western World witnessed the collapse of the World Trade Centres in New York. Subsequent to this event, the number of hate crimes toward Muslims spiked (Federal Bureau of Investigation, 2001). During 2008, the financial market collapsed, creating unemployment and poverty. In the aftermath of the global financial crisis, individuals threatened by the crisis reported higher anti-immigration and anti-Semitic sentiments depending on whom they blamed for the financial collapse (Becker, Wagner, & Christ, 2011). These two examples illustrate the impact that fear can have on intergroup relations. Perceived threats from members of outgroups to the welfare and values of one's ingroup and self can instil and maintain negative appraisals of those outgroups (Stephan & Stephan, 2000). Instances where perceived threats apply directly to the self, such as a fear of being physically or psychologically harmed from terror attacks or financial losses, can result in intergroup anxiety (Stephan, 2014). Intergroup anxiety is a widely studied construct in the intergroup relations literature because it is related to a range of outcomes, including prejudice (Voci & Hewstone, 2003) and avoidance of the outgroup (Barlow, Louis, & Terry, 2010; for a comprehensive review of the outcomes of intergroup anxiety, see Stephan, 2014).

Recent reviews have outlined similarities between intergroup anxiety and forms of clinical anxiety and fear (Birtel & Crisp, 2015; Paolini, Hewstone, Voci, Harwood, & Cairns, 2006). The current review builds upon these earlier efforts to reposition the theoretical understanding of how intergroup anxiety is developed and reduced. We will draw attention to established phenomenon in the field of specific phobia that are applicable to intergroup contexts. In particular, we focus on associative learning processes to reveal new insights into the nature of intergroup relations that would otherwise not be evident from a traditional intergroup outlook.

This review is organised into four sections. First, we advance a conceptualisation of intergroup fear and anxiety congruent with the associative learning literature. Second, we review research on associative learning and intergroup anxiety. We highlight key findings from recent experiments showing how fear toward outgroups can be preferentially learnt and is resistant to extinction. Third, we provide an overview of procedures that can promote the extinction of specific phobias with an emphasis on those that are most relevant to intergroup contexts. Finally, we highlight the need to test the ecological validity of a learning account of the formation of intergroup anxiety.

### **2.1 A Clinically Derived Conceptualisation of Intergroup Fear and Anxiety**

From a clinical perspective, anxiety is the anticipation of a future threat, and fear is an emotional response to a real or perceived imminent threat (American Psychiatric Association, 2013). In the intergroup literature, intergroup anxiety describes the apprehension individuals experience when anticipating or engaging in an interaction with outgroup members (Stephan & Stephan, 1985). Thus, intergroup anxiety has both an anxiety component, identified by the response when anticipating an interaction, and a fear component, identified by the response during the interaction.

Drawing from the clinical tradition, we propose that intergroup fear and anxiety are *not distinct emotions*; rather, they are differentiated on whether the emotive response is evoked in a specific (vs. a-specific) context and time frame. This differentiation aligns with learning theory and the established distinction between episodic and chronic intergroup anxiety (Paolini et al., 2006; Paolini, Harris, & Griffin, 2016). Defined as a *contextually-specific* emotion, episodic intergroup anxiety (analogous to our definition of intergroup fear) is a state-like anxious response evoked by a specific perceived threat, toward specific outgroup member(s), and during a specific intergroup interaction. Conversely, chronic intergroup anxiety (analogous to our definition of intergroup anxiety) is a *contextually-broad*, trait-like emotion, directed toward the entire outgroup

without reference to a specific interaction or timeframe (Paolini et al., 2016). This conceptualisation suggests fear is a target-specific response contextually and temporally defined, whereas anxiety is a contextually and temporally nonspecific group-level response.

Specific phobia and social anxiety also manifest in episodic forms (i.e., fear about a specific object or situation) and chronic ways (i.e., marked anxiety; American Psychiatric Association, 2013). The similarities with intergroup anxiety and fear in clinical work are important to note as investigations into the development and reduction of anxiety disorders often focuses on the fear component. In contrast, social psychologists have traditionally focused on chronic levels of intergroup anxiety (but see Kauff et al., 2017). Drawing inspiration from a multi-disciplinary space, focusing on the fear component of (episodic) intergroup anxiety may enhance our current understanding of what drives and maintains prejudiced responses to, and avoidance of, outgroup members (see also Abrams & Eller, 2017; MacInnis & Page-Gould, 2015; Paolini et al., 2016).

Associative learning has been used to explain the development of fear in humans for almost 100 years. The notable study dubbed the “little Albert experiment” was one of the first empirical investigations of associative learning of emotions. Watson and Raynor (1920) demonstrated that Albert acquired fear after seven trials pairing a rat with a loud noise. The pairings were believed to result in Albert learning to associate the rat with a loud noise, and this association consequentially generalised to other furry objects. Comparatively, investigations of how fear is learned in intergroup contexts is more recent (Olsson, Ebert, Banaji, & Phelps, 2005). Thus, controversies, debates, and questions that have occupied decades of research on acquired fears and phobias in humans have not yet been applied to intergroup relations research despite their potential relevance and importance.

## **2.2 The Learning Paradigm and its Application to Social Stimuli**

Associative learning is a general term that applies to both Pavlovian conditioning (also known as classical conditioning) and operant conditioning. The current review focuses on Pavlovian conditioning because it is known to activate evolutionary adaptive responses to fear and has been widely studied in relation to anxiety disorders (Fanselow & Sterlace, 2014). A basic Pavlovian conditioning procedure involves an acquisition phase (Gottlieb & Begej, 2014). Acquisition refers to the process where learning occurs by associating one stimulus with another stimulus. In the laboratory, acquisition occurs by a repeated pairing of a conditioned stimulus (CS) and an unconditioned stimulus (US) until an association between the two is learned. The US can be an aversive stimulus (e.g., an electrotactile stimulation) that elicits a response known as an unconditioned response (UR; e.g., elevated heart rate), regardless of an individual's prior learning history. In the case of successful fear conditioning, the presentation of only the CS following acquisition will elicit a conditioned fear response (CR). The presentation of the CS is a cue that retrieves memory of the US from either long- or short-term memory (Bouton, 2004).

An extinction phase may occur after an acquisition phase. The extinction phase involves repeated presentations of the CS alone. The CS-alone presentations produce a reduction of the conditioned fear response not due to the unlearning of the CS-US association, but rather the formation of a new memory of the pairings of the CS and the absence of the US (Bouton, 1994, 2002, 2014), otherwise known as the CS-noUS association.

A common experimental technique employing acquisition and extinction phases, known as differential conditioning, involves using two CSs matched in content (Lipp, 2006). The first CS (CS+) is followed by the presentation of the US in the acquisition phase, whereas the second CS (CS-) is never followed by the US. The differential fear

conditioning procedure thus uses a within-subjects design to control for non-associative processes such as habituation or sensitisation. Learning is considered to have occurred when the CR elicited by the CS+ is larger than that elicited by the CS-.

In typical fear conditioning studies, the CSs are neutral stimuli like geometric shapes or tones. Researchers have adapted this protocol by altering CSs to be representative of commonly feared stimuli (e.g., spiders) and, more recently, social stimuli. The latter are often faces with salient physical features that allow them to be distinguished from the faces of other individuals of the same or different social group(s). According to learning theory, any social stimulus should demonstrate a stronger fear response if paired with an aversive outcome (CS+) compared to a perceptually distinct stimuli not paired with an aversive outcome (CS-). Therefore, experiments with social stimuli can be extended to include a broad range of intergroup categories represented by CSs with well-recognised facial markers or accessories, including ethnicity (e.g., skin colour), gender, religion (e.g., a burqa), or age. Differential fear responses to these social stimuli can be conceptualised within a social psychology framework as a type of episodic intergroup anxiety due to the in-the-moment fear responses to a single outgroup exemplar (CS+) in a specific laboratory context.

Researchers have used social stimuli within differential conditioning designs to examine intergroup biases in the learning of fear. These studies, reviewed below, have found evidence for a general ingroup-outgroup asymmetry in the rate of acquisition and extinction of learnt episodic fear and boundary conditions of this asymmetry. Similarly, social psychologists have identified that outgroups can elicit negative affective responses, but complex factors can specify the scope of this intergroup bias (Devos, Silver, Mackie, & Smith, 2002). For example, certain intergroup emotions can vary in their applicability to specific outgroups (Dasgupta, DeSteno, Williams, & Hunsinger,

2009). Dasgupta et al. (2009) found that implicit outgroup bias was exacerbated when participants experienced an emotion compatible with pre-existing stereotypical responses to the outgroup (e.g., disgust and homosexual individuals), but not when the emotion was incompatible with pre-existing schematic representations of the outgroup (e.g., disgust and Arabs). We can apply these findings to investigations of fear learning and infer that outgroups stereotypically portrayed as threatening could be more readily and persistently associated with aversive stimuli compared to non-threatening outgroups (see also Dang, Xiao, & Mao, 2015). This hypothesis remains untested but is congruent with a recent theoretical account of fear learning in intergroup contexts that incorporated social factors into the initial evolutionary explanation for the ingroup-outgroup asymmetries in associative fear learning.

### **2.2.1 Ingroup-Outgroup Asymmetries in Associative Fear Learning**

In comparison to ingroup members, fear responses to outgroup members have been found to be learnt more readily (e.g., Navarrete et al., 2012) and to be resistant to extinction in certain circumstances (e.g., Olsson et al., 2005). These findings were initially interpreted as evidence that learnt fear of outgroup members is a consequence of evolutionary processes. Seligman's (1971) preparedness theory is a theoretical account for the role of evolution in associative learning. According to preparedness theory, certain types of CSs can be preferentially associated with certain USs or biologically "prepared" to enter an association. Cues that have posed mortal threats to humans across our evolutionary history are theorised to be more likely to result in fear due to prepared associative learning (McNally, 2016). An example is phobic responses to snakes. Humans learn a fear response to snakes faster than evolutionary benign stimuli (e.g., non-threatening flowers) or evolutionary recent objects (e.g., cars; Mineka & Zinbarg, 2006).

Preparedness theory's application in associative learning experiments with social stimuli (e.g., Navarrete et al., 2012) is not without critics. Mallan, Lipp, and Cochrane (2013) argue that fear learning toward outgroups does not meet the necessary conditions to satisfy the strict criteria of preparedness (see also Koenig et al., 2017; Maia, 2009). Prepared associations are easily acquired, resistant to extinction, and are cognitively irrational in comparison to unprepared associations (Öhman & Mineka, 2001). Experiments with social stimuli have found initial evidence that learnt fear toward outgroup CSs is cognitively rational (Mallan, Sax, & Lipp, 2009), thereby violating the criteria of preparedness. Hence, Mallan et al. (2013) are of the view that a combination of genetic, cultural, and social factors (e.g., stereotypes; social norms) must interact to influence fear learning toward outgroups.

This theoretical assertion is congruent with positions within the intergroup literature. For example, Cottrell and Neuberg (2005) explain fear of outgroups as reflecting an evolutionary adaptive need to preserve the ingroup's physical safety. Across our evolutionary history, human beings evolved to value group-based living due to adaptive consequences, such as sharing resources and responsibilities. However, as negative consequences of group-living were also present (i.e., spread of disease, social loafing, and threats of physical harm), it is argued that humans evolved through biological and cultural systems to protect themselves from outgroups as a way to avoid potential threats (see also Kurzban & Leary, 2001). These evolutionary and cultural factors have been at the forefront of discussions regarding the boundary conditions of a general ingroup-outgroup asymmetry in fear conditioning studies examining preferential learning and retarded extinction.

**Evidence of preferential learning to outgroup members.** Recent findings support the preferential learning of fear toward the outgroup. Neumann and colleagues (Neumann, Webb, Paolini, Griffin, & O'Donnell, 2016) found greater physiological

responses during acquisition to a Middle Eastern outgroup CS+, compared to a Middle Eastern outgroup CS-, and more negative subjective responses to both outgroup CSs compared to ingroup CSs. Another study, looking at groups minimally defined through arbitrary group allocations, found preferential acquisition of fear for the outgroup (vs. ingroup; Navarrete et al., 2012). These findings for minimally defined groups suggest that humans may have a disposition to preferentially learn a fearful response to outgroups even away from an evolutionary history of conflict or socially construed stereotypes. Humans may show preferential learning of anxiety to any outgroup; social and cultural factors may then identify the specific qualities or contents of the outgroup representation that trigger these effects (Olsson et al., 2005). Preferential learning of fear toward minimally defined groups may thus provide evidence of prepared learning with social stimuli as representations from the group are void of any social context.

**Evidence of retarded extinction to outgroup members.** A CS shows resistance to extinction when it shows a larger CR following the same number of extinction trials or takes more trials to successfully extinguish in comparison to a second CS that has undergone similar acquisition and extinction procedures. Olsson et al. (2005) recruited White and Black participants. Following successful acquisition of fear toward both ingroup and outgroup CSs, fear responses showed resistance to extinction for the outgroup CS in comparison to the ingroup CS. The rate of extinction toward the outgroup CSs was unrelated to participants' attitudes toward the outgroup, but was greater for those individuals who reported having had more prior interracial romantic partners, suggesting that previous intimate intergroup experiences enhance the extinction of intergroup bias.

In an extension of Olsson et al. (2005), a study conducted in Sweden found evidence of outgroup-specific retarded extinction for Black faces but not Middle-Eastern faces (Golkar, Björnstjerna, & Olsson, 2015). Additional exploratory analyses

revealed that the rate of extinction for the Middle-Eastern outgroup was related to environmental factors. Resistance to extinction for the Middle-Eastern outgroup was found for participants who were brought up in ethnically homogenous (European) environments, but not for those brought up in a mixed ethnicity environment.

Participants from ethnically heterogeneous environments are more likely to have encountered Muslims due to a higher population of Muslims in Sweden. These results highlight a possible interaction between evolutionary derived processes (i.e., retarded extinction) under socially-construed conditions.

Extinction can be enhanced or retarded by factors other than previous experiences with the outgroup. One study found that extinction of learnt fear of Black faces was moderated by emotional expression, indicating an additive effect of expression and race (Bramwell, Mallan, & Lipp, 2014). Additionally, no resistance to extinction was found when the CS was a female (rather than male) ethnic outgroup member (Navarrete et al., 2009) and when ingroup and outgroup membership was minimally defined even after finding a preferential learning effect (Navarrete et al., 2012). Evolutionary or culturally ascribed salience of threat markers can explain some of these findings. Gender could serve as a heuristic for potential danger, as males in comparison to females pose more of a physical threat (Navarrete et al., 2009) and minimally defined groups have no basis in evolutionary or social history and therefore cannot be considered threatening (Navarrete et al., 2012).

In summary, there is evidence that learned fear responses toward the outgroup can be acquired and extinguished through Pavlovian conditioning. In particular, the extinction of fear toward the outgroup has been shown to be retarded among individuals that have not had exposure to members of the outgroup being investigated and in situations where the outgroup poses a salient threat to the ingroup members. These findings from laboratory-based studies are mostly consistent with Seligman's (1971)

preparedness theory of fear acquisition in a revised format (Mallan et al., 2013) that incorporates social and cultural factors.

### **2.3 Applying Associative Learning to the Promotion of Intergroup Harmony**

The laboratory findings from the field of associative learning in intergroup contexts could be applied to promote the reduction of intergroup anxiety and improve harmony between groups in real settings. In clinical settings and in the laboratory, a reduction of fear and anxiety has been achieved by applying the principles of extinction through exposure therapy. Exposure therapy is regarded as the most efficacious form of psychological treatment for specific phobias and social anxiety disorders (Hofmann et al., 2006). It involves deliberately and repeatedly exposing an individual to a feared stimulus (CS) in the absence of a US until the intensity of the feared response is reduced to a non-clinical level (Richard, Lauterbach, & Gloster, 2007). The mechanism for fear reduction is the formation of a new memory that associates the presentation of the CS with no aversive consequence (Bouton, 2002).

Interactions with outgroup members, known as intergroup contact, is an effective way of reducing intergroup biases (Allport, 1954; Pettigrew & Tropp, 2006). Operationalised in a manner consistent with exposure therapy, intergroup contact is exposure to an anxiety-evoking stimulus (i.e., the outgroup) until the anxious response is diminished to a point that it no longer impedes positive intergroup relations (see Birtel & Crisp, 2012).

Drawing from research on specific phobias, clinicians have applied features known to enhance extinction to exposure therapy with success (see Craske & Mystkowski, 2006). Two of these features include enhancing cognitive processes during extinction and the use of multiple contexts. Given the similarities between exposure and contact, it is possible that these same mechanisms will enhance prejudice reduction strategies based on promoting contact with the outgroup.

### 2.3.1 Cognitive Factors and Instructed Extinction

For the CS-US pairing to result in a CR for non-prepared stimuli, participants need to be aware that the presentation of the CS will be paired with the US and that the pairing will continue in the future (Lovibond & Shanks, 2002). Awareness of the pairing is known as CS-US contingency awareness. The importance of contingency awareness is shown by the acquisition of a fear response from verbal instructions alone. Using functional magnetic resonance imaging, Phelps et al. (2001) demonstrated that the left amygdala of the human brain, known to be involved with the processing of fear responses, was activated by simply informing participants that they would be shocked when a CS (geometric shape) was presented. Moreover, this verbal conditioning also elicited an increase in physiological arousal. A more recent study found an additive effect as the combination of verbal instructions and US-reinforcement produced a stronger fear response compared to verbal-only conditioning (Raes, De Houwer, De Schryver, Brass, & Kalisch, 2014). A review concluded that autonomic conditioning, where the stimuli are aversive (e.g., electro-tactile stimulation) and outcome measures are biologically elicited and automatic (e.g., electrodermal response), is almost always dependent upon contingency awareness (Lovibond & Shanks, 2002).

There is evidence, however, that contingency awareness is not necessary in associative learning paradigms involving prepared stimuli (Soares & Öhman, 1993). Theoretically, prepared fears are learnt prior to cognitive processing and, therefore, they would be extinguished using pre-cognitive processing (Soares & Öhman, 1993). Conditioning paradigms utilising masked stimuli, where the CSs are altered so that they are not consciously recognisable, have shown that fear-relevant prepared stimuli (snakes and spiders) still demonstrate retarded extinction (Öhman & Soares, 1994). Additionally, conditioned fear responses to fear-relevant prepared stimuli (snakes and spiders) have also proven to be impervious to verbal instruction that the presentation of the CS will no

longer be paired with the US (Soares & Öhman, 1993). It is argued that, due to an evolutionary salience, fear-relevant stimuli are processed via pre-attentive, non-conscious mechanisms resulting in a fear response occurring prior to conscious awareness.

The application of this component of preparedness theory (Seligman, 1971) in associative learning of fear toward outgroups has led to the prediction that the extinction of learnt fear toward social stimuli should also be irrational (Mallan et al., 2009).

Irrational fears are impervious to cognitive processes and cannot be reduced by convincing arguments that the feared stimuli does not pose a threat (Seligman, 1971).

However, there is preliminary evidence fear learning with social stimuli is rational. In an intergroup relations context, the roles of CS-US contingency awareness and cognitive factors have not been examined in depth despite their theoretical importance.

A notable exception is a study conducted by Mallan et al. (2009). Australian White participants were presented with Chinese faces (CS) paired with an electro-tactile shock (US). Prior to the extinction phase, half the participants were informed that the presentation of the Chinese faces would no longer result in a shock and the other half were not given any instructions. During the extinction phase, the fear response of the group that received verbal instructions was attenuated whilst the fear response of the group that did not receive instruction demonstrated resistance to extinction.

Consequently, some scholars have called for a revision of the application of preparedness theory to social learning (Mallan et al., 2009; Mallan et al., 2013).

Despite the ongoing theoretical debate, understanding the cognitive processes underpinning the extinction of fear of outgroups can potentially be utilised in efforts to reduce intergroup fear (see Birtel & Crisp, 2012, 2015). A common cognitive process shared by several anxiety disorders is future-orientated perceptions of threat (Hofmann, 2008). For example, a spider phobia includes a perception that the spider

could cause physical harm in the foreseeable future. Similarly, in an intergroup setting, questionnaire-based research has found that the relationship between negative intergroup situations and intergroup anxiety is mediated by anticipation of threat (Aberson, 2015). Therefore, removing the CS-US expectancy through education and cognitive re-structuring (a therapeutic application of verbal instructions; see Luck & Lipp, 2016) could enhance the effects of intergroup contact and promote the reduction of intergroup anxiety.

### **2.3.2 Multiple Contexts and the Return of Fear**

Research with human participants has provided evidence that the extinction of an acquired fear does not result in a permanent removal of that fear. In the specific phobia literature, there is evidence that the likelihood that the extinguished fear response will return is dependent upon the context of learning, particularly during extinction learning. In a typical conditioning paradigm, the acquisition phase occurs in the same context as the extinction phase. Bouton's contextual memory model (Bouton, 1994, 2002, 2004, 2014) asserts that the CS-noUS association learnt during extinction creates a new memory that reduces the fear response. However, unlike the CS-US association formed in acquisition, the CS-noUS association formed in extinction is highly dependent on context. Pavlovian conditioning paradigms that manipulate the context of acquisition, extinction, and later test phases (where stimuli are re-presented to the participant) have found that if the CS is presented in a context that matched that present during extinction, the CS-noUS association is retrieved and no conditioned fear response is observed. However, if the CS is presented in a different context, the CS-US association is retrieved, and a conditioned fear response occurs (i.e., a “return of fear”). In short, following successful extinction, presentation of the CS in any context other than the context during extinction may result in a return of the CR.

The return of fear has been observed in laboratory procedures of (1) reinstatement, (2) renewal, (3) spontaneous recovery, and (4) reacquisition (for a comprehensive review, see Bouton, 2002). Importantly, each form of return of fear may have implications for intergroup settings. Reinstatement of CRs to the CS can occur when the US is presented by itself following extinction. Reinstatement only occurs when the US and the CS are presented in the same context as the initial learning procedure (e.g., following successful anxiety-reducing intergroup contact and being exposed to something unpleasant [US] that was originally paired with the outgroup member). Renewal has been observed when acquisition occurs in one context (Context A), extinction occurs in a distinct context (Context B), and then a fear response to the CS occurs after it is presented again in Context A (termed ABA renewal). For example, if fear toward an outgroup is learnt via a negative interaction with an exemplar in the workplace (Context A), and subsequently reduced via intergroup contact elsewhere (Context B), renewal could be observed if interacting with an outgroup exemplar back in the workplace. Fear responses can also be renewed if post-extinction exposure to the CS merely occurs in a new context (e.g., ABC renewal or AAB renewal). Spontaneous recovery occurs when the extinguished fear response returns during re-exposure to the CS after time has elapsed since extinction (e.g., seeing an outgroup member following successful intergroup contact). Consistent with the contextual memory model of learning (Bouton, 2002), the passing of time creates a shift in the temporal context. Finally, reacquisition occurs when there are CS-US pairings following extinction and these take place in the same context in which extinction occurred. The second set of CS-US pairings results in a rapid reacquisition of fear, indicating that the initial memory of the CS-US association is still present.

Research is needed to ascertain if return of fear occurs following the extinction of fear toward social stimuli and if it is more likely for outgroup stimuli. It has been shown

that fear-relevant and fear-irrelevant animal stimuli differ in the strength of renewal (Neumann & Longbottom, 2008). In addition, clinical research may present new directions for the use of extinction-based techniques to improve intergroup harmony. Researchers have examined strategies to reduce the return of fear (e.g., Neumann, 2007; Neumann, Lipp, & Cory, 2007) and these could also be applied to interventions involving intergroup contact. There are several processes known to attenuate return of fear (e.g., memory reconsolidation: Schiller et al., 2010), but one particularly powerful strategy is to conduct extinction across multiple contexts (Bandarian-Balooch & Neumann, 2011; Vansteenwegen et al., 2007). Similar effects of multiple context extinction have been observed in clinical settings; that is, fearful individuals will show a return of fear following exposure therapy when the fear assessment occurs in a different context than the treatment (Mystkowski, Craske, & Echiverri, 2002). Similar to laboratory-based conditioning studies, this return of fear can be attenuated by conducting exposure therapy in multiple contexts (Bandarian-Balooch, Neumann, & Boschen, 2015).

Acknowledging that conditioned fear is likely to return and that the inhibitory CS-noUS association formed during extinction is context dependent implies that intergroup contact should be most effective as a means to reduce intergroup anxiety when experienced over multiple contexts. Naturally occurring intergroup contact across multiple contexts occurs when, for instance, an individual works with an outgroup member and then socialises with them outside of the work place. Interventions designed to extinguish learnt fear toward the outgroup using intergroup contact could therefore be designed to incorporate interactions in not just one but multiple contexts, in the same manner as exposure therapy (Pettigrew & Tropp, 2006). For this to be achievable, we will need to overcome some inherent resistance to engaging in contact (Paolini, Harwood, Hewstone, & Neumann, 2018). A growing body of evidence indicates that

intergroup contact does not happen regularly as people tend to segregate themselves and maintain boundaries between social groups (Dixon & Durrheim, 2003), particularly those evoking intergroup anxiety (Shelton & Richeson, 2005). This minimises both the situations and contexts where intergroup contact may occur and the practical viability of contact as an anxiety-reducing agent.

#### **2.4 The Quest for Ecological Evidence for Associative Learning in Intergroup Contexts**

Laboratory-based experiments have produced clear evidence of conditioned fear following CS-US pairings. However, the proposition that conditioned fear is acquired outside of the laboratory has been debated (Mineka & Zinbarg, 2006; Rachman, 1977). Some have argued that laboratory studies of conditioning rely upon simplified and exaggerated learning opportunities (Beckers, Krypotos, Boddez, Effting, & Kindt, 2013). Presentation of outgroup faces (CSs) paired with an aversive stimuli (or not paired, i.e., CS-) in the absence of distracting stimuli allow participants to form a clear and unambiguous association. Real-life scenarios are rarely this simplistic and could be classified as “weak” (Lissek, Pine, & Grillon, 2006). Weak situations occur when the threat is less predictive of an aversive outcome (e.g., presentation of an outgroup member is rarely predictive of an immediate negative outcome) and the threat is not imminent. The result could be that outside the laboratory, a weaker CS-US association is formed or that no association is formed at all. Research is needed to examine whether real-life anxiety toward outgroups is the result of prior associative learning events.

Survey designs have been utilised to examine the ecological validity of conditioning explanations for the acquisition of specific phobia, although the evidence is mixed. An early examination of phobic patients found that more than half the patients attributed the onset of their anxiety symptoms to a conditioning event (Öst & Hugdahl, 1981). Conditioning events were conceptualised as a specific event that paired

the feared stimuli (CS) with strong discomfort or anxiety (US) that started a phobia in real life. Additional research has suggested that conditioned events are important to the onset of specific phobias in adults (Merckelbach, van den Hout, Hoekstra, & deRuiter, 1989) and children (Muris, Merckelbach, & Collaris, 1997). However, contradictory findings have also been reported in both adult (Davey, 1991) and child samples (Menzies & Clarke, 1993). Additionally, it has been suggested that non-Pavlovian forms of learning (i.e., vicarious learning and transfer of information; Rachman, 1977) and non-associative learning processes may cause the participants' phobias (Ollendick & King, 1991). Collectively, there is no clear conclusion about an associative learning account of the onset of clinical fear and anxiety. However, the lack of consistency in the findings may be due to methodological issues.

Research on the ecological validity of a learning account for the onset of anxiety disorders has been plagued with methodological controversies. For example, key instruments in the field have been subject to methodological criticisms, leading to claims of an overestimation of conditioning events (Menzies, Kirkby, & Harris, 1998). Researchers have classified any traumatic event as an instance of classical conditioning (Menzies & Clarke, 1994). As previously defined, classical conditioning involves a specific ordering of events. Firstly, a CS is associated with the US. The CS, by definition, should not elicit any conditioned fear responses prior to its pairing with a US. Secondly, after the CS-US association is formed, encounters with the CS in the absence of the US should elicit an affective or behavioural fear response. Therefore, studies using surveys to assess Pavlovian conditioning accounts of the onset of specific phobia need to ascertain, but most often fail to show, that (1) the CS did not elicit fear prior to being paired with a US or that it was the first time that the CS was encountered, (2) the CS was paired with an aversive US, and (3) that the presentation of the CS in the absence of the US subsequent to the conditioning experience produced fear.

Notwithstanding the inconclusive findings in the specific phobia literature, there is preliminary evidence of a learning account for the development of intergroup anxiety in real-life scenarios. However, these correlational studies suffer from the same limitations previously described. Previous survey-based research has found a strong link between negative encounters with an outgroup member and higher levels of intergroup anxiety (e.g., Aberson & Gaffney, 2008). These findings are at least consistent with the self-reported ecological validity of conditioning but share their limitations. As Pavlovian conditioning experiments often provide clear and simple observations of associative learning, providing empirical evidence that conclusively links CS-US associations to intergroup anxiety in a more complex, real-world setting is a necessary future research direction.

## **2.5 Conclusion and Recommendations**

The application of an associative learning framework to investigate the acquisition and extinction of intergroup anxiety could advance intergroup harmony (Paolini et al., 2016). We argued that fear and anxiety are key concepts for understanding barriers to intergroup harmony and showed that it is possible to draw parallels in their clinical and social psychological conceptualisations. At a practical level, these parallels include extinction-based exposure therapy as a treatment for clinical anxiety and intergroup contact as a means to reduce intergroup anxiety. Hence, factors known to enhance the efficacy of exposure therapy should also enhance the efficacy of intergroup contact (Birtel & Crisp, 2015).

Adopting this framework, we highlighted several future research directions, summarised below. These recommendations can be undertaken to improve strategies to reduce intergroup tensions; however, researchers should be mindful of ethical implications associated with preferential acquisition and retarded extinction. In ethical terms, the ingroup-outgroup asymmetry observed in associative learning studies raises

the potential for fear responses in the laboratory to be greater, and extinction to be less complete, for outgroup members relative to ingroup members. Nevertheless, future research should continue as these risks can be easily mitigated. One method to minimise these risks, and ensure the continuation of ethical research, is to monitor the participant's fear response and continue the extinction phase until all responses are attenuated. We believe methods such as these can allow ethical research to be conducted that serves to improve intergroup contact based on associative learning processes.

In particular, our review highlighted verbal instructions and extinction in multiple contexts as techniques of greatest potential to improve the rate of extinction and prevent the return of fear in intergroup settings. Future research should build upon early conditioning work (Mallan et al., 2009) and test if extinction phases are enhanced with verbal instructions that the outgroup CS will no longer be paired with an aversive stimulus. If verbal instructions reliably enhance extinction in intergroup settings, experiences of intergroup contact could be deliberately supplemented by explicitly correcting maladaptive cognitions by informing people that their contact partner does not pose a threat, thereby reducing the expectation of harm. This reasoning would be consistent with contemporary use of story-telling as a prejudice-reduction strategy in schools and other settings (Husnu, Mertan, & Cicek, 2018; Turner & Cameron, 2016).

Additionally, promoting contact with outgroups across multiple contexts may be efficacious in generalising fear reduction and attenuating the return of intergroup fear when outgroups are encountered in new contexts. Interventions that incorporate intergroup contact in a range of locations may enhance the long-term efficacy of contact-based strategies. This recommendation is consistent with that of eminent contact scholars noting a clear gap in this area (Pettigrew, 1998). The review also concluded that there is a lack of ecological evidence that fear is learnt toward outgroups in the way predicted by Pavlovian conditioning. Therefore, another recommendation is for future

researchers to employ appropriately sophisticated survey-based research protocols to ascertain whether outgroup CS-US pairings occur outside the simplified settings of laboratory studies.

Overall, the continuation of ethically sound research on intergroup anxiety using associative learning paradigms is important. The development, improvement, and promotion of interventions designed to improve intergroup harmony based upon associative learning principles offer ways for social advancement in a world with increasing multiculturalism and challenges positively harnessing diversity.

### Chapter 3 Preamble

Pavlovian conditioning learning paradigms offer new and interesting theoretical conceptualisations of how fear and anxiety can be learnt in intergroup contexts. These novel conceptualisations should be investigated in subsequent work. However, it is important to consider the nature of the measures used. Research on anxiety using the Pavlovian conditioning learning paradigm often use psychophysiological measures to assess anxiety and learning. Two psychophysiological responses purported to be robust and reliable are skin conductance and heart rate (Lavond & Steinmetz, 2003). Skin conductance is a measure of electrodermal activity in response to the activation of non-specific visceral affective arousal (Neumann & Westbury, 2011) and is used routinely in learning research (e.g., Effting & Kindt, 2007). Elevated heart rate has long been known to be associated with increased feelings of fear and anxiety (Beidel, Turner, & Dancu, 1985) and is also routinely used in conditioning research (e.g. Bandarian-Balooch, Neumann, & Boschen, 2015). Online measures of physiological arousal have been used in studies on intergroup anxiety (e.g., Blascovich, Mendes, Hunter, Lickel, & Kowai-Bell, 2001), but this approach is rare. Social psychologists are far more likely to use self-report questionnaires to assess intergroup anxiety. To date, none of these validated scales (reviewed below) include indicators of physiological arousal.

A key theoretical goal of this thesis is to reconcile the differences between learning theory and social psychology to compliment the previous work done in each individual domain. Part of this process involves reconciling different methodological approaches. Chapter 3 reports on a novel self-report instrument to measure intergroup anxiety that was developed for the current body of work. This new measure includes self-report questions to measure physiological anxiety responses to outgroup members. The scale development process occurred parallel to the other empirical pursuits. Thus, the results reported consist of analyses conducted on the data collected for Studies 1, 2,

and 3 (see below for further details of these studies). The newly developed CAP-IA is also used to address empirical research questions in Chapters 4 and 7.

**STATEMENT OF CONTRIBUTION TO CO-AUTHORED**

**PUBLISHED PAPER**

This chapter includes a co-authored paper. The status of the co-authored paper, including all authors, are:

*Manuscript in preparation.*

Co-Authors: D. L. Neumann & A. L. Duffy.

My contribution to the paper involved:

*I conceived the idea for the new scale, collected the data, undertook the analysis, and wrote the manuscript under supervision. The co-authors are part of my supervisory team. Their contribution to the manuscript involved providing supervisory advice and review of drafts.*

(Signed)\_\_\_\_\_ (Date) 25<sup>th</sup> October, 2019

Alexander W. O'Donnell

(Countersigned)\_\_\_\_\_ (Date) 25<sup>th</sup> October,  
2019 Supervisor: Professor David L. Neumann

### **3. The Development and Validation of the Cognitive, Affective, Physiological Intergroup Anxiety Scale (CAP-IA)**

Researchers investigating intergroup relations are often interested in the mechanisms that underpin when and how interactions between members of different social groups arise and the outcomes of these interactions. A widely researched mechanism is intergroup anxiety. Intergroup anxiety is the apprehensive response individuals can experience when interacting with, or anticipating an interaction with, an outgroup member (Stephan & Stephan, 1985). Research has shown that intergroup anxiety is an important variable when explaining the formation (e.g. Stephan, Ybarra, Martinez, Schwarzwald, & Tur-Kaspa, 1998) and reduction (Pettigrew & Tropp, 2008) of prejudice. As a result, there is a need for validated measures of intergroup anxiety based on contemporary theory to be used in contemporary research. The current paper reports on the development and validation of a new measure of intergroup anxiety. Initially, a contemporary conceptualisation of intergroup anxiety is described with reference to existing measurement scales. Next, three studies are presented. Study 1 provides an initial validation of the new measure, the Cognitive, Affective, and Physiological Intergroup Anxiety scale (CAP-IA). Studies 2 and 3 then utilise different samples, and different outgroups, to provide cross-validation of the CAP-IA.

#### **3.1 Intergroup Anxiety**

In a recent review, Stephan (2014) outlined three inter-related components of intergroup anxiety; cognitive, affective, and physiological. The cognitive component includes an appraisal that interacting with outgroup members will result in negative outcomes. These negative outcomes can include negative psychological outcomes (e.g., being misunderstood), negative behavioural outcomes (e.g., being physically harmed), being negatively evaluated by the outgroup, and, finally, being negatively evaluated by the ingroup (Stephan, 2014). The affective component of intergroup anxiety is the

experience of negative emotions. For example, people can feel apprehensive, uneasy, or distressed (Stephan, 2014). Finally, a review of empirical studies reported the link between intergroup anxiety and physiological symptoms including increased blood pressure, cortisol levels, and ventricular contractility (Stephan, 2014).

Researchers have long recognised cognitive and affective components of intergroup anxiety (e.g., Stephan & Stephan, 1985). The more recent recognition of a physiological component (Stephan, 2014) may be due to laboratory work in which physiological responses have been measured when interacting with outgroup members and/or experiencing intergroup anxiety (e.g., Brown, Bradley, & Lang, 2006; Greenland, Xenias, & Maio, 2012; Mendes, Blascovich, Hunter, Lickel, & Jost, 2007; Olsson, Ebert, Banaji, & Phelps, 2005; West, Turner, & Levita, 2015). However, the assessment of physiological anxiety responses can extend beyond the laboratory. Work in the field of clinical psychology has validated self-report measures of physiological responses to anxiety (e.g., McLeod, Hoehn-Saric, & Stefan, 1986). As such, a self-report multidimensional measure of intergroup anxiety that includes a physiological subscale is feasible. This is especially relevant because of the predominance of self-report research designs in intergroup relations research. For example, 71% of 500 studies on intergroup contact were shown to use a survey research design (Pettigrew & Tropp, 2006). The addition of a physiological subscale to an overall measure of intergroup anxiety will provide a scale with comprehensive coverage of the theoretical construct, thereby ensuring content validity.

### **3.2 Existing Intergroup Anxiety Scales**

Several measures of intergroup anxiety currently exist. These include, but are not limited to, Stephan and Stephan's (1985) intergroup anxiety scale, the intergroup anxiety toward Muslims scale (Hopkins & Shook, 2017), and the intergroup anxiety toward African-Americans scale (Britt, Boniecki, Vesico, Biernat, & Brown, 1996). The

scales, as reviewed below, are all validated. However, they do not measure intergroup anxiety as per the recent multidimensional conceptualisation (Stephan, 2014).

### **3.2.1 Intergroup anxiety scale.**

Stephan and Stephan (1985) developed an 11-item measure of intergroup anxiety that emphasises the affective component. The scale consists of items asking individuals how they would feel interacting with a member of a specific ethnic group in comparison to their own ethnic group. On a 10-point scale, individuals select whether they would feel more or less certain, awkward, self-conscious, happy, accepted, confident, irritated, impatient, defensive, suspicious, and careful. The scale was initially validated for use with majority (Caucasian) and minority (Hispanic) outgroups in a student sample (Stephan & Stephan, 1985). Since then, the scale has been used in studies using African (Voci & Hewstone, 2003), elderly (Bousfield & Hutchison, 2010), immigrant (Stephan, Ybarra, & Bachman, 1999), homosexual (Vezzali & Giovannini, 2012), Muslim (Islam & Hewstone, 1993), Japanese, and British (Greenland & Brown, 1999) outgroups. These aforementioned research articles used variations of the intergroup anxiety scale ranging from 3-item versions to 15-item versions. The breadth of use has demonstrated this established scale to have high validity; however, it only assesses a single component of intergroup anxiety.

### **3.2.2 Intergroup anxiety towards Muslims scale (IATMS)**

Recently developed by Hopkins and Shook (2017), the IATMS assesses intergroup anxiety towards Muslims. The scale requires participants to indicate their level of agreement with a range of statements designed to tap the affective and cognitive domains of intergroup anxiety. The cognitive domain specifically measures concerns regarding negative evaluations. The final scale has a two-factor structure (cognitive and affective) validated via factor analyses. The scale includes 11 items measured on a 10-point scale. Across three studies on American undergraduate students and an online

community sample, the scale demonstrated convergent validity (e.g., intergroup avoidance, Hopkins & Shook, 2017). However, it does not contain a physiological subscale and is only applicable to a single outgroup.

### **3.2.3 Intergroup anxiety towards African Americans (IATAA).**

Britt et al. (1996) developed an 11-item measure of intergroup anxiety that focused on the cognitive component, with African Americans as the specific outgroup. Items were designed to measure intergroup anxiety when interacting with African Americans under specific instances (e.g., sitting alone in a room with an African American). The scale also assessed the different factors that contribute to intergroup anxiety (e.g., a lack of knowledge about African Americans). The scale has demonstrated convergent validity in the form of significant relationships with related constructs (e.g., modern racism, Britt et al., 1996) but shares limitations with the IATMS as it does not contain items to assess physiological responses to intergroup anxiety and only relates to a single outgroup. Additionally, this scale assesses the cognitive component with items assessing negative appraisal from the outgroup, and not other sources.

### **3.3 The Development of a New Intergroup Anxiety Scale**

To summarise, existing scales of intergroup anxiety do not measure the construct as per the recent multidimensional conceptualisation (Stephan, 2014). All three scales reviewed assess the affective component. The cognitive component is assessed in two of the reviewed scales, but the IATAA only assess thoughts related to negative appraisal from the outgroup. No current scale assesses physiological anxiety responses. Additionally, only one of the scales reviewed has been adapted to be used with more than one outgroup. Accordingly, the CAP-IA was developed to provide a more comprehensive assessment of the cognitive, affective, and physiological dimensions of intergroup anxiety across multiple outgroups. In addition, the cognitive subscale of the

CAP-IA was designed to assess a broader range of cognitive factors than previous scales.

The CAP-IA initially underwent an item development process (Appendix B) and convergent validity checks (Study 1) with a sample of Australian undergraduate students. Subsequently, the factor structure of the CAP-IA was confirmed and additional convergent validity checks were undertaken (Study 2) on an online American sample. Across the first two studies, the outgroup of interest was Muslims. Finally, in Study 3, the versatility of the CAP-IA scale across outgroups was tested by examining the factor structure and convergent validity of the scale when applied to a distinct outgroup, African-Americans, using a second online American sample.

### **3.4 Study 1**

The aim of the first study was to test the factor structure of the CAP-IA using confirmatory factor analysis (CFA), and provide an initial validation of the newly developed scale. Responses to the CAP-IA scale were compared to other scales to determine if the new measure was consistent with previous research and theory. In particular, the associations between the CAP-IA and symbolic and realistic intergroup threat were examined. The integrated threat theory (Stephan & Stephan, 2000) outlines how symbolic threat (threat to one's worldview due to moral and value-based differences) and realistic threat (threat to the wellbeing of one's group, such as physical violence) are related to intergroup anxiety and prejudice. Recent conceptualisations state that intergroup anxiety is related to both symbolic and realistic threat, but that the association is strongest with realistic threat (Stephan, Ybarra, & Morrison, 2009). It is expected that the CAP-IA demonstrates a similar pattern of results. Additionally, the validity of the CAP-IA was examined by assessing if participants' responses to the scale were related to their concerns regarding meeting an outgroup member.

### 3.4.1 Method

#### Participants and Procedure

A sample ( $N = 478$ ) of Australian undergraduate students undertaking a first-year psychology course was recruited ( $M_{age} = 23.06$  years,  $SD = 7.80$ , Range: 17 – 58). The sample was predominately female (66.1%), and mostly Caucasian (59.0%). Participants who self-identified as following the Islamic faith (1.7%) were excluded from the analysis because Muslims were framed as the outgroup. In exchange for course credit, participants completed a questionnaire including a larger battery of measures designed to assess their interpersonal interactions with people from different backgrounds.

#### Materials

**CAP-IA.** Initially, 34 items were developed, administered to participants, and subsequently reduced. The content validity of the initial 34 items was ensured during the item development process by basing the statements on previous work on social and intergroup anxiety. The scale development process, detailed in Appendix B, involved removing items after examining response coverage, gender bias, inter-item correlations, item-total correlations, and factor loadings in a confirmatory factor analysis (CFA). Initially, 6 items were removed because none of the participants selected the upper most response option, 8 items were redundant as identified by high correlations with at least one other item on the subscale and consequently deleted, and 6 items were deleted for poor factor loadings during a one-factor congeneric CFA of the subscales. At the conclusion of this process, 14 items were included in the final scale (see Appendix). The affective and physiological subscales consisted of five items each, whereas the cognitive subscale consisted of four items.

To complete the scale, participants were initially asked to reflect on instances when they had interacted with Muslims (the outgroup of interest) or when they had

anticipated interacting with Muslims. They were then asked to indicate how often (1 = *Never* to 5 = *Always*) they had experienced the thought, feeling, or physical sensation described when interacting with, or when about to interact with, Muslims.

To obtain an overall score on the CAP-IA and each of its domains, a weighted aggregate was computed. For the affective and physiological subscales, the response to each of the five items was multiplied by 4 and then summed. For the cognitive subscale, the response to each of the four items was multiplied by 5 and summed. This created a weighted aggregate for each subscale, where the possible range was 20 to 100. For the total CAP-IA (Table 3.1), the weighted subscales were summed together in order to obtain a final scale that weighted each domain equally, with possible scores ranging from 60 to 300. Normative data for the final scale can be seen in Appendix C.

Table 3.1  
*The final Cognitive, Affective, Physiological Intergroup Anxiety Scale (CAP-IA)*

---

**Cognitive**

That you will be discriminated against because of your ethnicity  
 That you will be disrespected  
 That you will be judged harshly by Muslims because of your beliefs  
 That Muslims pose a danger to me

---

**Affective**

Distressed  
 Worried  
 Uneasy  
 Anxious  
 Scared

---

**Physical**

Sweaty/clammy hands  
 Blood rushing to the head  
 Faster heartbeat  
 Unsteady hands  
 Butterflies in stomach

---

**Symbolic and realistic threat.** Two 7-item scales (Stephan et al., 2002; Tausch, Hewstone, & Roy, 2009) were used to measure symbolic and realistic threat, respectively. Participants were asked to indicate their level of agreement, on a 5-point scale (1 = *Strongly Disagree* to 5 = *Strongly Agree*), with a range of statements about Islamic people living in Australia. The symbolic threat measure included statements

regarding work ethic, family values, and the Australian way of life. The realistic threat measure included statements about welfare, the threat of terrorism, and crime.

**Intergroup contact concerns.** Participants were presented with a brief scenario that described a situation in which an Islamic student was thinking of hosting a social event at the University's campus for students to attend. Subsequently, participants were asked to indicate their concerns about attending the event ( $0 = I do not have any concerns about attending this event$ ,  $1 = I do have concerns about attending this event$ ).

### 3.4.2 Results

#### Confirmatory Factor Analysis

Mplus (v. 7.4; Muthen & Muthen, 2012) was used to conduct the confirmatory factor analyses (CFA). Missing data (0.4%) was removed using listwise deletion. Maximum likelihood with robust standard errors was the estimator employed. The model fit for each CFA model was determined using a range of statistics with conventional cut-offs (Hu & Bentler, 1999). The measures of fit that were used, with their acceptable values in parentheses, were: chi-squared ( $\chi^2 > .05$ ), root mean-square error of approximation (RMSEA  $< .05$ ), standardised root mean-square residual (SRMR  $< .06$ ), comparative fit index (CFI  $> .95$ ), and the Tucker-Lewis index (TLI  $> .95$ ).

For each subscale, a one-factor congeneric model was tested. The results indicated good fitting models (Cognitive:  $\chi^2 = 3.46$ ,  $df = 2$ ,  $p = .178$ ; RMSEA = .04; SRMR = .01; TLI = .98; CFI = .99; Affective:  $\chi^2 = 14.25$ ,  $df = 5$ ,  $p = .014$ ; RMSEA = .09; SRMR = .02; CFI = .96; TLI = .93; Physical:  $\chi^2 = 5.55$ ,  $df = 5$ ,  $p = .353$ ; RMSEA = .02; SRMR = .02; TLI = .99; CFI = .99). The next step of analysis involved a higher order CFA, where the three domains were included in the same model to determine if they loaded onto a higher order intergroup anxiety factor. Analysis of the full CAP-IA scale (Figure 3.1) had good model-fit statistics ( $\chi^2 = 149.74$ ,  $df = 74$ ,  $p < .001$ ; RMSEA = .05; SRMR = .04; TLI = .96; CFI = .96), indicating a valid structure.

The final CFA that was conducted compared the higher-order model solution with a single-factor solution. Therefore, a CFA was conducted where the final 14 items were loaded onto a single intergroup anxiety construct. This model had poor fit ( $\chi^2 = 538.00$ ,  $df = 77$ ,  $p < .001$ ; RMSEA = .11; SRMR = .08; TLI = .74; CFI = .78). A chi-square difference test was also subsequently employed to make a statistical comparison between the one-factor and three-factor solutions. Due to the use of the maximum likelihood with robust standard errors as the estimator, a direct comparison between the two chi-squares could not be made. Therefore, a scaling correction factor was applied during the procedure (Satorra & Bentler, 2001). This analysis indicated that the one-factor solution was significantly worse than the higher-order, three-factor solution ( $\chi^2 = 127.68$ ,  $df = 3$ ,  $p < .001$ ), supporting the conceptualisation of the domains as separate constructs that load onto a higher-order intergroup anxiety factor.

### **Convergent Validity Checks**

All convergent validity checks were conducted in SPSS (v. 25) except where stated otherwise. Bivariate correlations between the scales included in the convergent validity checks can be observed in Table 3.2. As can be seen, all of the scales were correlated with the CAP-IA subscale scores and total score in the predicted direction.

Table 3.2

*Cronbach's Alpha and Pearson Correlations between the Subscales and Total Score on the CAP-IA, Realistic and Symbolic Threat, and a Measure of Intergroup Contact Concerns (N = 468)*

	$\alpha$	1.	2.	3.	4.	5.	
1. Cognitive	.88	-					
2. Affective	.94	.68**	-				
3. Physiological	.92	.61**	.67**	-			
4. CAP-IA	.94	.90**	.90**	.83**	-		
5. Realistic Threat	.88	.54**	.46**	.35**	.53**	-	
6. Symbolic Threat	.73	.49**	.38**	.29**	.46**	.83**	-
7. Intergroup Contact Concerns <sup>†</sup>	-	.20**	.27**	.16**	.24**	.14**	.12**

\*  $p < .05$ ; \*\*  $p < .001$

<sup>†</sup> 0 = No concerns, 1 = Some concerns (coefficients denote Spearman's rho)

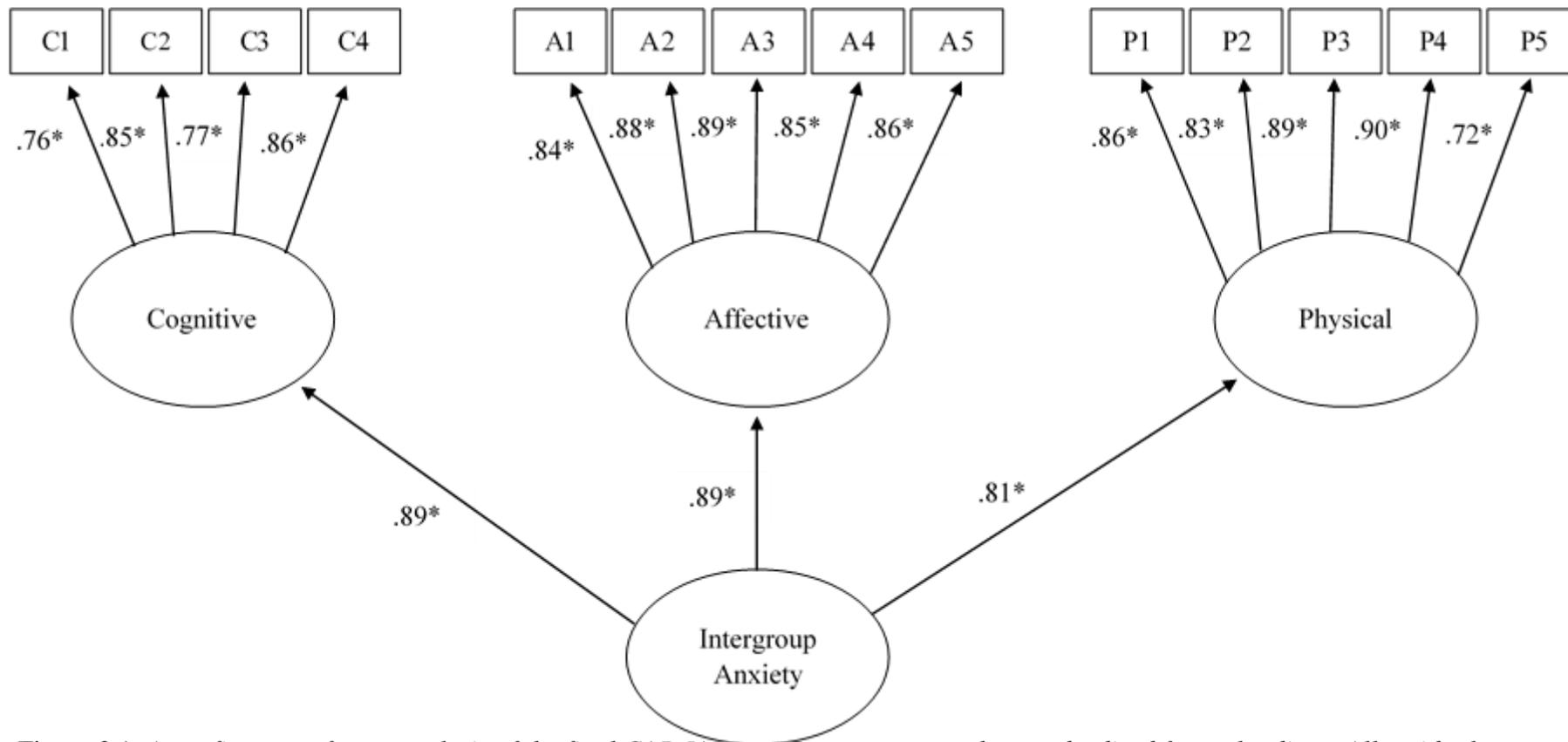


Figure 3.1. A confirmatory factor analysis of the final CAP-IA scale. Parameters are the standardized factor loadings. All residual terms are left off the figure to assist readability ( $N = 468$ ).

Note: \* $p < .001$  level.

**Symbolic and realistic threat.** Initially, path analysis was conducted using AMOS (v. 23) to examine the relationship between realistic and symbolic threat (as predictor variables) and the three subscales of the CAP-IA entered simultaneously as criterion variables. The analysis was fully saturated; thus, model fit statistics were not available. Results indicated that realistic threat was significantly related to all three subscales when they were entered simultaneously as dependent variables (Cognitive:  $B = 7.68$ ,  $\beta = .43$ ,  $p < .001$ ; Affective:  $B = 7.28$ ,  $\beta = .46$ ,  $p < .001$ ; Physiological:  $B = 4.11$ ,  $\beta = .35$ ,  $p < .001$ ). Conversely, symbolic threat was not significantly related to any of the three subscales (Cognitive:  $B = 2.79$ ,  $\beta = .13$ ,  $p = .053$ ; Affective:  $B = .11$ ,  $\beta = .01$ ,  $p = .934$ ; Physiological:  $B = .07$ ,  $\beta = .01$ ,  $p = .949$ ).

Additionally, the total CAP-IA was regressed on both the realistic and symbolic threat measures in a multiple regression. In total, 28.1% of the variance in the CAP-IA was explained by the two threat variables,  $F(2,467) = 91.30$ ,  $p < .001$ . Only the realistic threat scale ( $\beta = .48$ ,  $B = 2.72$ ,  $p < .001$ ) was uniquely associated with the CAP-IA. The symbolic threat scale was not significantly related to the CAP-IA ( $\beta = .06$ ,  $B = 0.42$ ,  $p = .365$ ).

**Intergroup contact concerns.** Two separate logistic regression analyses were completed to determine whether the subscales and CAP-IA scores predicted the response to an invitation involving meeting an outgroup member. Initial screening of the concern variable showed that the majority of participants (88.5%) indicated that they did not have concerns regarding the event. In the first analysis, each of the CAP-IA subscales were entered as independent variables to determine if they could predict whether participants would indicate any concerns. Overall, the three subscales were able to significantly predict group membership (*Nagelkerke*  $R^2 = .16$ ,  $p < .001$ ). Based upon the classification table, 90.0% of participants were correctly classified. Individually, only the cognitive subscale made a significant and unique contribution ( $B = .05$ ,  $SE$

= .01,  $p < .001$ ). The results confirm that the higher the score on the cognitive subscale, the more likely the participants were to indicate that they had concerns regarding the event. Neither the affective subscale ( $B < -.01$ ,  $SE = .02$ ,  $p = .826$ ) nor the physiological subscale ( $B = -.01$ ,  $SE = .02$ ,  $p = .694$ ) made a significant unique contribution to the model.

For the second logistic regression, the total CAP-IA score was entered as a predictor variable. Overall, the model was significant (*Nagelkerke*  $R^2 = .11$ ,  $p < .001$ ) and 89.1% of participants were correctly classified. Results showed that the higher the score on the CAP-IA, the more likely the participant was to indicate they had concerns regarding the event ( $B = .02$ ,  $SE < .01$ ,  $p < .001$ ).

### 3.4.3 Discussion

The results provide initial evidence for the validity of the newly developed CAP-IA. The validity of the scale was determined in two ways. Firstly, the factor loadings and model fit indices of the CFA supported the theoretically derived three-factor measure of intergroup anxiety in an Australian undergraduate sample. Secondly, the CAP-IA was validated by demonstrating that measures of realistic threat were significantly related to the subscale scores and total score and that higher scores indicated more concerns regarding attending a potential event organised by an outgroup member.

The convergent validity checks and comparisons between the subscales gave further information about the scale. Realistic threat was related to each of the subscales in the expected directions. However, symbolic threat was unrelated to the subscales. These results suggest that the scale could reflect more immediate and extreme forms of intergroup anxiety. Realistic concerns regarding ones wellbeing are more likely to elicit more severe and immediate forms of anxiety than symbolic concerns regarding cultural values. The nature of the items on the scale further support this interpretation.

Physiological signs of anxiety are related to visceral feelings of fear and anxiety which are more strongly evoked in situations where there is distress or potential immediate harm (Hodgson & Rachman, 1974). The items on the affective subscale (*distressed, worried, uneasy, anxious, scared*) could also be considered to be reflective of a more severe form of affective anxiety in comparison to traditional measures of intergroup anxiety (e.g., *confident, impatient*; Stephan & Stephan, 1985). Finally, only the cognitive subscale was uniquely related to having concerns regarding attending an event organised by an outgroup member. This could be because concerns about an outgroup event are cognitive in nature. These results lend themselves to an argument that the cognitive, affective, and physiological domains of intergroup anxiety should not be applied interchangeably.

### 3.5 Study 2

The use of CFA in the initial development of the CAP-IA is an established method of scale development. However, a potential limitation of this approach is that the modifications could be driven by sample characteristics (MacCallum, Roznowski, & Necowitz, 1992). Cross-validation of the finalised model across samples is therefore a necessary step (Byrne, 1994). Study 2 aimed to cross-validate the CAP-IA on a new sample of adults from the United States of America.

Study 2 also aimed to further validate the scale by comparing scores to other established measures. Firstly, CAP-IA scores were correlated with a measure of communication apprehension. Intergroup anxiety is a contextually specific manifestation of anxiety that shares commonalities with other forms of anxiety. For example, Plant and Devine (2003) argue that intergroup anxiety is a specialised, or contextually bound, form of social anxiety. Accordingly, a theoretically driven validation of an intergroup anxiety scale should ascertain if the measure converges with social anxiety, but also determine if it is distinct in its own right, by being outgroup

specific. Therefore, an initial test was conducted to determine if higher levels of intergroup anxiety are associated with greater communication apprehension. In all further analyses, communication apprehension was statistically controlled for to demonstrate that the CAP-IA reflects anxiety regarding a specific outgroup, as opposed to broader discomfort with other people. The communication apprehension measure is a non-clinical indicator of social anxiety.

Secondly, CAP-IA scores were correlated with a measure of negative intergroup contact. There is an extensive literature outlining how a negative experience with the outgroup is associated with higher levels of intergroup anxiety (e.g., Aberson & Gaffney, 2008). Consequently, the current study examined the relationship between participant's scores on the CAP-IA with a measure of negative intergroup contact with both Muslims and other social outgroups. The effects of intergroup contact generalise to other outgroups but the secondary effect is stronger when the outgroups share similarities (Harwood et al., 2011). In the current study, associations between CAP-IA scores toward Muslims and measures of negative encounters with members from distinct groups defined by religion (Muslims), ethnicity (Chinese) and sexual orientation (LGBT) were considered. Higher scores on the CAP-IA toward Muslims should be related to previous negative encounters with Muslims and more weakly related to negative encounters with other social groups (i.e., Chinese and LGBT).

Established scales of intergroup anxiety (Stephan & Stephan, 1985) ask participants to think of interactions with the outgroup and compare them to interactions with the ingroup when responding. In contrast, the CAP-IA asks participants to only consider the outgroup. As such, there is a possibility that the scale measures a generalised form of social anxiety that is not outgroup specific. To examine this possibility, communication apprehension was used as both a validity check and a

control variable by entering communication apprehension as an independent variables in the second convergent validity check.

### 3.5.1 Method

#### Participants and Procedure

Participants ( $N = 450$ ;  $M_{\text{age}} = 36.38$  years,  $SD = 12.45$ ,  $\text{Min} = 18.80$ ,  $\text{Max} = 79.26$ ) residing in the United States of America were recruited via Amazon's Mechanical Turk (MTurk). The majority of the sample was female (64.4%), with two participants identifying their gender as "other". Christianity was the most common religion reported by participants (57.8%), followed by no religion (32.2%). Given the focus on a Muslim outgroup, individuals who nominated themselves as Islamic (1.8%) were excluded from analyses. The current study offered monetary compensation for completing the survey.

#### Materials

**CAP-IA.** The newly established CAP-IA (Appendix) was administered to participants. The response format, preamble, and scoring process for the questions were consistent with Study 1.

**Communication apprehension.** Four items were used to measure communication apprehension. These items comprised the No Social Anxiety Scale from the International Personality Item Pool (IPIP; Goldberg et al., 2006). The items (e.g., *I express myself easily in real life*) were rated on a 5-point scale (1 = *A great deal* to 5 = *Not at all*). Higher scores denote lower levels of communication apprehension.

**Negative intergroup contact.** Participants were asked to respond to the statement "*I have had a lot of negative/bad interactions with [outgroup] in the past six months*" for Muslims, Chinese people, and people that identify as LGBT. Responses were recorded on a 7-point scale ranging from 1 = *Strongly disagree* to 7 = *Strongly agree*.

### 3.5.2 Results

#### CFA

Mplus was used to conduct a confirmatory factor analysis. Missing data (0.23%) was removed using listwise deletion. Analysis of the full model with a higher order intergroup anxiety construct had a good model fit ( $\chi^2 = 133.39$ ,  $df = 74$ ,  $p < .001$ ; RMSEA = .04; SRMR = .05; TLI = .96; CFI = .97). The standardised factor loadings ranged from 0.77 to 0.84 for the cognitive domain, 0.86 to 0.90 for the affective domain, and 0.83 to 0.90 for the physiological domain. The cognitive (0.88), affective (0.90), and physiological (0.85) latent constructs all significantly loaded onto a higher-order intergroup anxiety construct. All coefficients were statistically significant (all  $p$ 's  $< .001$ ).

#### Convergent Validity Checks

The bivariate correlations between each of the CAP-IA subscales, the total score, and the convergent validity checks can be observed in Table 3.3. The three subscales were all significantly related, and all convergent validity check measures were related to the three subscale scores and total score in the predicted directions.

**Communication apprehension.** Firstly, the three subscales from the CAP-IA were entered in a regression analysis with communication apprehension as the dependent variable. The subscales explained a significant 6.7% of the variance in communication apprehension,  $F(3,437) = 10.47$ ,  $p < .001$ . Out of the three subscales, only the physiological dimension of intergroup anxiety was a unique predictor ( $B = -0.01$ ,  $\beta = -.25$ ,  $p = .001$ ), with higher scores on the physiological subscale associated with higher communication apprehension (Cognitive:  $B < .01$ ,  $\beta = .08$ ,  $p = .256$ ; Affective:  $B < -0.01$ ,  $\beta = -.08$ ,  $p = .280$ ). Secondly, the full CAP-IA was correlated with communication apprehension. Results indicate that higher scores on the CAP-IA was related to higher communication apprehension ( $r = -.22$ ,  $p < .001$ ).

Table 3.3

*Cronbach's Alpha and Pearson Correlations between the Subscales and Total Score on the CAP-IA, Communication Apprehension, and Negative Intergroup Contact Experiences (N = 438)*

	$\alpha$	1.	2.	3.	4.	5.	6.	7.
1. Cognitive	.87	-						
2. Affective	.94	.72**	-					
3. Physiological	.94	.67**	.72**	-				
4. CAP-IA	.95	.90**	.91**	.88**	-			
5. Communication Apprehension	.72	-.15*	-.20**	-.25**	-.22**	-		
6. Negative Contact (Muslims)	-	.40**	.44**	.41**	.46**	-.09	-	
7. Negative Contact (Chinese)	-	.16**	.21**	.23**	.22**	-.09	.51**	-
8. Negative Contact (LGBT)	-	.27**	.30**	.33**	.33**	-.09	.57**	.51**

\*  $p < .05$ ; \*\*  $p < .001$

**Negative intergroup contact.** Path analysis was conducted to examine the negative intergroup contact variables and communication apprehension as predictor variables for the three subscales when entered simultaneously into the model as outcome variables. Results indicated that negative experiences with Muslims were significantly related to higher scores on all three subscales (Cognitive:  $B = .45$ ,  $\beta = .39$ ,  $p < .001$ ; Affective:  $B = 4.53$ ,  $\beta = .40$ ,  $p < .001$ ; Physiological:  $B = 2.97$ ,  $\beta = .32$ ,  $p < .001$ ). Communication apprehension was also significantly related to all three subscales (Cognitive:  $B = -2.36$ ,  $\beta = -.11$ ,  $p = .012$ ; Affective:  $B = -3.45$ ,  $\beta = -0.16$ ,  $p < .001$ ; Physiological:  $B = -3.69$ ,  $\beta = .21$ ,  $p < .001$ ). All other pathways were not significant (all  $p$ 's  $> .069$ ) with the exception of the positive relationship between negative encounters with people who identify as LGBT and the physiological subscale ( $B = 1.30$ ,  $\beta = .14$ ,  $p < .001$ ).

In the second analysis, which involved total CAP-IA scores ( $R^2 = .25$ ,  $F[4,437] = 36.74$ ,  $p < .001$ ), negative contact with Muslims was significantly related to higher intergroup anxiety ( $B = 12.01$ ,  $\beta = .42$ ,  $p < .001$ ). Similarly, negative experiences with people who identify as LGBT ( $B = 3.22$ ,  $\beta = .10$ ,  $p = .039$ ) and communication apprehension ( $B = -9.40$ ,  $\beta = -.18$ ,  $p < .001$ ) were significantly related to intergroup anxiety, but with a noticeably weaker effect size. Negative intergroup contact with Chinese people was not related to the total CAP-IA ( $B = -2.01$ ,  $\beta = -.07$ ,  $p = .193$ ).

### 3.5.3 Discussion

The second study provided further evidence of the validity of the CAP-IA. Importantly, the CAP-IA was validated using a second sample, from a country other than Australia, with the three-factor structure of cognitive, affective, and physiological aspects of intergroup anxiety again receiving support. In addition, recruiting from an online population provided validation of the scale in a more heterogeneous sample (as compared to the University student sample recruited in Study 1). Study 2 also provided additional evidence of the content validity of the CAP-IA. Congruent with theory and previous findings in the intergroup anxiety field, the CAP-IA was associated with more negative previous encounters with the outgroup of interest (Aberson & Gaffney, 2008), and greater communication apprehension in general. Negative intergroup contact experiences with Muslims significantly predicted all three subscales of the CAP-IA thereby highlighting the additive benefit and range of information provided by the inclusion of all three components of the new measure.

### 3.6 Study 3

Although Studies 1 and 2 provide support for the validity of the CAP-IA, the outgroup referenced in the CAP-IA for both studies was Muslims. To show that the CAP-IA can be used to assess intergroup anxiety experienced in response to a variety of outgroups, Study 3 sought to validate the measure using an African-American outgroup.

Construct validity of the measure was examined by CFA, with factor loadings and model-fit indices expected to support the validity of the scale. Additionally, convergent validity checks were conducted using measures of generalised anxiety, general evaluation of African-Americans, and intergroup avoidance. Given that intergroup anxiety has been considered a sub-clinical component of anxiety specific to intergroup contexts (Plant & Devine, 2003), it was expected that higher levels of intergroup anxiety as measured by the CAP-IA would be positively related to a measure of general anxiety. Previous research using immigrants as the outgroup also suggests that greater intergroup anxiety should be related to more negative evaluations of the outgroup (Voci & Hewstone, 2003). General evaluations are a measure of attitudes (Wright, Aron, McLaughlin-Volpe, & Ropp, 1997) which are specified by affect and cognitions (Breckler, 1984). Therefore, the physiological subscale is not expected to be uniquely related to general evaluations of the outgroup. Finally, intergroup anxiety, and the corresponding subscales, were expected to be related to higher levels of intergroup avoidance (Plant & Devine, 2003). To ensure that the CAP-IA is measuring outgroup-specific anxiety, the final two convergent validity checks were conducted after controlling for generalised anxiety scores.

### 3.6.1 Method

#### Participants and Procedure

Amazon's MTurk was used to collect responses from 554 residents of the United States of America. Given that the outgroup of interest was African-Americans, any African-Americans who began the study were automatically sent to the end of the survey and did not answer any questions that followed the demographic questions. More females (60.6%) than males (38.3%) completed the survey, with six individuals identifying as "other". The age of participants ranged from 18.16 to 80.75 years ( $M_{age} = 36.84$ ,  $SD = 11.57$ ). A majority of respondents were White (84.1%), but individuals who

were Hispanic (5.1%), Chinese (2.0%), Pacific Islander (1.6%) and other ethnicities (7.2%) also completed the survey. MTurk users were invited to complete a survey in exchange for monetary compensation.

### **Materials**

**CAP-IA.** The 14-item CAP-IA measure was adapted to be applicable to African-Americans. All references to “Muslims” within the scale were changed to state “African-American”. All other wording, response options, and formatting of the measure remained the same as in Studies 1 and 2.

**General anxiety.** The 21-item Depression, Anxiety, and Stress scale (DASS-21) is a non-diagnostic self-report measure assessing depression, arousal, and psychological tension. It is a short-form of Lovibond and Lovibond’s (1995) 42-item scale. The current study used the 7-item anxiety subscale to assess participants’ level of general anxiety. Participants are presented with statements (e.g., *I felt scared without any good reason*) and asked to indicate, on a 4-point scale (0 = *Never* to 3 = *Almost always*) how much each statement applied to them during the previous week.

**General evaluation scale.** The General Evaluation Scale (GES; Wright et al., 1997) assesses prejudice towards outgroups. The scale is a reliable semantic differential task assessing how people feel towards the specified outgroup in general. Participants respond to six adjective pairs on a 7-point scale (e.g., *Warm – Cold*). Responses were coded so that higher scores indicated more negative evaluations.

**Intergroup avoidance.** Intergroup avoidance was measured using a 5-item scale from Plant and Devine (2003) that referenced African-Americans. The items relate to the participant’s desire to approach or avoid interactions with African-Americans (e.g., *If I had a choice, I would rather not interact with African-Americans*). All items were rated on a 5-point scale (1 = *A great deal* to 5 = *Not at all*). Higher total scores indicated higher levels of intergroup avoidance.

### 3.6.2 Results

#### CFA

The analytic strategy used in Study 3 was the same as that used in Studies 1 and 2. Missing data (3.79%) was removed using listwise deletion. Analysis of the measurement model with a higher-order intergroup anxiety construct yielded a good model-fit despite a significant chi-square ( $\chi^2 = 155.43$ ,  $df = 74$ ,  $p < .001$ ; RMSEA = .05; SRMR = .04; TLI = .96; CFI = .97). The standardised factor loadings ranged from 0.67 to 0.84 for the cognitive domain, 0.83 to 0.90 for the affective domain, and 0.74 to 0.88 for the physical domain. The standardised factor loadings of the lower order cognitive (0.98), affective (0.93) and physiological domains (0.79) onto the higher order intergroup anxiety construct were also all significant. All factor loadings were statistically significant ( $p < .001$ ).

#### Convergent Validity Checks

Table 3.4 presents the bivariate correlations between the subscales and total scores for the CAP-IA, DASS-21, the general evaluation of African-Americans, and avoidance of African-Americans.

**General anxiety.** A mean of the DASS-21 anxiety subscale was used as the dependent variable in a multiple regression analysis with each of the CAP-IA subscales serving as predictors. Overall, 26.9% of the variance in general anxiety was explained by the three CAP-IA subscale scores ( $F[3,529] = 64.89$ ,  $p < .001$ ). Only the physiological subscale scores ( $B = 0.02$ ,  $\beta = .56$ ,  $p < .001$ ) were significantly and uniquely associated with DASS-21 anxiety scores (Cognitive:  $B < 0.01$ ,  $\beta = .04$ ,  $p = .513$ ; Affective:  $B < -.01$ ,  $\beta = -.11$ ,  $p = .11$ ). Subsequently, the total CAP-IA scores were correlated with DASS-21 anxiety scores. Results indicated that higher total scores on the CAP-IA was associated with higher DASS-21 anxiety scores ( $r = .41$ ,  $p < .001$ ).

Table 3.4

*Cronbach's Alpha and Pearson Correlations between the Subscales and Total Score on the CAP-IA, General Anxiety, GES, and Intergroup Avoidance (N = 533)*

	$\alpha$	1.	2.	3.	4.	5.	6.
1. Cognitive	.86	-					
2. Affective	.94	.80**	-				
3. Physiological	.91	.67**	.69**	-			
4. CAP-IA	.95	.92**	.93**	.84**	-		
5. DASS-21	.90	.32**	.31**	.52**	.41**	-	
6. GES	.91	.63**	.61**	.43**	.63**	.15**	-
7. Intergroup Avoidance	.95	.67**	.68**	.49**	.69**	.15**	.77**

\*  $p < .05$ ; \*\*  $p < .001$

**General evaluation of African-Americans.** To test for the convergence between the CAP-IA scores and GES scores, two separate multiple regressions were completed, both with the GES scores as the dependent variable (Table 3.5). The first examined each subscale of the CAP-IA and DASS-21. Overall, 43.3% of the variance in the general evaluation of African-Americans was explained by the predictors ( $F[4,526] = 100.60, p < .001$ ). Only the cognitive and affective subscale score were uniquely and significantly related, with higher scores on these subscales associated with higher scores on the GES. In the second analysis, which included the CAP-IA total score, 41.1% of the variance in the general evaluation of African-Americans was explained by the predictor variables ( $F[2,528] = 348.13, p < .001$ ). Higher scores on the CAP-IA were significantly related to higher scores on the GES, indicating higher levels of negative appraisals of the outgroup.

**Intergroup avoidance.** In the first analysis ( $R^2 = .51, F[4, 528] = 137.73, p < .001$ ), the cognitive and affective subscale scores of the CAP-IA, but not the

physiological subscale scores, were uniquely related to intergroup avoidance scores (Table 3.5). In the second analysis ( $R^2 = .49$ ,  $F[2, 530] = 258.89$ ,  $p < .001$ ), higher scores on the total CAP-IA scale was significantly related to a higher level of intergroup avoidance scores.

Table 3.5

*Convergent validity Checks between the Subscales and Total Score of the CAP-IA with a Measure of the Evaluation and Avoidance of African-Americans (N = 533)*

	General Evaluation Scale		Intergroup Avoidance	
	B (SE)	$\beta$	B (SE)	$\beta$
Analysis 1				
Cognitive	.03 (.01)	.40**	.03 (.01)	.35**
Affective	.03 (.01)	.33**	.01 (.01)	.42**
Physiological	-.01 (.01)	-.01	.01 (.01)	.03
DASS-21	-.19 (.10)	.07	-.31 (.10)	-.11
Analysis 2				
CAP-IA	.02 (< .01)	.68**	.03 (< .01)	.76**
DASS-21	-.34 (.10)	-.13**	-.45 (.09)	-.17**

\*  $p < .05$ , \*\*  $p < .001$

### 3.6.3 Discussion

The third study further examined the validity of the CAP-IA by using a distinct type of outgroup (ethnicity) than in Study 1 and 2 (religious). Consistent with the previous studies, the CFA provided evidence that all three subscales loaded onto the higher order intergroup anxiety construct thus confirming construct validity. The convergent validity checks also provided evidence that the CAP-IA is a valid scale. The total CAP-IA score was significantly related to a measure of prejudice (GES) and self-reported avoidance of the outgroup after controlling for a general form of anxiety. These results compliment the previous studies and highlight that the CAP-IA measures an outgroup-specific form of anxiety that has potential use in future research. In contrast to the earlier convergent validity checks, the physiological subscale was not uniquely related to either of the outgroup-specific measures. These findings were expected for the

measure of general evaluations of the outgroup because attitudes tend to be affective and cognitive in nature. In contrast, the physiological subscale was expected to be uniquely related to the self-report measure of intergroup avoidance. The measurement of intergroup avoidance could potentially be the cause of this unexpected finding. Physiological markers are a sign of *reactivity* to stressors (Blascovich, 2000). In the previous studies, realistic threat is a type of stressor and negative intergroup contact is a previous stressor. In this instance, physiological reactivity may not have been related to intergroup avoidance because no stressor had occurred.

### 3.7 General Discussion

The present research has provided support for a new three-dimensional measure of intergroup anxiety. The CAP-IA is the first scale to include the three components of intergroup anxiety identified in contemporary theory (Stephan, 2014). The validity of the new measure was assessed across different outgroups and in samples drawn from different countries. Specifically, the CAP-IA was validated for Australian and American populations. Confirmatory factor analysis consistently provided evidence for the construct validity of the CAP-IA and indicated that all three subscales, including the novel physiological subscale, loaded onto the higher order intergroup anxiety factor. Convergent validity checks provided additional evidence of the scale's validity. Congruent with theory and past research, realistic intergroup threat and negative intergroup contact were both significant predictors of the CAP-IA. Additionally, the CAP-IA was a significant predictor of concerns regarding the outgroup, communication apprehension, general anxiety, general evaluation of the outgroup, and intergroup avoidance. Across these analyses, the results indicate that both the total CAP-IA score and the individual subscale scores are valid.

The inclusion of a physiological subscale is a unique feature of the newly developed scale. During the validity checks, it was determined that realistic threat and

negative encounters with the outgroup predicted physiological subscale scores, thereby demonstrating the potential benefit of the subscale's inclusion. It is possible that these predictor variables are indicative of a larger, more immediate threat that is likely to evoke a biologically-elicited, anxiety response in direct response to the threat. Support for this explanation can be found in the significant relationships between the physiological subscale and measures of social anxiety (communication apprehension) and generalised anxiety in Studies 2 and 3, respectively. As these are measures of an intense, pathological form of anxiety, the significant relationship with the physiological subscale could be indicative of an intense form of anxiety that can be experienced in intergroup settings in response to a threat (Blascovich, 2000). The inclusion of this subscale in future research could allow a greater understanding of intergroup anxiety responses that extend beyond maladaptive thoughts and unpleasant feelings.

We argue that our measure supplements the range of validated and established intergroup anxiety scales available in the literature. As a validated measure of intergroup anxiety, the CAP-IA could equally be used in the same studies as the other established scales but has added advantages in those investigations where physiological responses are theoretically meaningful. For example, intergroup anxiety is known to share similarities with clinical anxiety (Birtel & Crisp, 2015; Plant & Devine, 2003; O'Donnell et al., 2019), and physiological responses are routinely examined during investigations of clinical anxiety. The CAP-IA would offer greater flexibility for researchers interested in the similarities and differences between these two forms of anxiety, compared to the existing scales.

The current studies consistently observed strong levels of internal consistency for the CAP-IA through examination of Cronbach's alpha, but an evaluation of test-retest reliability is needed to determine whether scores on the scale remain stable over time. The 6-month test-retest reliability of Stephan and Stephan's (1985) measure of

intergroup anxiety was reported to be poor (Binder et al., 2009), leading to claims that the construct itself may fluctuate over time (Stephan, 2014). However, an alternative explanation is that the scale itself is simply not temporally stable. Identifying the test-retest reliability of the CAP-IA is therefore an important future research direction.

Additionally, examining the convergence of the CAP-IA with constructs not measured via self-report would provide additional information about the validity of the scale. Beyond the basic limitations of self-report measures, utilising the same reporter for all variables could result in common method bias (i.e., shared variance across the measures that is attributable to the method itself; Donaldson & Grant-Vallone, 2002). Conducting future convergent validity checks using experimental measures (e.g., skin conductance, blood pressure, cortisol hyper-reactivity) would be an appropriate way to address this limitation.

Convergence between objectively observed physiological arousal and self-reported awareness of bodily changes would also provide greater confidence in individuals' capacity to accurately interpret their physiological changes, and by extension, the validity of the physiological subscale. Broader research on interoception, or the capacity to identify internal bodily states, provides evidence that individuals can identify and report their physiological responses. For example, Garfinkel and colleagues (2015) assessed interoception and found the whole sample performed better than expected by chance on the heart rate tracking task, and that self-reported confidence in their accuracy was corroborated by greater accuracy. Future research should validate the CAP-IA using a similar paradigm, whereby participants are administered the physiological subscale whilst objective indicators of bodily changes are measured during an intergroup experience, to determine if participants can accurately assess their own physiological state. Further, participants could be asked to retrospectively recall their bodily states some time after the objective measures have been recorded. This

approach would validate the retrospective self-reported recall required by participants when completing the CAP-IA. Although the broader literature on interoception provides evidence that individuals can make these judgements accurately, extending these studies to an intergroup context will provide information as to whether the physiological subscale is a unique predictor of intergroup anxiety in response to stressors.

### **3.7.1 Conclusion**

The recent interest in intergroup anxiety has resulted in research being conducted with useful and valid measures of intergroup anxiety. However, none of the scales offer full coverage of the theoretical domains of the construct. The new CAP-IA addresses this gap in the literature. Notwithstanding the limitations noted, the CAP-IA has demonstrated good evidence of validity, with different populations and in reference to diverse outgroups. The intergroup relations field is advancing their investigations of intergroup phenomenon to be increasingly detailed, nuanced, and related to specific instances. It is important to have measures that remain applicable given the direction of the field. The evidence presented in these three studies provides an initial indication that the CAP-IA may be able to serve this purpose.

### Chapter 4 Preamble

In Chapter 2, laboratory-based aversive conditioning studies were reviewed to provide recommendations for future research on intergroup relations. The available evidence suggested that presenting images of an outgroup member with a fear-inducing, aversive stimulus results in fear toward images of that outgroup member. This methodology has been widely used in the clinical anxiety literature but has also been widely criticised. These criticisms, as reviewed in Chapter 2, were the laboratory research designs are unrealistic and simplistic in comparison to the complexities of the real world. This chapter reports on the first attempt to apply an aversive conditioning framework to explain the formation of intergroup fear and subsequent anxiety toward, and avoidance of, the outgroup in the real world, thereby addressing the limitations raised in Chapter 2.

This chapter reports the key findings from Study 3 ( $N = 129$ ) and 4 ( $N = 361$ ). A retrospective method was used in which two online samples were asked to recall details regarding their first negative encounter with an African American or Muslim individual, respectively. Participants were also asked about their intergroup anxiety using the CAP-IA and their avoidance of outgroup members. Congruent with learning theory, participants who reported an unpleasant event with an outgroup member reported more fear during the encounter than did those who did not report experiencing an unpleasant event. Additionally, the intensity of unpleasantness during the first encounter was indirectly related to current avoidance of the outgroup, through the mediating mechanisms of retrospectively recalled fear and current levels of intergroup anxiety. These results are the first to showcase that aversive conditioning can contribute to the formation of intergroup anxiety outside the laboratory (Aim 1: To integrate associative learning and social psychological theories to explain the formation of intergroup anxiety) and demonstrate how initial learning experiences and events can contribute to

intergroup avoidance (Aim 2: To understand how intergroup anxiety can contribute to a deterioration in intergroup relations, through intergroup avoidance). The work in this chapter has been prepared for publication.

**STATEMENT OF CONTRIBUTION TO CO-AUTHORED PUBLISHED**

**PAPER**

This chapter includes a co-authored paper. The status of the co-authored paper, including all authors, are:

*Manuscript in preparation.*

Co-Authors: D. L. Neumann & A. L. Duffy.

My contribution to the paper involved:

*I conceived the idea for the research question with D.N., collected the data, undertook the analysis, and wrote the manuscript under supervision.*

*The co-authors are part of my supervisory team. Their contribution to the manuscript involved providing supervisory advice and review of drafts.*

(Signed) \_\_\_\_\_ (Date) 25<sup>th</sup> October, 2019

Alexander W. O'Donnell

(Countersigned) \_\_\_\_\_ (Date) 25<sup>th</sup> October, 2019  
Supervisor: Prof. David L. Neumann

#### **4. Associative Learning Processes in the Formation of Intergroup Anxiety and Avoidance in Society**

To explain the development of prejudice and negative intergroup relations, researchers have emphasised intergroup emotions (e.g., Dasgupta, DeSteno, Williams, & Husinger, 2009; Mackie, Silver, & Smith, 2004). The importance of intergroup emotions was highlighted by meta-analytic findings suggesting that emotional responses toward the outgroup are a stronger predictor of discrimination than are cognitive attitudes (Talaska, Fiske, & Chaiken, 2008). Two intergroup emotions routinely implicated in the development of negative intergroup relations are fear and anxiety (Paolini, Harris, & Griffin, 2016). Fear and anxiety have previously been differentiated by whether the emotion is state-like, and therefore tied to a specific time and context (intergroup fear), or if it is a trait-like, enduring emotion (intergroup anxiety; Paolini et al., 2016). The aim of the current study was to examine mechanisms underpinning the formation of both fear during a specific interaction and anxiety in a broader intergroup context. Specifically, we assessed the ecological validity of an associative learning framework to build on the existing body of laboratory-based investigations. We sought evidence that associative learning contributes to the formation of context-specific fear in intergroup encounters and that learnt intergroup fear can have a wider influence on intergroup relations by creating intergroup anxiety and subsequent avoidance.

Associative learning using aversive stimuli is regarded as a key mechanism that can lead to the formation of fear and anxiety toward a wide range of stimuli (Fanselow & Sterlace, 2014). Pavlovian conditioning is a form of associative learning that occurs when two stimuli become associated with one another. In fear learning research, laboratory-based experiments have been conducted by pairing a conditioned stimulus (CS) with a negatively valenced unconditioned stimulus (US). The US is typically an aversive stimulus that elicits an automatic, or unconditioned, response (UR) that is

based on innate processes and not prior learning. If fear conditioning is successful, the CS will act as a cue that retrieves a memory of the US, subsequently causing a conditioned fear response (CR; Bouton, 2002; 2004). Accordingly, fear conditioning is dependent upon cognitive processes including memory and awareness (Weidemann, Satkunarajah, & Lovibond, 2016). Fear is conditioned when participants demonstrate contingency awareness, or the knowledge of the CS-US pairing, and fully expect the contingency will continue in the future (Bouton, 2004; Lovibond & Shanks, 2002).

Recent laboratory investigations have used social stimuli as the CS to examine how intergroup fear and anxiety are learnt. These studies have employed a range of outgroups, created through minimal group paradigms (Navarrete et al., 2012), and represented by Black faces (Bramwell, Mallan, & Lipp, 2014; Olsson, Ebert, Banaji, & Phelps, 2005), Asian faces (Mallan, Sax, & Lipp, 2009) and Middle Eastern faces (Golkar, Björnstjerna, & Olsson, 2015). In general, there is evidence of an ingroup-outgroup asymmetry, whereby fear toward outgroup members is acquired faster and is harder to extinguish compared to ingroup members. However, this asymmetry is moderated by social and cultural factors (Mallan, Lipp, & Cochrane, 2013; O'Donnell, Neumann, Duffy, & Paolini, 2019).

#### **4.1 Limitations of Laboratory-Based Conditioning Studies**

While laboratory-based studies have provided empirical evidence in support of associative learning accounts of intergroup fear, the reliance on evidence from experimental paradigms has attracted criticism (Beckers, Krypotos, Boddez, Effting, & Kindt, 2013; Mineka & Zinbarg, 2006; Rachman, 1977). A frequently referenced criticism of Pavlovian conditioning experiments is that they are not reflective of the complexity of the real world. Laboratory-based conditioning studies clearly present participants with an aversive US that co-occurs with the presentation of the CS. Aversive USs reinforce behaviours by signalling to the participant that harm is

imminent, resulting in the activation of the body's defensive system (Lonsdorf et al., 2017). In the laboratory, the most common type of US is a pain elicitor (e.g., electrocutaneous stimulus; Lonsdorf et al., 2017). These aversive USs, known as primary reinforcers, are all unambiguous, intense, and clearly related to an aversive outcome. Primary reinforcers produce a large learning effect and can consequentially motivate behaviours by activating intrinsic needs to survive. Therefore, laboratory-based conditioning studies using primary reinforcers create a "strong-situation" because the reinforcing cue (US) is clearly and unambiguously predictive of a negative hedonistic event (i.e., pain; Beckers et al., 2013; Lissek, Pine, & Grillon, 2006).

In contrast, associative learning with social stimuli in the real world is less likely to consistently produce strong-situations. Interactions between people are embedded within a large array of environmental cues ensuring the US could have differing levels of intensity, or the US may predict an aversive outcome of lower salience. Additionally, USs may differ from the typical pain-elicitors used in experimental paradigms because individuals often have motivations derived from complex needs that may not be biologically important (Herrnstein, 1964).

To address the level of complexity in human subjects, early researchers introduced the concept of secondary reinforcers (Skinner, 1938). Secondary reinforcers receive their motivating properties from prior learning and associations with primary reinforcers. For example, money can be used to acquire food and is thus considered a secondary reinforcer (Delgado, Labouliere, & Phelps, 2006). Fear in humans has been successfully conditioned using both primary and secondary reinforcers (e.g., a loss of money; Delgado et al., 2006; Delgado, Jou, & Phelps, 2011), suggesting that the effects of aversive learning with social stimuli could be replicated with a range of USs. Describing the type of reinforcing USs people experience in real life intergroup interactions would provide further insight into how fear toward outgroups is learnt.

## 4.2 CS-US Pairings and Intergroup Relations

Experimental studies exploring Pavlovian conditioning with social stimuli typically measure a fear response toward a specific outgroup exemplar through a range of measures (e.g., skin conductance, Olsson et al., 2005; pleasantness ratings, Bramwell et al., 2014). In contrast, research designs in the social psychology literature typically measure anxiety toward the broader social group (e.g., Barlow, Louis, & Hewstone, 2009). This distinction is important because most studies examining intergroup harmony focus on methods to reduce group-level biases (Pettigrew & Tropp, 2006), not affective responses to individual outgroup members.

These divergent approaches to examining intergroup emotions can be integrated by considering the distinction between episodic and chronic expression of emotion (Paolini et al., 2016). Episodic intergroup anxiety is similar to fear as measured in Pavlovian conditioning experiments because it is contextually and temporally evoked in response to a specific outgroup member (i.e., CS) in a specific circumstance (i.e., the experiment). In contrast, chronic intergroup anxiety is a contextually broader and enduring group-level anxious response towards an entire outgroup (Paolini et al., 2006).

Theoretical advancements (Paolini et al., 2016) and recent empirical work (Kauff et al., 2017) have asserted that episodic anxiety, or experiences of intergroup fear, should predict an individual's level of chronic intergroup anxiety, that in turn predicts intergroup avoidance. The inclusion of episodic intergroup anxiety compliments the existing range of cross-sectional (e.g., Plant & Devine, 2003) and longitudinal (e.g., Cole & Yip, 2008) evidence that chronic intergroup anxiety predicts avoidance of outgroup members. Therefore, within a fear conditioning framework, it would be expected that fear toward an outgroup CS (episodic intergroup anxiety) should be learnt when an outgroup member is paired with an aversive stimulus. This fear

should subsequently be related to chronic intergroup anxiety about the broader social group and result in behavioural avoidance of the group.

Intergroup avoidance is a well-established problem when it comes to efforts to improve intergroup relations. Interacting with members from a different social or ethnic group is empirically proven to improve intergroup relations and decrease an individual's level of prejudice (Pettigrew & Tropp, 2006). However, despite increasing levels of multiculturalism, avoidant behaviours prevent widespread intergroup interactions (Paolini, Harwood, Hewstone, & Neumann, 2018). The role of intergroup avoidance in solidifying intergroup hostilities provides an imperative to continue to explore factors that drive avoidance, such as fear and anxiety.

### **4.3 The Current Study**

The aim of the current study was to extend our knowledge beyond experimental learning paradigms by testing whether Pavlovian conditioning can account for the formation of intergroup fear and subsequent (chronic) anxiety outside of the laboratory. A retrospective survey design was employed to investigate the development of fear, anxiety, and avoidance of outgroup members. In accordance with previous recommendations (Menzies & Clarke, 1994; O'Donnell, Neumann, Duffy, & Paolini, 2018), the survey was designed to ascertain if the outgroup member (CS) was *associated* with an aversive US. Therefore, participants were asked if something unpleasant (analogous to an aversive US) occurred during their first negative encounter with an outgroup member. Aversive associative learning processes were tested by comparing participants who did experience something unpleasant (i.e., CS-US pairing) and those who did not on measures of fear during the negative encounter (i.e., CR).

The consequences of the initial CS-US pairing were also examined for participants who reported experiencing something unpleasant. The indirect relationship between the unpleasantness of the encounter (i.e., US intensity) and current levels of

intergroup avoidance was tested, with retrospectively reported episodic anxiety (i.e., CR) and current chronic intergroup anxiety as mediators. To further address the criticisms of laboratory-based paradigms, a content analysis was conducted on descriptions of the initial encounter to report the type of reinforcer (i.e., primary or secondary) paired with the outgroup member. The interaction between the type of reinforcer and the US intensity (i.e., degree of unpleasantness) provides an examination of conditioning outside of the standardized, high intensity, biologically-derived USs observed in experimental designs.

The current study undertook methodological safeguards to minimise potential recall bias inherent in retrospective studies and the recent ‘replication crisis’ in social sciences. First, the participants’ self-reported confidence in the accuracy of their memory and their level of general anxiety was measured and statistically controlled. Second, two versions of the survey were administered to examine the reliability and replicability of the results to address concerns stemming from the recent ‘replication crisis’ (Earp & Trafimow, 2015; Pashler & Wagenmakers, 2012; Open Science Collaboration, 2015). In a self-replication and expansion, the same sampling frame was used to collect responses related to two outgroups distinguished by ethnic (African Americans) and religious (Muslims) cues.

In accordance with the aim of the study, several hypotheses were tested. First, it was hypothesised that individuals who report that something unpleasant (US) occurred during their first negative encounter with an outgroup member (CS) would report more episodic anxiety during the encounter (i.e., CR), in comparison to those who did not report experiencing anything unpleasant. Second, US intensity, as measured by the degree of unpleasantness, should be related to higher level of episodic intergroup anxiety during the encounter. Third, it was hypothesised that feelings of episodic intergroup anxiety would generalise and thus be related to chronic levels of intergroup

anxiety. Fourth, chronic intergroup anxiety should be related to more intergroup avoidance. Finally, in a serial mediation model, it was expected that unpleasant occurrences of higher intensity would indirectly predict increased intergroup avoidance, through the mediating mechanisms of higher episodic and chronic intergroup anxiety. Additional content analyses were conducted to (1) describe the type of US participants reported (either primary or secondary) and (2) determine if the type of reinforcer moderated the relationships between intensity of the US (i.e., ratings of unpleasantness) and episodic and chronic intergroup anxiety.

## 4.4 Method

### 4.4.1 Participants and Procedure

Residents of the United States of America ( $N = 1,180$ ) were recruited via Amazon's Mechanical Turk (Mturk), however only participants who had a negative encounter with the outgroup were included in the main analyses.<sup>1</sup> The age of the sample ranged from 18 to 80 years ( $M_{\text{age}} = 36.57$ ,  $SD = 11.72$ ) and the majority of the sample were female (females = 60%, males = 39.3%, other = 0.7%). Two versions of the survey were available for participants that were identical, with the exception of the outgroup (either African American or Muslim). At the start of the survey, participants were required to provide their ethnicity and religious demographics. Individuals who indicated they adhered to the Islamic faith were allocated to the African American survey and individuals who nominated their racial background as African American

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<sup>1</sup> For reference, participants who reported no interactions with outgroup members (Mus: 10.1%; AA: 0.4%) or no negative encounters (Mus: 35.8%; AA: 34.5%) reported significantly different intergroup anxiety compared to participants who reported a negative encounter (for analyses involving responses to African-Americans, participants who reported no interactions were excluded due to the small sample size; Mus:  $F(2,611) = 66.24$ ,  $p < .001$ ; AA:  $t(549) = -6.43$ ,  $p < .001$ ). As determined by multiple comparisons using a Bonferroni correction, participants who reported a negative encounter reported significantly higher intergroup anxiety (Mus:  $M = 2.09$ ,  $SD = 0.96$ ; AA:  $M = 1.67$ ,  $SD = 0.72$ ) compared to participants who reported no negative encounters (Mus:  $M = 1.32$ ,  $SD = 0.52$ ; AA:  $M = 1.30$ ,  $SD = 0.52$ ) or no encounter (Mus:  $M = 1.66$ ,  $SD = 0.83$ ).

were allocated to the Muslim survey. Participants who were Islamic and African American ( $N = 13$ ) were sent to the end of the survey and did not answer any other question. Participants that were not Islamic or African American were randomly allocated to one of the surveys.

Consequently, 613 participants completed the questions related to Muslims and 554 participants completed the questions related to African Americans. Chi-square analyses indicated that the two samples did not differ in their religious background,  $\chi^2(6, 1149) = 3.88, p = .693$ , ethnic background,  $\chi^2(7, 1035) = 7.34, p = .394$ , or gender,  $\chi^2(4, 1178) = 7.53, p = .110$ . Additionally, the average age was not significantly different between the two samples,  $t(1,114) = -0.56, p = .575$ .

#### 4.4.2 Materials

**Outgroup avoidance.** Intergroup avoidance was measured using a five item, internally consistent ( $\alpha_{AA} = .91; \alpha_{Mus} = .91$ ) scale from Plant and Devine (2003). The items relate to the participant's desire to avoid interactions with the outgroup of interest (e.g., *If I had a choice, I would rather not interact with [Muslims/African Americans]*). All items were rated on a 7-point scale (1 = *Strongly disagree* to 7 = *Strongly agree*).

**Chronic intergroup anxiety.** The Cognitive, Affective, and Physiological Intergroup Anxiety scale (CAP-IA; O'Donnell, Neumann, & Duffy, *in prep*) was administered to participants. The newly developed scale includes 14 items on a 5-point scale (1 = *Never* to 5 = *Always*) designed to assess maladaptive thoughts (e.g., *[Muslims/African Americans] pose a danger to me*), anxious feelings (e.g., *Worried*), and physiological markers of anxiety (e.g., *Butterflies in stomach*) when interacting with, or anticipating interacting with, an outgroup member. A mean was calculated with all 14 items as the full scale was internally consistent ( $\alpha_{AA} = .95; \alpha_{Mus} = .95$ ).

**Negative encounters with the outgroup.** Initially, participants were told that this section of the survey was going to ask them questions about their own experiences

interacting with the outgroup (either African Americans or Muslims). They were instructed to spend one minute thinking about their real-life, personal experiences with the outgroup. The screen prevented them from continuing for 60 s to encourage recall. Participants were then asked if they had ever personally interacted with the outgroup and responded on a yes/no dichotomy. Participants that indicated yes were asked if they had ever had a negative encounter with the outgroup, defined as a personal interaction they did not enjoy. Only the participants that responded yes continued to the next sections. Participants were informed that this section of questions related to *their first negative encounter* with the outgroup. Participants were asked to write down as much information as they could about the encounter, to encourage them to think about the incident in detail. Subsequently, they answered further questions.

***Unpleasantness.*** Participants were asked if they had experienced anything unpleasant during the interaction (0 = *yes*, 1 = *no*), after being informed that individuals evaluate different things as unpleasant, but it could include feeling socially embarrassed, being in pain, feeling afraid, or being in discomfort for any reason. Individuals who responded yes were then asked to specify in an open-ended response box what the unpleasant thing was and to rate the level of unpleasantness on a 7-point scale (1 = *A little unpleasant* to 7 = *Very unpleasant*). The open-ended response was to assess whether the description was analogous to a US and to determine if the conditioning event included a primary or secondary reinforcer. The response scale was used to determine the intensity of the US.

***Episodic intergroup anxiety.*** Participants were asked three novel questions related to their level of anxiety during their first negative encounter (CR) with the outgroup ( $\alpha_{AA} = .79$ ;  $\alpha_{Mus} = .83$ ). There was one item to assess each of the affective (*Felt anxious*), cognitive (*Thought that you would be disadvantaged because of the encounter*), and physiological (*Felt a change in the physical sensations in your body*)

domains of intergroup anxiety. Responses were coded on a 7-point scale (1 = *Not at all* to 7 = *Very much so*) and a mean of the three items was calculated.

***Confidence in the memory.*** Participants were asked how confident they were that the details they provided were correct and reflected the events as they happened (1 = *Not at all confident* to 7 = *Very confident*).

**General anxiety.** A subscale of the 21-item Depression, Anxiety, and Stress scale (DASS-21) was used to measure general anxiety. The 7-item anxiety subscale is a non-diagnostic self-report measure adapted from Lovibond and Lovibond's (1995) larger scale. Participants respond to how much particular statements related to physical and emotional arousal applied to them during the previous week (0 = *Never* to 3 = *Almost always*). Responses in both surveys were internally consistent ( $\alpha_{AA} = .90$ ;  $\alpha_{Mus} = .92$ ).

## 4.5 Results

### 4.5.1 Overview of Analyses

The data were analysed in several steps. At different stages of the analyses, different subgroups of the sample were analysed (Figure 4.1). The level of missing data differed depending upon the analysis but was listwise deleted. Across all steps, responses to the two versions of the survey were analysed independently from one another. The first step was to conduct a validity check on the open-ended question that asked participants to nominate the unpleasant thing that happened during the encounter. This sought to validate the analogous comparison between something unpleasant and an aversive US. As such, only participants who reported experiencing something unpleasant during the encounter were asked this open-ended question and could be coded. In addition to validating the important conceptual link, the participants' responses were able to be coded to describe the complexity of aversive stimuli experienced by humans in naturalistic settings. Two reviewers independently coded the

responses using the full description of the interaction as supplementary information (Appendix D) to assist in the interpretation of responses. Responses were coded based on whether the unpleasant occurrence served as a primary or secondary reinforcer, or if the participant should be excluded.

The second step of analyses tested if the CS (outgroup), paired with the US (something unpleasant), led to self-reported fear during the negative encounter. Participants who reported a valid negative encounter (as determined in the content analysis) were classified based upon whether they experienced something unpleasant or if they did not report anything unpleasant (0 = *Nothing unpleasant*, 1 = *Something unpleasant*). Group differences were examined for the outcome of episodic anxiety using *t*-tests.

At the third step of the analysis, Amos (v.23) was used to conduct a serial mediation using path analysis to examine the indirect effect of the intensity of the unpleasantness on intergroup avoidance, through the mediating mechanisms of episodic and chronic intergroup anxiety. The type of US (i.e., primary or secondary), as determined by the content analysis, was included as a moderating variable. As such, only participants who indicated they experienced something unpleasant were included in this stage of analyses. Simultaneously added as control variables were the confidence the participant had in the memory and their general anxiety. The significance of the indirect pathway was determined through bootstrapped 95% confidence intervals (Hayes, 2009).

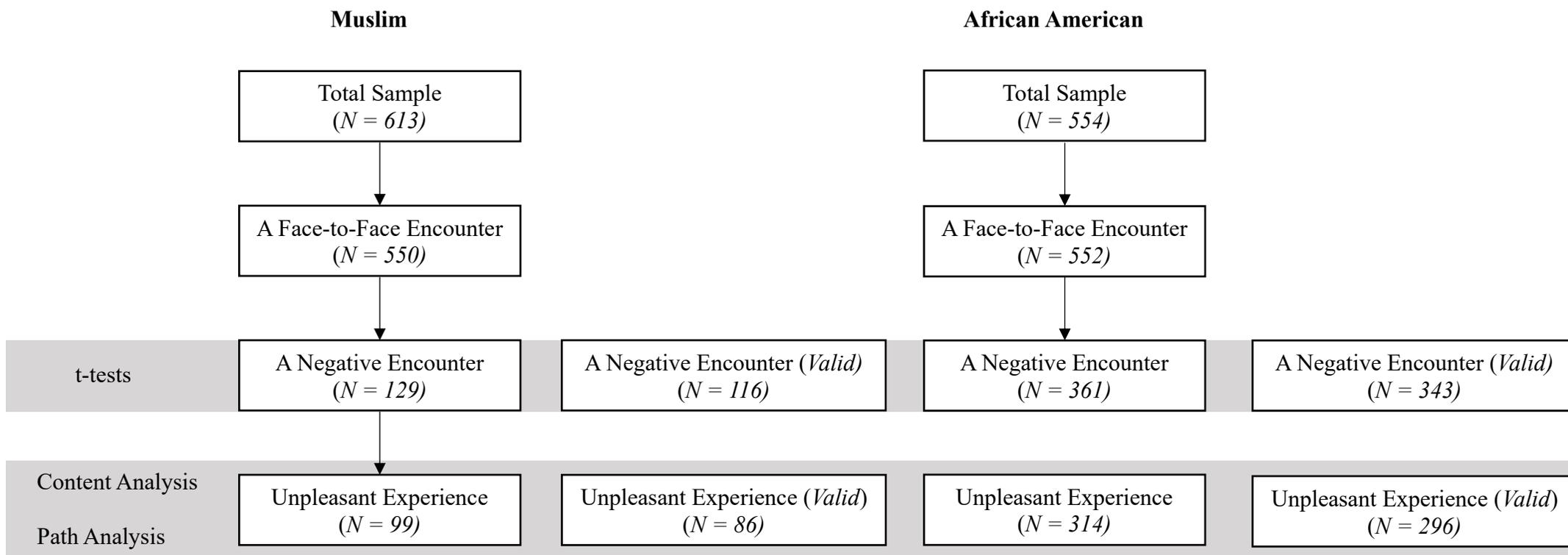


Figure 4.1. An overview of the sampling procedure showing the number of participants eligible for each analysis. Valid sample sizes represent the number of participants excluding those with invalid responses to the open-ended question determined through the content analysis. The discrepancy between these numbers and the final sample size for each analysis represent listwise deletion of missing data.

#### 4.5.2 Content Analysis of Open-Ended Responses

Participants who indicated they had experienced something unpleasant (Muslim outgroup:  $N = 99$ ; African American outgroup:  $N = 314$ ) had their responses to the open-ended questions analysed by two independent reviewers (see Appendix D for coding rules). Cases were excluded when the participant witnessed an interaction that did not involve them, where the participant did not construe the event as unpleasant, or when the participant did not provide a response. The unpleasant occurrence was coded as a primary reinforcer when it could have direct implications for the biological wellbeing of the person. As such, primary reinforcers were considered to be threats to the physical safety of the participant, withdrawal of biologically required resources (e.g., forced removal of food or shelter), and behaviour resulting in social isolation. Congruent with the definition provided by Herrnstein (1964), secondary reinforcers were stimuli that had obtained their potency due to the experiences, or prior learning, of the individual. As such, responses highlighting the loss of a secondary resource (e.g., money), non-threatening arguments, work place incidents, and general discomfort in a situation were coded as secondary reinforcers. Participants who provided evidence of both types of reinforcers were coded as experiencing a primary reinforcer.

The two reviewers had good inter-rater reliability ( $\kappa = .74$ ; Landis & Koch, 1977) and inconsistencies were resolved with a mutual decision following further discussions. As a result of the validity check, 13.1% ( $N = 13$ ) of responses to the Muslim survey and 5.7% ( $N = 18$ ) of responses to the African American survey were assessed as providing an invalid response and were removed from all further analyses. For the remaining responses, a chi-square goodness-of-fit test was conducted to determine if the proportions of primary and secondary reinforcers were significantly different from equal proportions. For the valid responses to the Muslim survey, the proportions of primary ( $N = 32$ ) and secondary ( $N = 54$ ) reinforcers were significantly

different,  $\chi^2(1) = 5.63, p = .018$ , with fewer primary reinforcers than expected. The valid responses to unpleasant experiences with African Americans also revealed significant differences in the proportions of primary ( $N = 197$ ) and secondary ( $N = 99$ ) reinforcers,  $\chi^2(1) = 32.45, p < .001$ . Contrary to the responses to the Muslim survey, more primary than secondary reinforcers were reported by participants.

#### **4.5.3 Unpleasant Experiences during the Negative Encounter**

Means were compared using *t*-tests in SPSS (v. 25). Welch's *t*-test was employed because it is robust to both unequal variances and unequal sample sizes. For the participants who indicated they had experienced a negative encounter with the outgroup, the majority of participants (Muslim outgroup: 86 out of 116, 74.1%; African American outgroup: 296 out of 343; 86.3%) indicated that something unpleasant had happened during the encounter. Results indicate that episodic anxiety was higher for the participants who experienced something unpleasant (Muslim:  $M = 3.51, SD = 1.12$ ; African American:  $M = 3.81, SD = 2.42$ ) compared to the participants who did not report anything unpleasant occurring (Muslim:  $M = 2.01, SD = 0.91$ ; African American:  $M = 2.42, SD = 2.01$ ). These differences were statistically significant for the responses to both Muslims,  $t(62.01) = -6.30, p < .001$ , and African Americans,  $t(57.55) = -8.19, p < .001$ .

#### **4.5.4 Path Analysis**

Initially, bivariate correlations were examined for each sample (Table 4.1). In both samples, the level of unpleasantness in the negative encounter was significantly positively correlated with levels of reported episodic and chronic intergroup anxiety. Unpleasantness was also significantly related to higher intergroup avoidance in the responses regarding Muslims. Episodic intergroup anxiety, chronic intergroup anxiety, and intergroup avoidance were all significantly and positively related. With reference to the control variables in the responses to the African American survey, greater

confidence in the memory was related to ratings of more unpleasantness, lower general anxiety, and reporting a secondary reinforcer. Confidence in the memory was also related to episodic anxiety in the Muslims sample. In both samples, general anxiety was correlated with higher levels of chronic anxiety and participants who experienced a primary reinforcer reported higher unpleasantness.

Both path analyses yielded good model fit using conventional cut-offs (Hu & Bentler, 1999). The model, including the standardised coefficients, can be observed in Figure 4.2 (for unstandardised coefficients, refer to Table 4.2). The direction of the relationships and the statistical significance of individual pathways were replicated across both samples and so a single interpretation is provided. Across the two samples of participants that reported a valid unpleasant occurrence during their first negative encounter with the outgroup, the rating of unpleasantness was significantly related to feeling episodic intergroup anxiety during the encounter. Individuals that reported higher levels of episodic anxiety reported significantly higher levels of chronic anxiety. Importantly, the interaction between US intensity and US-type was not a significant predictor of either episodic or chronic intergroup anxiety. Finally, higher chronic intergroup anxiety toward both outgroups was associated with more avoidance of that outgroup.

Examinations of the 95% confidence intervals for the indirect pathways found evidence that all indirect pathways were statistically significant in both samples (Table 4.3). Importantly, the serial mediation pathway was significant, whereby retrospective recall of the unpleasantness of the negative encounter with the outgroup was related to current levels of intergroup avoidance, through the mediating mechanisms of episodic intergroup anxiety and, subsequently, chronic intergroup anxiety. Additionally, the relationship between the level of unpleasantness in the negative encounter and chronic intergroup anxiety was mediated by episodic intergroup anxiety. Finally, feeling

episodic anxiety during the negative encounter was related to current levels of avoidance indirectly through chronic anxiety. Alternative models were explored (see Appendix E), but the original model had the strongest statistical support.

#### 4.6 Discussion

The current study employed a novel methodology to assess the ecological validity of Pavlovian conditioning processes in the formation of intergroup anxiety and avoidance. By doing so, the study provided the first self-report evidence that associative learning processes may result in intergroup anxiety responses following real-life negative interactions. Previously, negative encounters with an outgroup member have been found to be associated with chronic intergroup anxiety (Aberson & Gaffney, 2008) and more recent work has found a link between negative encounters with an outgroup and episodic intergroup anxiety (Kauff et al., 2017). The present study expanded on these findings by applying an associative learning framework to examine the *first negative encounter* with an outgroup member.

Congruent with the first hypothesis and an associative learning perspective, the presence of an unpleasant event (US) paired with an outgroup member during the first negative encounter resulted in higher episodic anxiety during the negative encounter (CR). This finding illustrates that a CS-US pairing during the negative encounter produced a greater fear response than simply being in a tedious interpersonal situation. Thus, the current study supports an *associative* learning account of the formation of anxiety in intergroup contexts.

Table 4.1

*Descriptive Statistics and Pearson's Correlations between Responses to Questions Regarding African Americans (N = 292, Lower Quadrant) and Muslims (N = 85, Upper Quadrant)*

	Mean <sub>AA</sub> (SD)	Mean <sub>Mus</sub> (SD)	1.	2.	3.	4.	5.	6.	7.
1. Intergroup Avoidance	2.74 (1.56)	4.08 (1.84)	-	.66**	.28*	.15	-.19	.02	.10
2. Chronic Anxiety	1.66 (0.68)	2.11 (0.93)	.72**	-	.51**	.25*	-.04	.01	.49**
3. Episodic Anxiety	3.83 (0.99)	3.51 (1.12)	.22**	.28**	-	.42**	-.02	.26*	.17
4. Unpleasantness	5.58 (1.65)	5.06 (1.92)	.15*	.19**	.58**	-	-.36**	.15	.03
5. Reinforcer <sup>a</sup>	-	-	-.10	-.08	-.36**	-.31**	-	-.15	-.03
6. Confidence in Memory	6.46 (0.92)	6.33 (0.96)	.05	.01	.24**	.31**	-.05	-	-.20
7. General Anxiety	0.37 (0.50)	0.55 (0.65)	.10	.32**	.09	-.01	-.02	-.25**	-

Note: \*  $p < .05$ , \*\*  $p < .001$

AA denotes responses about African Americans

Mus denotes responses about Muslims

<sup>a</sup> 0 = Primary, 1 = Secondary

Table 4.2

*Unstandardised Regression Coefficients and Confidence Intervals (95%) depicting the Strength of the Relationship between Variables at Each Stage of the Full Analysis*

	Muslims ( $N = 85$ ) <sup>†</sup>			African Americans ( $N = 292$ ) <sup>‡</sup>		
	Episodic Anxiety	Chronic Anxiety	Avoidance	Episodic Anxiety	Chronic Anxiety	Avoidance
Confidence in Memory	.32* (.09 - .55)	-.02 (-.20 - .16)	-.12 (-.44 - .20)	.11* (.01 - .22)	.01 (-.08 - .10)	-.01 (-.15 - .14)
General Anxiety	.38* (.05 - .71)	.59** (.34 - .85)	-.96** (-1.47 - -.45)	.23* (.04 - .41)	.42** (.26 - .57)	-.48** (-.75 - .21)
Unpleasantness	.24** (.12 - .37)	.03 (-.07 - .14)	-.09 (-.27 - .09)	.30** (.24 - .37)	.04 (-.02 - .10)	-.02 (-.11 - .09)
Reinforcer <sup>a</sup>	.35 (-.15 - .85)	.02 (-.35 - .40)	-.82* (-1.47 - -.14)	-.44** (-.65 - -.24)	.02 (-.15 - .19)	-.15 (-.45 - .12)
Unpleasantness x Reinforcer	.12 (-.16 - .40)	-.02 (-.23 - .19)	-	-.09 (-.20 - .03)	-.07 (-.16 - .03)	-
Episodic Anxiety	-	.35** (.18 - .52)	-.10 (-.42 - .23)	-	.14* (.05 - .24)	.02 (-.15 - .18)
Chronic Anxiety	-	-	1.73** (1.33 - 2.13)	-	-	1.76** (1.55 - 1.95)

Note: \*  $p < .05$ , \*\*  $p < .001$

<sup>a</sup> 0 = Primary, 1 = Secondary

<sup>†</sup>  $\chi^2(1) = 0.17, p = .898$ ; GFI = 1.00; TLI = 1.00; RMSEA = .01

<sup>‡</sup>  $\chi^2(1) = 0.73, p = .394$ ; GFI = .99; TLI = 1.01; RMSEA = .01

Table 4.3

*The Indirect Effects and Corresponding Bootstrapped Confidence Intervals (95%) for Each Pathway in the Full Analysis*

	Muslims (N = 85)		African Americans (N = 292)	
	Chronic Anxiety	Avoidance	Chronic Anxiety	Avoidance
Unpleasantness	.08 (.04 - .15)	.18 (.01 - .37)	.04 (.02 - .07)	.15 (.06 - .24)
Episodic Anxiety	-	.60 (.35 - .87)	-	.25 (.09 - .42)

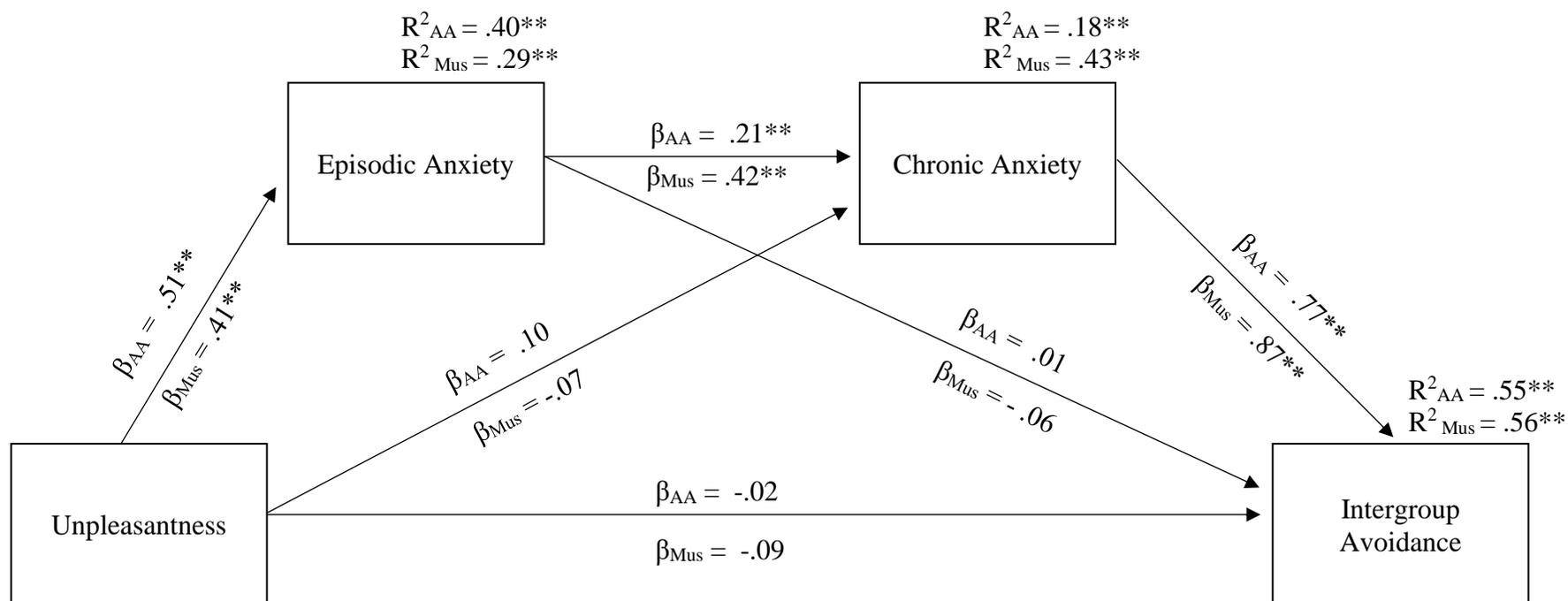


Figure 4.2. Standardised regression coefficients depicting the results from the hypothesised path analysis examining the indirect relationship between unpleasantness and intergroup avoidance through episodic and chronic intergroup anxiety. Participants' confidence in their memory of the interaction, general anxiety, and the type of reinforcer were statistically controlled for but not presented in the figure.

Additionally, the strength of the US, as measured by the level of unpleasantness, was related to episodic intergroup anxiety during the encounter (CR), thus supporting the second hypothesis. Subsequently, episodic intergroup anxiety was related to chronic intergroup anxiety, and chronic levels of intergroup anxiety were related to more avoidance of the outgroup, in support of hypothesis three and four, respectively. The final hypothesis was also supported as the unpleasantness of the first encounter with the outgroup was indirectly related to current intergroup avoidance through episodic and chronic anxiety. The link between negative events and their corresponding state-like emotive response with more trait-like emotions and behavioural preferences is consistent with theory (Paolini et al., 2006) and empirical self-report research (Kauff et al., 2017). However, it expands on laboratory-based conditioning work that typically examines outgroup CS-US pairings with real-time measures of physiological episodic intergroup anxiety or evaluations of the CSs (Bramwell et al., 2014).

The current investigation of primary and secondary reinforcers can advance our understanding of experimental fear conditioning studies. Experimental designs are purported to be unrepresentative of real interactions because USs are clearly aversive (e.g., pain following electric shock) and the absence of any other stimuli in the learning protocol produces unambiguous and clear associative learning (Beckers et al., 2013; Lonsdorf, et al., 2017). In contrast, aversive conditioning events in real life are purported to have more variability and therefore include USs that are less predictive of a clear and imminent danger. Congruent with this approach, the current study found variability in the intensity and type of USs (primary or secondary) reported by participants. The presence and intensity of the US during an intergroup interaction, irrespective of whether it was a biologically derived marker of threat, lead to the self-reported formation of fear and anxiety. The presented findings advance theory by

suggesting that laboratory-based conditions are not always representative of real world interactions, but fear conditioning successfully occurs regardless.

The current study provides information that can be employed in a practical way. These results indicate that intergroup anxiety can originate from an initial negative encounter with an outgroup member. Therefore, interventions to reduce prejudice based upon exposure-based techniques (i.e., interacting with outgroup members) should be able to successfully incorporate elements of cognitive therapy (Birtel & Crisp, 2015; O'Donnell et al., 2019). For example, community programs to reduce prejudice could identify fearful people's initial aversive learning experience and offer counselling to reduce their expectation of harm and increase their coping skills when faced with similar situations, as per cognitive interventions for clinical anxiety (Tryon, 2005).

The inclusion of, and replication of results using distinct outgroups (religious: Muslims, ethnic: African Americans) is a strength of the present study. Notwithstanding this strength, the current study also has some limitations. Namely, the use of a cross-sectional, self-report inventory drawing upon retrospective events could be construed as a limitation. Recall bias, or the accuracy of a retrieved memory, is a known problem with retrospective studies (Hassan, 2005). Of particular relevance to the current study, there are meta-analytic reports that recall bias involving threatening stimuli is stronger with anxious participants (Mitte, 2008). To account for this, the participants' self-reported confidence in their memory and their general anxiety were entered into the analyses as statistical controls, thereby reducing the error in the results due to the potential biased reporting of the retrieved memory. The statistically significant and theoretically meaningful direct and indirect effects observed after use of these statistical controls is indicative of robust results that withstand the potential of a recall bias.

Mediation models in cross-sectional designs are routinely criticised (Selig & Preacher, 2009). Therefore, whilst it was theorised that anxiety during the negative

encounter would predict participants' current levels of intergroup anxiety, the cross-sectional design ensures that it is not possible to discount alternative explanations. For example, individuals who have higher chronic intergroup anxiety could have a recall bias during the retrieval of their memory of their first negative encounter. In the current study, two alternative models were run that provided evidence that chronic intergroup anxiety was not indirectly related to avoidance through episodic anxiety or through the serial mediation of unpleasantness and episodic anxiety. Nevertheless, future research could provide additional information on the temporal ordering by examining participants' responses in real time (e.g., daily diaries or experience sampling methods).

Future research could also explore other learning processes that could contribute to the formation of intergroup anxiety. The current study provided strong evidence that associative learning processes account for a significant proportion of the variance in intergroup anxiety. However, there is still a substantial amount of variance that was not explained. Future research could apply a similar methodology to assess other forms of learning. For example, social learning through observation has been applied to an intergroup context (Golkar & Olsson, 2017). An important distinction between classical fear conditioning and conditioning through social observation is that the former requires a first-hand aversive experience (Olsson, Nearing, & Phelps, 2007). It is possible that social observation and other types of learning (e.g., transfer of information; Rachman, 1977) could also be implicated in the formation of intergroup anxiety. Future research should expand upon the current study by assessing other, experimentally established aetiological factors of anxiety.

In conclusion, the findings presented indicate that associative learning is a process that can account for the formation of intergroup anxiety outside the standardization and level of control in experimental studies. In a novel self-report design, two samples responded to questions related to their first negative encounter with

either African Americans or Muslims. Their retrospective accounts detail how, if something unpleasant happened during the encounter, they had higher levels of fear during the interaction. Subsequent analyses found that the level of unpleasantness predicted current outgroup avoidance through episodic and chronic intergroup anxiety. These results are beneficial to both social and learning psychologists, as the presented study sits at the nexus of different theoretical perspectives and methodologies.

### **Part I Interim Summary**

The previous chapters have identified that learning processes can account for the formation of intergroup anxiety (Aim 1) and that anxiety is subsequently linked to the avoidance of outgroup members (Aim 2). Collectively, Part One of this thesis explored how associative learning processes can lead to intergroup anxiety outside of the laboratory. This work adds to our knowledge regarding how anxiety can be learnt in an intergroup context and its downstream consequences. To facilitate this research, a new measure was created to integrate common markers of anxiety (i.e., physiological reactivity) in typical self-report measures.

Beyond exploring how intergroup anxiety is formed, Part One clearly outlines how anxiety can result in avoidance. Thus, the empirical work presented in Chapter 4 clearly defines the problem the remainder of this thesis seeks to address: individuals who are highly anxious will avoid the most efficacious remedy for prejudice, intergroup contact. As noted in the General Introduction, avoiding intergroup contact is a key reason why intergroup tensions are not attenuating in pluralistic societies where contact should be otherwise widespread. Part Two of this thesis attempts to address this problem through the creation of new form of contact that should elicit lower levels of avoidance; Virtual Reality Intergroup Contact. Therefore, the remainder of the thesis addresses the final aim: To provide an acceptable form of intergroup contact using virtual reality technology.

# Part II

## **The Development of Virtual Reality Intergroup**

### **Contact**

### Chapter 5 Preamble

This chapter builds upon the previous investigations into the formation of anxiety and subsequent avoidance by detailing contemporary approaches to overcome the problems associated with informal segregation and intergroup avoidance (Aim 3). I present information outlining how *contact-based interventions* should improve intergroup relations in the absence of naturally occurring contact, when individuals accept these interventions. Additionally, I argue that indirect forms of contact should be more acceptable than direct contact. These arguments are outlined as a precursor to the discussion (in subsequent chapters) of the benefits of the new form of indirect contact: Virtual Reality Intergroup Contact (VRIC).

In the current chapter, a novel theoretical approach is advanced as I discuss the factors that promote or hinder the likelihood of interventional forms of contact occurring by considering each individual's agency to engage in, or avoid, contact interventions. I draw upon existing theoretical and empirical work in the medical sciences to provide a temporal model of intervention acceptability that describes how willing people are to engage in interventions (prospective acceptability), comply with the instructions during an intervention (concurrent acceptability), and how positive their perceptions of the experience are (retrospective acceptability). Using this model, I evaluate the available evidence of acceptability for imagined indirect contact and provide future research directions for all forms of contact, including the novel VRIC. It is hoped that future research using this model can promote the wide spread implementation of indirect contact to ameliorate intergroup tensions. This chapter has been prepared for publication.

**STATEMENT OF CONTRIBUTION TO CO-AUTHORED PUBLISHED  
PAPER**

This chapter includes a co-authored paper. The status of the co-authored paper, including all authors, are:

*Manuscript in preparation.*

Co-Authors: A. Duffy, J. Harwood, D. Neumann, & S. Paolini (alphabetical order)

My contribution to the paper involved:

*I conceived the idea for the literature review and developed its structure, found the relevant literature, and wrote the review under supervision. Two co-authors (Neumann & Duffy) are part of my supervisory team. Additionally, two co-authors (Paolini & Harwood) were external collaborators. Their contribution to the manuscript involved providing supervisory advice and review of drafts.*

(Signed) \_\_\_\_\_ (Date) 25<sup>th</sup> October, 2019

Alexander W. O'Donnell

(Countersigned) \_\_\_\_\_ (Date) 25<sup>th</sup> October, 2019

Supervisor: Professor David L. Neumann

## **5. The Acceptability of Intergroup Contact Interventions: A General Theoretical Framework and Proof of Concept Review**

Allport (1954) proposed that prejudice could be reduced by face-to-face contact between groups when that prejudice is not deeply rooted in the character of the individual. This proposition inspired a considerable volume of research in the decades following Allport's influential work, with comprehensive reviews of this literature now confirming that intergroup contact can indeed reduce prejudice (Pettigrew, 1998; Pettigrew & Tropp, 2006). Allport's early hypothesis has been more recently expanded to include considerations of the benefits (and perils) of *indirect* forms of contact. Indirect contact is the viewing, perception, awareness, or engagement in interactions with outgroup members in ways that do not require face-to-face contact (Dovidio, Eller, & Hewstone, 2011; Harwood, 2010; Turner & Cameron, 2016). Previous reviews have defined, evaluated, and outlined advantages for many indirect forms of contact, including electronically mediated contact (see White, Harvey, & Abu-Rayya, 2015), vicarious contact (see Vezzali, Hewstone, Capozza, Giovanni, & Wölfer, 2014), extended contact (see Zhou, Page-Gould, Aron, Moyer, & Hewstone, 2019), musical contact (see Harwood, 2017), and imagined contact (see Crisp & Turner, 2009; Miles & Crisp, 2014).

Allport (1954) penned his initial hypothesis in a time of segregation and pervasive racial discrimination. It is within that context that activist-scholars emerged with the intention to avert prejudicial behaviours and change policies deemed to be unjust (Cherry, 2008). Social psychologists featured prominently in successful fights for racial desegregation in the United States of America (Benjamin & Crouse, 2002; Pettigrew, 1961). Despite legal successes in reducing formal barriers for intergroup contact, contemporary social psychologists are still faced with intergroup segregation, albeit through informal processes. This continued segregation is demonstrated by evidence

that members of distinct social groups still do not act interact readily (Paolini, Harwood, Hewstone, & Neumann, 2018).

Members of distinct social, ethnic, and religious groups can now interact in both direct and indirect ways due to interconnections available in the modern world. However, these opportunities are often missed: in communities with high levels of diversity, and subsequently more opportunities to engage in intergroup contact, research suggests that individuals still predominately interact with their ingroup (Paolini et al., 2018). For example, following the end of formal segregation during apartheid in South Africa, there still exists wide-spread, informal segregation (Dixon, Tredoux, Durrheim, Finchilescu, & Clack, 2008; Keon & Durrheim, 2010). Similar effects are also widely documented in settings other than post-conflict societies (e.g., Aboud, 2005; Al Ramiah, Schmid, Hewstone, & Floe, 2015). Reports of this nature reinforce the view that relying on naturally occurring interactions to facilitate a widespread reduction of prejudice is problematic due to the infrequency of intergroup contact.

In recognition of this problem, several theorists propose the development and implementation of contact-based *interventions* (direct and indirect) as a way to ‘ready’ individuals for naturally occurring, positive interactions with outgroup members (Crisp & Turner, 2009; Turner & Cameron, 2016). This perspective asserts that exposure to diversity in contrived settings provides individuals with the skills and motivation to seek out diversity elsewhere. A fast-growing body of work supports these models, with evidence that contact-based interventions in the laboratory and applied settings lead to more intergroup contact and more willingness to engage in future contact (e.g., Miles & Crisp, 2014).

The idea of placing contact-based interventions at the start of a gradual process leading to increased spontaneous contact and reduced segregation is promising. Yet, our view is that it largely ignores the complex interplay of institutional and individual

processes that ultimately determine *if* a contact-based intervention is implemented, used, and continues in the future. Most contact-based interventions are not ‘casus fortuitous’ (i.e., unavoidable accident) as they require careful planning and deliberate implementation. Often, these programs are carefully implemented in institutions (e.g., in schools and workplaces) to ensure individuals are cognizant of authorities’ support for contact (Allport, 1954), and pro-contact institutional norms contribute to interventions’ overall positive effects (Grütter & Meyer, 2014; Skinner & Meltzoff, 2019). In advancing our theoretical framework, we assert that institutional implementation of contact is also critical from a contact-avoidance stance, as it provides additional barriers to contact-evasion that are not present in less structured and monitored settings.

To capitalize on these ‘special properties’ of institutional settings, institutions and their administrators still need welcoming contact-based interventions that appeal to potential intervention participants. Individuals within the organization need to be willing to engage with (voluntarily or less so) the intervention, comply with the intervention requirements, and come out of them with positive impressions of the experience so as to be positively inclined to engage in similar experiences of contact in the future, in same or novel environments (i.e., more contact across multiple settings, including naturalistic ones).

In this paper, we aim to provide a more nuanced discussion of whether contact-based interventions can overcome the problem of informal intergroup segregation. The discussion centers on a fresh analysis of the complex interplay of institutional and individual processes implicated in decisions about whether contact-based interventions are implemented, used, and continued in the future. To this end, we start by providing an overview of contact-based interventions. Second, we outline a general model of acceptability of contact-based interventions centered around individuals’ (leaders’ and lay participants’) willingness to engage in contact interventions. Third, we provide a

first evaluation of the viability of our novel acceptability model by testing it against available evidence regarding the acceptability of a specific type of contact-based intervention – imagined contact interventions. Fourth, we extend our theoretical model to include modifiable factors believed to enhance the likelihood that the interventions will be accepted. Finally, we provide a discussion of methodological considerations designed to spur future research endeavours.

The central arguments and theoretical framework presented in this paper apply to all forms of contact-based interventions, whether they involve face-to-face interactions or otherwise. At the core of our general theoretical framework is the view that institutional leaders and intervention participants are individuals with free will to engage in or avoid the intervention. A second proposition that emerges in this review is that the context and communication features of different contact-based interventions can impact intervention acceptability. These two propositions are premised on the realization that people are free to allocate their time and resources toward activities in which they are motivated to engage. Interventionists need to consider these individual preferences and reform their programs to meet them to ensure maximum engagement and implementation. Failure to adopt these principles could confine effective interventions to the laboratory and small-scale trial sites. Only through these more nuanced considerations of individual autonomy can we truly appraise contact-based interventions' ability to evoke change, reduce intergroup segregation, and increase intergroup contact.

### **5.1 Contact-Based Interventions**

In the current paper, we focus on contact-based interventions that involve the development of a contact-based experience by a person of authority which is then administered on a lay-person. These interventions aim to improve intergroup relations. In other words, the intention of intervening forms of contact are to interfere with

naturally occurring (maladaptive) intergroup processes and create more positive appraisals of the outgroup to improve relations between opposing groups in a set social context (e.g., members of ethnic groups in competitive relations; individuals with different abilities, sexual orientations, etc.). An intergroup contact intervention does not merely provide opportunities for intergroup contact, it actively facilitates an intergroup experience and ensures contact occurs (Lemmer & Wagner, 2015). As such, a typical intervention has an administrator or moderator that provides instructions to enable intergroup contact. The efficacy of these interventions are established, with meta-analytic evidence that real-world interventions are effective in improving ethnic attitudes (Lemmer & Wagner, 2015).

Despite their established efficacy, it is important to note that all interventions are limited because their effectiveness is dependent upon (often prejudiced) people and institutional leaders participating in the intervention. Contrary to natural forms of intergroup contact, individuals and institutions need to consent to the administration of the intervention. In the field of intergroup relations, self-selection processes contributing to an individual choosing to interact with an outgroup member have long been acknowledged (Pettigrew, 1998), but remained largely under investigated. Recent work has begun to address this, by exploring the contextual (e.g., social norms) and personal (e.g., personality) factors that contribute to an individual's willingness to engage in naturally occurring intergroup contact (Ron, Solomon, Halperin, & Saguy, 2017; Saguy & Kteily, 2014; Stürmer et al., 2013; Stürmer & Benbow, 2017). This emerging literature is yet to explore antecedents to why individuals choose to engage in contact-based interventions. Given this, we have instead looked to the field of medical science and population health to guide this discussion. Researchers and practitioners in these fields have long understood that, for a treatment to work, the treatment needs to be available and the patient needs to be referred to it (Sekhon et al., 2017). These processes

are largely dependent upon influential leaders and institutional implementation of specific programs (Ambresin, Bennett, Patton, Sancu, & Sawyer, 2013). Additionally, the patient must accept and comply with the instructions of the treatment (Blackwell, 1976). This understanding has led to investigations into the acceptability of a broad array of medical interventions.

### **5.2 Acceptability: A Novel Dimension to Contact-Based Interventions**

Acceptability is a construct that reflects the extent to which people delivering or receiving the intervention consider it to be appropriate. In an intergroup setting, appropriateness for both individuals and institutions relates to whether the intervention fits within the target's current circumstances and whether it is deemed suitable to improve intergroup relations. Importantly, acceptability is not sufficient to ensure an intervention's success, but it is a necessary component (Sekhon, Cartwright, & Francis, 2017). Even the most efficacious intervention will not deliver the desired results if individuals with the capacity to implement them refuse, and if participating individuals are unwilling to accept, and thus comply, with the requirements associated with undertaking the intervention.

Empirical evaluations of the acceptability of medical interventions have been carried out during each step of the intervention process. Whilst some acceptability studies consider the intervention providers' perspective (e.g., Clancy et al., 2019), most studies have focused on acceptability from those receiving the intervention (Sekhon et al., 2017). For example, studies have reported on rates of intervention refusal before implementation (e.g., Zeltzer et al., 2002), dropout rates during the intervention (Keyworth, Knopp, Roughley, Dickens, Bold, & Coventry, 2014), self-reported attitudes toward different interventions after the intervention (e.g., Promberger et al., 2011), and participants' preferred intervention format (e.g., Sharp, Power, & Swanson, 2004). In summary, researchers have evaluated the acceptability of an intervention

using attitudinal and behavioural (intended and observed) measures at different stages of the intervention.

These investigations in medical sciences and population health are congruent with temporally-defined models of acceptability. In their theoretical framework of acceptability, Sekhon and colleagues (2017) suggested that acceptability should be considered prior, during, and following an intervention. Prior to the intervention, a participant's *prospective acceptability* is their appraisal of the anticipated components and experiences of an intervention. During the intervention, *concurrent acceptability* represents the degree to which the participant continues to accept the intervention. Finally, following the intervention, *retrospective acceptability* is the participant's perceptions and acceptance of their experiences after the administration of the intervention.

Prospective, concurrent, and retrospective acceptability all share the same underlying operationalization. It is the degree to which an individual receiving or administering an intervention perceives it to be appropriate as a method to reduce prejudice (Sekhon et al., 2017). Nevertheless, distinct outcomes should be expected for anticipated, experienced, and recalled perceptions of appropriateness. These outcomes include engaging in, completing, and ensuring the longevity of contact-based interventions. Understanding how these distinct outcomes emerge in an intergroup context are important, as they could each uniquely contribute to overcoming informal segregation (Figure 5.1).

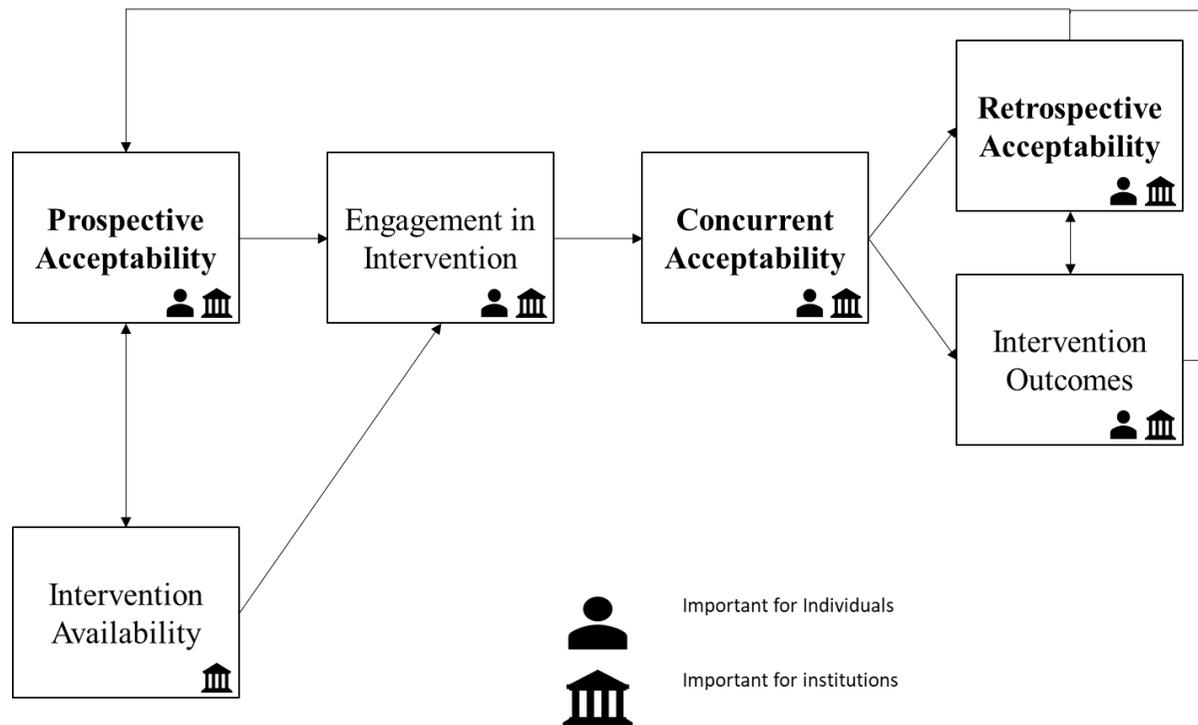


Figure 5.1. A temporal model of acceptability for contact-based interventions.

Initially, prospective acceptability from institutions and individuals is important in ensuring the intervention is initiated. Without high prospective acceptability from organisational leaders, the intervention is unlikely to be offered or implemented. Prospective acceptability from an individual perspective is also vital (especially from highly prejudicial people), as interventions might be avoided by individuals in much the same manner as naturalistic forms of contact. Therefore, interventions with low prospective acceptability are ill suited to address informal segregation.

Following commencement of the intervention, high concurrent acceptability is necessary to ensure prejudice-reducing interactions and tasks are undertaken. Low concurrent acceptability will limit the efficacy of an intervention because participants will drop out, not fully engage with, or cease complying with directions. Individuals need to satisfactorily complete the intervention for any effects, including greater willingness for intergroup contact, to occur. Thus, simply starting an intervention voluntarily or where mandated (e.g., in a school) is not enough to overcome intergroup segregation.

Retrospective acceptability after undertaking the intervention should, in turn, impact prospective acceptability in different ways. First, positive assessments of the intervention should lead institutions to implement future interventions for others to undertake. Second, individuals should be more likely to engage in similar interventions if they considered a previous one appropriate, thereby facilitating ongoing intergroup contact. Third, high prospective acceptability should create an environment where others may be more comfortable and accepting of similar interventions after learning of previous participants' satisfaction. Finally, researchers could identify and change poorly perceived components of an intervention by assessing previous participants' retrospective acceptability.

Taken together, applying the temporal model of acceptability suggests that determining factors that predict whether an intervention is used, adhered to, and perceived positively can strengthen the potential for contact-based interventions to overcome issues associated with intergroup segregation. Nevertheless, it is difficult to conclude that interventions can serve as an ‘entry-point’ for future and more intimate intergroup contact as acceptability has not been the focal point of empirical investigations. Therefore, there is a lack of empirical support that interventions have a broader appeal and are likely to be engaged with.

### **5.3 The Acceptability of Imagined Contact Interventions as a Proof of Concept**

The assessment of the degree to which contact-based interventions are acceptable is an under-researched area. To our knowledge, the acceptability of contact-based interventions has not been the focus of any empirical work. Despite the absence of systematic investigations of acceptability across all types of intergroup contact, we have attempted to compile evidence to validate our discussion of the three forms of acceptability. Specifically, information from published studies may be used as a proxy for the appraisal of acceptability. In the following section, we attempt to evaluate the existing evidence of the acceptability of imagined intergroup contact interventions using the temporally-based model of acceptability. Our view is that the temporal model of acceptability potentially applies to all forms of contact-based interventions. Nevertheless, we focus on imagined intergroup contact to illustrate how the application of an acceptability framework can be used to increase contact up-take and prejudice reduction efforts.

Imagined intergroup contact involves mentally simulating an interaction with an outgroup member (Crisp & Turner, 2009). Research on imagined intergroup contact typically employs the instructions outlined by Crisp, Stathi, Turner, and Husnu (2009) when implementing the contact. These instructions include directions to imagine a

meeting with an outgroup stranger that is positive, relaxed, and comfortable. The two key features of these instructions are that (1) there is a mental simulation of an interpersonal encounter and (2) the encounter is a positive one. A previous meta-analytic review on 71 independent effects of imagined contact concluded that, on average, imagined intergroup contact significantly reduces intergroup bias (Miles & Crisp, 2014). Importantly, there was a medium effect size across a range of different outcome variables (e.g., attitudes, observed and intended behavioural measures). The effect size was moderated by age, with stronger effects of imagined intergroup contact observed in children. These findings, in conjunction with previous literature (Turner, Crisp, & Lambert, 2007), have spurred calls for imagined intergroup contact to be implemented in multicultural learning exercises in schools and communities (Crisp, Stathi, Turner, & Husnu, 2009). As noted, such efforts will only be effective if participants at an institutional and personal level accept the intervention.

To evaluate the acceptability of imagined intergroup contact, literature searches were conducted on Scopus, Science Direct, and Google Scholar.<sup>2</sup> The resulting 64 articles (109 individual studies) were published between 2007 and 2019 and represent research conducted on the impact of administrator-led imagined intergroup contact on intergroup relations. No article tested the acceptability of imagined intergroup contact at an institutional level. Indeed, only a minority of studies were conducted in institutions (7.34% in school classes, 3.67% in a university course workshop, 0% in workplaces). We extrapolated evidence for the acceptability from the participants' perspective in 18 articles (see Table 5.1). Like evaluations of acceptability in the medical science field, evidence from both attitudinal and behavioural measures across the entire duration of

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<sup>2</sup> This literature search was comprehensive but not systematic. A complete list of articles screened and the search terms used can be found in Appendix F.

the intervention were considered with respect to prospective, concurrent, and retrospective acceptability of imagined intergroup contact.

### **5.3.1 Prospective Acceptability**

Only one study provided evidence for the prospective acceptability of imagined intergroup contact. In their study, Husnu and Paolini (2018) allowed participants to select between engaging in a positive or negative mental simulation with the outgroup. This methodology assessed prospective acceptability because implicit in the participants' selection is how acceptable they find each valenced contact condition. Of interest to the current review, more participants (Study 2, 64.85%) selected to imagine a positive interaction. Additionally, participants who had more and higher quality past direct experiences with outgroup members were more likely to choose to imagine a positive interaction. The preference for positive imagined contact suggests that, when provided an opportunity to engage in imagined contact, participants will accept a more positive form. However, individuals with less positive past experiences with outgroup members were more likely to select negative contact. In a prejudice-reduction program, it is unlikely that a negative contact option would be presented to participants. Nevertheless, in lieu of other information, we interpret these results as reflecting a broader desire for positive imagined interactions which bodes well for prospective acceptability. Furthermore, the results indicate that previous direct experiences influence peoples' decision making around intervention prospective acceptability when such decision making is autonomous.

The paucity of information regarding prospective acceptability is not surprising. Every study reviewed was an evaluation of an imagined contact intervention. Therefore, all participants had either (1) understood the study and considered it to be acceptable to some degree by agreeing to participate, or (2) were not provided with enough information to assess the study (i.e., deceptive or partially concealed recruitment, see

Column 4, Table 5.1 for cover stories). The diversity of samples and recruitment methods (Table 5.1, Columns 2 & 4) make it impossible to isolate why individuals chose to participate. Additionally, there was no information available about the participants who did not agree to participate. Consequently, this does not provide sufficiently direct evidence that individuals found the intervention acceptable.

### **5.3.2 Concurrent Acceptability**

The current review assessed the concurrent acceptability of imagined intergroup contact based upon compliance with the instructional set. This was assessed in two ways. First, articles were examined for information on the content of the mental simulation. It is common practice in imagined intergroup contact interventions to ask participants to write down or verbalise what they imagine to ensure they completed the task. This protocol was included in 94 procedure sections. In the current review, we focused our attention on the articles that provided an empirical description of compliance. Second, we used manipulation checks as a marker of compliance. Manipulation checks were conducted in some studies to ensure that the instructions provided to participants evoked the desired response, as it is unlikely for the instructional set to evoke the desired effects if the participants ignore them. Therefore, we have used these manipulation checks as a proxy indicator of concurrent acceptability. Additionally, many of these manipulation checks provided additional information regarding the participants' experiences during the intervention. Attrition was not evaluated as a form of concurrent acceptability. Participants may withdraw from a study for a variety of reasons unrelated to the administration of imagined contact itself (e.g., length of survey, computer issues; Dunaev et al., 2018) and so attrition was not considered as a sufficiently valid measure of concurrent acceptability.

Across both indexes, there was evidence for the concurrent acceptance of imagined intergroup contact. In all studies, the rate of exclusion due to non-compliance

was very low (<5%). Some studies (e.g., Dunaev et al., 2018; Warner & Villamil, 2017) compared rates of compliance across experimental groups and found rates of compliance to be proportional across both *intergroup* experimental conditions and *control* conditions engaging in other mental simulations. These limited comparisons provide evidence that compliance with the instructions is not reduced by the intergroup contact-component of the intervention.

An examination of the manipulation checks found that the manipulation generally produced the expected effects. The interpretation of these findings is predicated on the assumption that the instructions administered across the studies were valid and effective. However, the consistency of effects suggest that the manipulations were successful and that participants complied with the instructions provided to them. These manipulation checks also provided detailed information on the participants' experiences during the intervention. For example, Bagci et al. (2019) found that participants in the intergroup imagined contact condition found the task to be *less interesting* than the control condition across two studies. However, the average responses for both groups were relatively high as indicated by scores well above the mid-point of the scale used. Similarly, Harwood et al., (2011) reported participants in the imagined contact condition found the mental simulation *less enjoyable* compared to the control condition, although the experience was rated enjoyable overall (indicated by scores above the mid-point of the scale). These results indicate participants found imagined contact less interesting and enjoyable compared to non-contact mental simulations, but nevertheless engaged with the intervention and rated it positively.

### **5.3.3 Retrospective Acceptability**

A key proxy indicator for retrospective acceptability is willingness to engage in similar experiences in the future. Behavioural intentions are a common outcome in imagined contact studies. Greater willingness to engage in future interactions could

represent a retrospectively perceived acceptability of intergroup encounters more broadly. However, this indicator was not considered here as the Miles and Crisp (2014) meta-analysis provided conclusive evidence that imagined contact produced higher behavioural intentions for future intergroup contact, relative to control conditions.

In order to provide a novel evaluation of retrospective acceptability, we screened articles for quantitative or qualitative assessments of participants' experiences after the intervention. Husnu & Crisp (2010a, Study 3) measured participants' retrieval of their memory of the intervention one day after an initial mental simulation. Participants reported the ability to recall their imagined encounter accurately, easily, and with confidence. This finding demonstrates retrospective acceptance of imagined contact as they could coherently understand the process of the intervention with little burden even after the intervention's cessation.

In a more comprehensive assessment of retrospective acceptability, Malott, Wahesh, and Crawford (2019) administered and evaluated an imagined contact intervention to counselling students as part of an educational course. At the conclusion of mental imagery, they asked their participants to write down what they considered to be the most meaningful components of the intervention. Three themes were identified from these responses: increased awareness of biases, humanization of the outgroup, and desire for more intergroup contact. Across these three themes, participants reported taking away positive and meaningful lessons that they could apply to their everyday life and future career. Whilst limited, these findings indicate that imagined contact interventions could be both accepted by, and beneficial to, students undertaking educational courses.

Table 5.1.

The available information on the prospective, concurrent, and retrospective acceptability of imagined intergroup contact derived from proxy indicators in the published literature.

1. Publication (study)	2. Sample <sup>a</sup>	3. Cover Story	4. Incentive	4. Outgroup	5. Experimenter <sup>c</sup>	6. Assessment
<b>Prospective Acceptability</b>						
Husnu & Paolini, 2019 (2)	Turkish Cypriot (Uni)	Social Issues in Cyprus	Volunteers	Greek Cypriot	Present (Lab)	Participants actively selected a positive or negative imagined contact scenario.
<b>Concurrent Acceptability</b>						
<b>Compliance Check<sup>†</sup></b>						
Dunaev et al., 2018	Americans (Com)	Short mental imagery task	M	Obsese	Absent (Onl)	<b>Written Description:</b> Participants in imagined contact conditions (vs. control) wrote more words. 18 people were excluded for not complying with the instructional set or not writing anything at all, however, the exclusion rates were not significantly different between the conditions.
Harwood et al., 2017	Young (Uni)	<i>Not Stated</i>	CC	Older Adult	Absent (Onl)	<b>Written Description:</b> An average of 48 words was written indicating participant compliance.
Merritt et al., 2018	American (Uni)	<i>Not Stated</i>	<i>None Stated</i>	Higher Body Fat	<i>Not Stated</i>	<b>Written Description:</b> Participants were asked three questions about their imagined interactions. Participants who failed all three checks (N = 5) were excluded.
Vezzali, Stathi, et al., 2015 (1)	Italian (Com)	<i>Not Stated</i>	<i>None Stated</i>	Immigrants	Present (Field)	<b>Written Description:</b> 3 participants did not understand the task and could not write down what they imagined.
Warner & Villamil, 2017	Political Affiliations (Uni)	<i>Not Stated</i>	M	Political Affiliations	Absent (Onl)	<b>Written Description:</b> Participants were asked specific questions about the imagined contact (e.g., what did you talk about) and 4.9% of cases were deleted for non-compliance. The rates of exclusion were evenly distributed across conditions.
West & Bruckmuller, 2013 (1)	Healthy Controls (Uni)	<i>Not Stated</i>	CC	Mentally Ill	Present (Lab)	<b>Written Description:</b> 2 participants wrote nothing, independent coders concluded that 95.8% understood the task, 93.3% completed the task correctly.
West & Bruckmuller, 2013 (2)	Non-Muslims (Uni)	<i>Not Stated</i>	<i>None Stated</i>	Muslims	Present (Field)	<b>Written Description:</b> 100% provided a description of an interaction, for 1 participant, it was not clear if the interaction was a memory or imagined contact.

**Manipulation Check and Study Experiences**

Bagci et al., 2018 (1)	Turkish (Com)	<i>Not Stated</i>	<i>None Stated</i>	Syrian	Absent (Onl)	<b>Realism:</b> All contact conditions had similar perceived realism.
Bagci et al., 2018 (2)	Turkish (Uni)	<i>Not Stated</i>	<i>None Stated</i>	Syrian	Present (Lab)	<b>Realism:</b> Positive imagined contact with friendship was perceived as marginally less realistic as neutral and positive imagined contact.
Bagci et al., 2018 (3)	Turkish (Uni)	<i>Not Stated</i>	<i>None Stated</i>	Syrian	Present (Lab)	<b>Realism:</b> Conditions varied in how realistic they perceived the imagined contact. <b>Difficulty of Task:</b> No difference between contact and control groups.
Bagci et al., 2019 (1)	Kurd (Com)	<i>Not Stated</i>	M	Turkish	Present	<b>Interest in Task:</b> Control condition found the mental imagery more interesting. <b>Positivity:</b> Control condition found the task more positive.
Bagci et al., 2019 (2)	Turkish (Uni)	<i>Not Stated</i>	M	Kurds	Present (Lab)	<b>As above.</b>
Brambilla et al., 2012	Italian (Uni)	Attitudes toward social issues.	<i>None Stated</i>	Albanian, Canadian, Chinese, Peruvian	Present (Lab)	<b>Positivity:</b> both contact and control (outdoor imagery) was seen as positive, but the control condition was significantly more positive.
Falvo et al., 2014	Healthy Control (Com)	To analyze intergroup attitudes	<i>None Stated</i>	Disabled	Present (Lab)	<b>Positivity:</b> Contact condition viewed imagined interaction as positive and recognised interesting and unexpected characteristics in their imagined partner. <b>Outgroup Salience:</b> Outgroup was more salient for participants in contact condition.
Harwood et al., 2011	American (Uni)	<i>Not Stated</i>	<i>None Stated</i>	Illegal Immigrants	Present (Lab)	<b>Positivity:</b> Positive (vs. negative) contact condition perceived the mental imagery more enjoyable. Control condition was most enjoyable.
Husnu & Crisp, 2010a (2)	Non-Muslim (Uni)	Attitudes about social attitudes	CC	Muslim	Present (Lab)	<b>Vividness:</b> Elaborated imagined contact resulted in a more vivid mental simulation.
Husnu & Paolini, 2019 (1)	Turkish Cypriot (Uni)	Social Issues in Cyprus	Volunteers	Greek Cypriot	Present (Lab)	<b>Positivity:</b> Participants in positive contact condition had more positive imagined encounter compared to negative contact condition, but no significant differences with unvalenced instructions.

Husnu & Paolini, 2019 (2)	Turkish Cypriot (Uni)	Social Issues in Cyprus	Volunteers	Greek Cypriot	Present (Lab)	<b>Processing Fluency:</b> Self-selected positive contact was easier to imagine than self-selected negative contact.
Kuchenbrandt et al., 2013	German (Uni)	Creativity and Social Perceptions	M	Roma	Present (Lab)	<b>Cooperation:</b> participants asked to imagine a cooperative imagined interaction perceived it to be more cooperative. <b>Realism:</b> All contact conditions had similar perceived realism.
Pagotto et al., 2012	Non-Muslim (Uni & Com)	<i>Not Stated</i>	<i>None Stated</i>	Muslims	Present (Lab)	<b>Attentional focus:</b> Participants reported focusing on intended characteristics of the imagined partner (interpersonal v. intergroup). <b>Meta-Cognitive Experience:</b> The study manipulated task difficulty and found the more difficult imagined contact manipulation was rated less pleasureable and easy.
West & Bruckmuller, 2013 (1)	Healthy Controls (Uni)	<i>Not Stated</i>	CC	Mentally Ill	Present (Lab)	<b>Meta-Cognitive Experience:</b> As above.
West & Bruckmuller, 2013 (2)	Non-Muslims (Uni)	<i>Not Stated</i>	<i>None Stated</i>	Muslims	Present (Field)	<b>Motivation:</b> Participants asked to rate their motivation to complete the task. No differences between imagined contact and control conditions.
West et al., 2011 (1)	Healthy Controls (Uni)	<i>Not Stated</i>	CC	Mentally Ill	Present (Lab)	<b>Positivity:</b> Imagined contact was negatively valanced.
West et al., 2011 (2)	Healthy Controls (Uni)	<i>Not Stated</i>	CC	Mentally Ill	Present (Lab)	<b>Positivity:</b> No difference in the positivity of the mental simulation irrespective of whether participants were given positive or neutral information about the outgroup.
West et al., 2011 (3)	Healthy Controls (Uni)	<i>Not Stated</i>	CC	Mentally Ill	Present (Lab)	<b>Positivity:</b> Imagined interaction was positive.
<b>Retrospective Acceptability</b>						
Husnu & Crisp, 2010a (3)	Youth (Uni)	Perceptions on attitudes of social issues	CC	Older Adults	Present (Lab)	<b>Accessibility:</b> 1 day after the manipulation, participants in an elaborated imagined condition (vs. standard imagined) reported faster, easier, and more accurate recall of their imagined interaction.
Malott, Wahesh, & Crawford, 2019 (1)	American (Uni)	<i>Not Stated</i>	CC	Self-selected	Present (Field)	<b>Open-Ended Questions:</b> Participants wrote what they considered to the most meaningful components of the intervention. Coding of the responses identified 3 themes (increased awareness of bias, activity humanised, desire for more).

<sup>a</sup> Com = Community; Uni = University sample, <sup>b</sup> CC = Course Credit, M = Monetary compensation, <sup>c</sup> Lab = Laboratory Study, Onl = Independent Online study, Field = Field Study

<sup>†</sup>94 (86.24%) studies identified they asked participants to write down/verbalise what they imagined, included in this table are examples of articles that specifically describe the outcomes associated with that check.

### **5.3.4 Summary and Conclusion**

Overall, we found preliminary evidence that once individuals were involved in the imagined contact intervention, they complied with instructions and found the experience interesting and enjoyable. In contrast, there was little evidence for the prospective acceptability of imagined intergroup contact. One study suggested that when given the choice, more individuals would select a positive (vs. negative) form of imagined contact (Husnu & Paolini, 2019). However, no study examined natural approach behaviours or attitudes toward an outgroup-related mental imagery task in a representative sample. This review was only conducted on imagined intergroup contact to serve as a proof of concept. Nevertheless, we assert that acceptability is important to all contact-based interventions. Next, we expand the theoretical model to consider untested hypotheses related to intervention acceptability, drawing from a wide array of literatures.

### **5.4 Improving acceptance of Contact-Based Interventions with Reformulated and Targeted Programs**

The basic premise underpinning the present theoretical framework is that individuals with opportunities to implement and participate in contact-based interventions will not do so if they do not find the intervention acceptable. Previous theoretical models that placed contact-based interventions at the start of a gradual process toward more meaningful and intimate occasions of natural intergroup interactions did not provide nuanced consideration of the antecedents predicting the occurrence of these interventions as a first step. Nor did they consider how to encourage their prolonged implementation. Our review of the acceptability of imagined intergroup contact provides more evidence that these considerations have been overlooked.

The reviewed evidence on concurrent acceptability suggests that, once engaged in an intervention, individuals adhere to the requirements and exhibit beneficial outcomes post-intervention. These results likely reflect compliance during either incentivized

research participation or in organizational settings (e.g., schools) where participants are acutely aware of the support from authorities.<sup>3</sup> Accordingly, we purport that the greatest obstacle to successful implementation of contact-based interventions is prospective acceptability, which is influenced by retrospective acceptability. Detailed below is an extended theoretical model (Figure 5.2) that considers initiating an intervention as the trigger point to enjoyable and effective intergroup contact that promotes future intergroup encounters. A key advantage of interventional approaches (vs. naturalistic contact) is the developers' control over the length, scope, and content. Accordingly, we discuss how researchers can adapt the type of intervention, and the context in which it is administered, to increase the likelihood it will be deemed acceptable. We discuss empirical findings from the medical sciences, theoretical work in the intergroup relations field, and preliminary investigations of self-selection processes in naturalistic intergroup contact to identify features that could enhance acceptability. Specifically, there is evidence that how the contact is implemented (i.e., direct vs. indirect), and other institutional and individual factors, influence whether an intervention is accepted at the outset.

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<sup>3</sup> Interventions available for voluntary initiation outside of an institution may have lower concurrent acceptability that is influenced by a range of factors. For example, evidence from health-based programs designed to improve physical activity suggest their efficacy are highly dependent upon the recipients' *enjoyment* of exercise (Wankel, 1993; Williams et al., 2006). A broader discussion on differences in acceptability between institutionally arranged and voluntary contact-based interventions may be warranted. However, the current discussion focuses on interventions where support from authorities is provided as other theoretical models purport the success of interventions rest in institutional implementation (e.g., continuum of contact, Crisp & Turner, 2009; confidence in contact, Turner & Cameron, 2016).

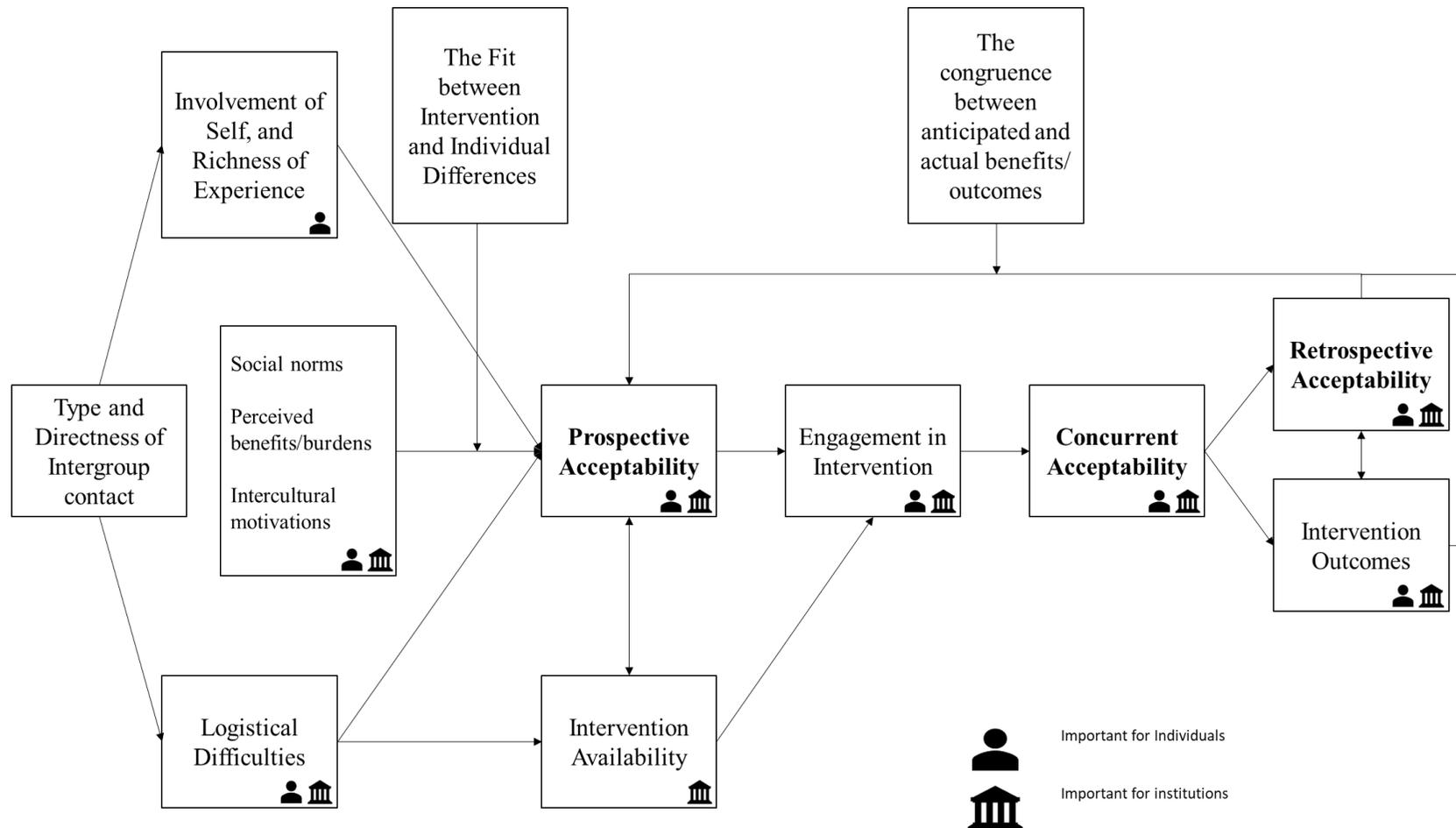


Figure 5.2. An extended temporal model of acceptability for contact-based interventions highlighting factors to promote the availability and initiation of prejudice-reducing interventions.

### 5.4.1 Directness and Type of Contact

The many reviews on indirect contact interventions (e.g., Crisp & Turner, 2009; Dovidio et al., 2011; Harwood, 2010; Turner & Cameron, 2016; Vezzali, Hewstone et al., 2014; White et al., 2015) have outlined their distinct advantages to researchers and social activists in comparison to interventions involving direct encounters. We synthesize some key points here to highlight how these relative advantages of indirect interventions could enhance acceptability. These relative advantages include (1) the required presence of an outgroup member, and (2) reduced anxiety stemming from communication features.

#### **Logistical difficulties of requiring the presence of an outgroup member.**

Crisp and Turner (2009) argue that different contact strategies exist on a continuum of increasing logistical difficulty and intensity. Their ‘continuum of contact’ was developed considering the logistical challenges associated with informal segregation (i.e., limited opportunities for direct contact) and not the psychological processes contributing to self-segregation. Implementing an intervention in ethnically homogenous contexts present challenges when an outgroup member is required to be physically present, as is the case in face-to-face contact interventions. This requirement can lead to logistical complications and financial expenses hindering widespread applications of these interventions.

Increased costs and burdens of a face-to-face intervention would likely reduce acceptability for both potential participants and administrators, in turn inhibiting the likelihood the intervention will be offered and creating barriers to participating for individuals. In contrast, programs that are flexible around constrained time and financial commitments could be more accepted (e.g., reusable online modules). Thus, an advantage of indirect contact interventions is their potential application to many people in an easy and relatively inexpensive manner, in turn fostering greater acceptance

compared to more demanding interventions. Another theoretical model also provides a strong assertion that less intensive, indirect interventions could be more acceptable. Specifically, it is proposed their design should alleviate factors promoting intergroup avoidance.

**Reduced anxiety stemming from low involvement of self and richness of experience.** Prominent sources of intergroup avoidance are perceived threats and intergroup anxiety (see Paolini et al. 2018, for a review). For example, perceptions that outgroup members pose a direct threat (Greenland, Xenias, & Maio, 2012) and concerns about appearing prejudicial in interpersonal exchanges (Plant & Devine, 2003) are both linked to avoidance of the outgroup. Harwood's (2010) 'contact space' models communication features that could reduce anxiety on two orthogonal dimensions. The first dimension, involvement of self, is the degree to which the contact participant perceives their personal involvement in the interaction. The second dimension, richness of self-outgroup experience, is the number of communication cues and the immediacy of responses during the intergroup interaction. Face-to-face intergroup contact is high in both dimensions as the individual is clearly involved in an interpersonal exchange with sources of multiple communication cues (e.g., non-verbal and verbal cues) that facilitate feedback from the contact-partner in real time (Harwood, 2010). In contrast, indirect forms of contact will vary between these two dimensions. For example, mentally simulated intergroup contact is high in the involvement of self because the participant imagines a direct interaction, but is low in richness because the absence of any real contact-partner produces no outlets for communication feedback (Harwood, 2010).

Using this contact space framework, Harwood (2010) proposed that anxiety during the interaction should be higher when the experience involves the self in a rich communication context. Adopting this approach, we can assert that individuals who avoid face-to-face contact due to anxiety and perceived threats should be more willing

to engage in indirect interactions with outgroup members when they can reduce their involvement and/or the number of communication channels available. Indirect contact interventions are likely to be low on one or both orthogonal dimensions and should therefore have higher acceptability.

For example, researchers who investigate electronically mediated forms of indirect contact have previously purported that reduced communication cues and asynchronous interactions can reduce anxiety *before* the interaction and therefore reduce the likelihood that it will be avoided (Amichai-Hamburger & Furnham, 2007; White, Harvey, & Abu-Rayya, 2015). Text-based indirect contact, for example, removes non-verbal cues and allows individuals to formulate and edit responses. Therefore, this form of indirect contact is low in sensory richness, evokes lower anxiety, and should be more accepted. Similarly, vicarious contact should elicit lower levels of anxiety and perceived threat in comparison to face-to-face contact. Directly observing other intergroup dyads engage in contact limits the inclusion of the self (Harwood, 2010; Wright et al 1997) and should reduce the possibility of aversive outcomes to the self (e.g., being physically harmed; appearing prejudicial). Therefore, individuals concerned about threats should be more willing to engage in vicarious (vs. face-to-face) contact because of the low involvement of self.

#### **5.4.2 Modifiable Individual and Institutional Factors that Could Promote Contact-Based Intervention**

In addition to the the nature and directness of the contact, there are many other factors that could potentially enhance or impede the acceptability of contact-based interventions. We purport that many of these factors are established antecedents of naturalistic intergroup contact: intergroup anxiety (e.g., Plant & Devine, 2003), perspective taking (e.g., Wang, Kenneth, Ku, & Galinsky, 2014), empathy (e.g., Esses & Dovidio, 2002; Mazziotta, Feuchte, Gausel, & Nadler, 2014), pre-existing attitudes

(e.g., Binder et al., 2009), and personality (e.g., Stürmer et al., 2013). Comprehensive reviews of the literature have already outlined the importance of these micro- and macro-level factors in naturalistic settings (Paolini et al., 2018; Ron et al., 2017). These factors are likely linked to acceptance of contact-based interventions as well. Some of these individual differences can be altered through intergroup contact, leading back to greater prospective acceptability for future encounters (see Turner & Cameron, 2016). However, prior to beneficial exposure to diversity they are difficult to modify. In contrast, we center our conversation on modifiable aspects of the interventions' features and context to promote the occurrence of the intervention as an early entry point to more diverse interactions.

**Social norms.** Societal expectations of behaviours, or social norms, are instrumental in facilitating behavioral changes in a wide array of areas (Reynolds, Subašić, & Tindall, 2015). Comprehensive assessments have determined that both the expression and suppression of prejudicial attitudes are heavily reliant on perceptions of predominant social norms regarding the acceptability of prejudices (Crandall, Eshleman, & O'Brian, 2002). Similar processes have been implicated in relation to approaching contact-experiences. Individuals who perceived others valued diversity reported greater interest in engaging in naturalistic intergroup contact (Tropp & Bianchi, 2006). These findings provide evidence that intergroup behaviours are influenced by societal expectations. Consequentially, manipulating perceptions of societal expectations should enhance the acceptability of contact-based interventions.

There is a growing body of evidence suggesting manipulating what is perceived as typical can encourage prosocial behaviours. Perhaps most famously, Goldstein, Cialdini, and Griskevicius (2008) influenced environmental behaviours in hotel guests by advertising them as normative behaviours in which other guests engage. Appeals describing normative behaviours matched to the participants' proximal situation were

found to increase towel reuse. This type of manipulation is also effective in altering intergroup outcomes. For example, children who were told that members of their ingroup liked members of the outgroup reported reduced prejudice compared to children informed that their ingroup disliked the outgroup (Nesdale, Maass, Durkin, & Griffiths, 2005). In much the same way that normative appeals can alter environmental behaviours and prejudices, this simple manipulation could influence the likelihood that an individual will engage in a contact-based intervention. School principals could be informed that other principals in the local area fully support pro-diversity measures and are implementing similar approaches. Individuals within workplaces could be informed that others within their team have already completed the program.

Beyond manipulating perceived norms, successful implementation of effective contact-based interventions could create a social climate that values engaging in intergroup interactions. Cross-sectional and longitudinal studies in multiple countries found that simply residing in places where naturalistic contact was more common reduced prejudice irrespective of individual contact experiences (Christ et al., 2014). Importantly, this effect was mediated by norms of tolerance (Christ et al., 2014). It is possible that simply being in an organization or other context with contact-based interventions could improve acceptability through the creation of a tolerant norm. Knowing others have engaged in intimate forms of contact has been demonstrated to improve intergroup relations by altering norms related to ingroup and outgroup acceptance of positive intergroup relations (Cameron, Rutland, Hossain, & Petley, 2011; Tezanos-Pinto, Bratt, & Brown, 2010; Turner, Hewstone, Voci, & Vonofaku, 2008; Wright et al., 1997). These findings showcase the importance of retrospective acceptability, as the attitudes and behaviours of previous participants could prove instrumental in creating an environment where engaging in contact-based interventions is normative.

**Motivations and perceived benefits.** Another important component of acceptability are the motivations behind engaging in contact-based interventions. Findings from contact-based interventions suggest that individuals who perceived benefits from the intervention had greater reductions in intergroup biases (Yablon, 2012), potentially due to greater concurrent acceptability. Several studies have also identified motivations involved in approaching intergroup contact. Often, these studies have demonstrated that intergroup contact occurs when it facilitates achieving goals and advancing self-interest (c.f., connecting with others, see Migacheva, Crocker, & Tropp, 2011 for a review). For example, Dunne (2013) found intergroup contact was higher for individuals who reported a pragmatic use of, or advancement following, the intergroup exchange (e.g., learn a new language). Similarly, learning motivations predict greater interest in intergroup contact as a desire to learn can be achieved by interacting with people from diverse backgrounds (Migacheva & Tropp, 2012).

More recently, a wider number of motivations have been implicated with approaching intergroup members. In their exploratory study, Stürmer and Benbow (2017) found six motivational functions for intergroup contact: knowledge and understanding, value expression, professional advancement, social development, personal-, and group-image concerns. These functions could also be applicable for interventional approaches. For example, a recent graduate may be motivated to engage in a contact-based intervention to improve their employability (i.e., professional advancement). Acceptance of a community intervention could be driven by desires to establish connections with new people (i.e., social advancement).

Understanding the motivations and perceived benefits from an organizational view point could assist in developing interventions more likely to be accepted by leaders in institutions. Existing research on diversity in workplaces provides an excellent starting point. Much of this work has demonstrated that organizational

implementation of contact-based interventions could offer functional value. For example, workers who perceive a climate accepting of diversity report greater organizational commitment and lower turnover (Chrobot-Mason & Aramovich, 2013). In a schooling context, students who experience discrimination have poorer academic and psychological outcomes (Wong, Eccles, & Sameroff, 2003). Alternatively, institutions may accept and implement diversity programs to publicly appear prosocial (Marques, 2010). Thus, institutions may be motivated to instigate these interventions as they may serve adaptive purposes congruent with the goals of the organization, whether the outcomes relate to productivity, performance, or public opinion.

An implicit assumption with a functional motivations approach is that people and institutions will not engage in an intervention if it does not offer them a benefit (either appetitive in nature or the absence of aversion/punishment). Nevertheless, Stürmer and Benbow's (2017) work clearly identified that there are different benefits that could motivate people to engage in contact-based interventions and appealing to only one may not be enough to encourage widespread uptake. This approach is congruent with the functional perspective of intercultural exploration.

**The fit between intervention and individual differences.** Opportunities for intergroup contact occur in a range of environments (Stürmer & Benbow, 2017). These distinct environments offer experiences with varying degrees of value to the individuals engaging in the contact (i.e., individuals who engage in intergroup contact derive a psychological benefit). In turn, the perceived value of these experiences is dependent upon the internal motivations of the individuals. Following their exploratory assessment of motivations to engage in intergroup contact, Stürmer and Benbow (2017) provided participants with an opportunity for a computer-mediated interaction with an outgroup member who made a statement invoking one of these motivations. Participants were more likely to select an interaction with the outgroup member who was perceived to

meet their motivations. Based upon these initial efforts, we should expect that intergroup contact is more acceptable when the functional value of the intergroup contact experience meets the motivations of the individual engaging in the contact. For example, an individual motivated to engage in intergroup contact to extend their knowledge should be more likely to interact with an outgroup member who expresses a desire to share information.

Contact-based interventions similarly occur in different contexts (e.g., educational institutions, community settings). However, they also utilise a range of communication mediums (e.g., text-based chat). We propose that the combination of contextual and communication features of contact-based interventions will influence the perceived value of the experience. Therefore, the motivations of an individual should predict the perceived acceptability within an intervention (i.e., context) and between interventions (i.e., communication mediums). In this instance, we refer to context as the place and reason for administration (e.g., in a workplace) and communication features refers to the type of contact being engaged in (e.g., asynchronous chat).

The acceptability of the exact same contact-based intervention will likely vary depending upon the context in which it is administered and the desires of the individuals. A parent may be accepting of their child engaging in a supervised e-contact intervention during school, but may be less accepting of their unsupervised child interacting on chat forums at home. Furthermore, individual differences and motivations should influence the perceived acceptability of different interventions. For example, someone who is motivated to learn about different cultures may find contact interventions that facilitate question asking (e.g., e-contact) more acceptable than interventions with no outgroup member present (e.g., imagined contact).

In order to adapt interventions to meet specific motivations of individuals, researchers first need to identify what motivates people. Vital to these efforts are studies

of retrospective acceptability that assess the participant's perceived benefits of the intervention. Malott et al. (2019) reported how college students felt the intervention would help them interact with diverse clients in the future. Findings of this nature allow the developers of interventions to incorporate features compatible with the motivations of the intended market. For instance, instructional videos are commonplace in training programs for a range of professions (e.g., Kelly, Lyng, McGrath, & Cannon, 2009). Individuals providing these training programs may be more accepting of vicariously viewing intergroup contact if it is included in their existing programs with educative value, as opposed to stand alone programs. Researchers are already altering established interventions to meet the motivations of different groups of people. Recent work expanded the imagined contact paradigm to be more applicable to younger children by including a drawing task designed to be fun, engaging, and accessible for this population with limited reading and writing skills (Birtel, Di Bernardo, Stathi, Crisp, Cadamuro, & Vezzali, 2019). By ensuring the intervention is fun, the researchers showed adaptability for the given audience.

Taken together, this suggests that enhancing acceptability of contact-based interventions is dependent upon finding an appropriate fit between contact type, intervention context, and individual motivations. The axiom that individual differences matter is a basic tenet in psychology, yet this poses a substantial challenge for interventionists. The unique combination of experiences, preferences, motivations, and needs for individuals ensures personalising content to increase the acceptability of interventions is difficult.

Health care professionals, however, have adopted this approach and documented some success using two related approaches that personalise content for an individual or subpopulation. First, *tailored communication* messages are individualised messages that target a specific person and are designed to change their behaviours based upon the

most appropriate communication message considering their individual needs (Rimer & Kreuter, 2006). Second, *targeted communication* messages have been used. This approach involves targeting a specific subsection of a population based upon their general characteristics (Noar, Harrington, Van Stee, & Aldrich, 2011). Both approaches have been used with success in different health related communication campaigns (Kreuter & Wray, 2003).

Importantly, individual or group-based targeting is increasingly feasible due to growing connectivity and data acquisitions from online platforms (Lustria, Noar, Cortese, Van Stee, Glueckauf, & Lee, 2013). Individuals interested in social cohesion could adopt these approaches and disseminate information to specific people or groups based upon their motivations and needs. Future research in this area could provide promising avenues to enhance the acceptability of indirect contact and ensure broader appeal to the public to engage in these interactions.

In summary, we provided a theoretical model (Figure 5.2) outlining factors leading to higher acceptability of contact-based interventions. This discussion centred around the acceptability of different types of contact-based interventions and the features and contexts of interventions that make them acceptable based upon individual needs and motivations. This model requires validation through future research conducted on both potential intervention implementers and participants. Understanding how to alter the perceived acceptability of contact-based interventions is needed to ensure they are a viable solution to the damaging effects of intergroup segregation.

### **5.5 Future Research Directions: Measuring ‘Acceptability’**

To facilitate an informed discussion on the viability of all types of contact-based interventions, we recommend future research validates our theoretical model (Figure 5.2) by determining the individual and environmental factors that contribute to, cause, and/or alter one’s acceptance of a contact-based intervention. A new line of work, that

will need to adapt existing research paradigms, is required to address these questions.

These methodological considerations are discussed next.

On the most basic level, acceptability reflects people's (both intervention administrators' and participants') thoughts and feelings toward an intervention. Whilst acceptability is a psychological orientation, these thoughts and feelings can manifest in behaviors (intended and observed). Despite many factors contributing to a global acceptability construct, many studies in the medical science literature have focused on a single indicator. For example, studies have focused on perceived benefits and limitations (Kaltenthaler, Sutcliffe, Parry, Beverley, Rees, & Ferriter, 2008; Knowles et al., 2014), enjoyability (Penn, Ryan, & White, 2013), perceived risks (Kaaijk et al., 2014), and satisfaction (Baldaszi, Wimmer-Puchinger, & Löschke, 2003). Self-report scales measuring a global acceptability construct also exist and have items assessing if the intervention is suitable, likeable, ethical, risky, effective, or uncomfortable, amongst others (e.g., Kazdin, 1980; Kelley, Heffer, Gresham, & Elliott, 1989). Each of these indicators of acceptability can be used to measure anticipated, in-the-moment, and recalled acceptability depending upon the timing of the data collection (Sekhon et al., 2017). Additionally, the administration of these indicators of acceptability can occur in a range of research designs (see Miltenberger, 1990; Ayala & Elder, 2011, for more detailed reviews on quantitative and qualitative approaches).

Using these indicators of acceptability will advance investigations of the feasibility of contact-based interventions. However, determining how these concerns and subjective experiences relate to behaviours is vital. A common indicator of prospective acceptability is behavioural intentions, such as willingness to engage in the intervention. This can be assessed in several ways. Participants can be asked if they would use an intervention (e.g., Westercamp & Bailey, 2007), or select their preference from a list including multiple interventions (e.g., Arvidsson et al., 2005). Whilst

enlightening, this approach may not yield informative results for the intergroup relations literature. Unless a no-contact option is provided, individuals may be forced to select between interventions that have low acceptability, thus leading to inaccurate conclusions. To illustrate this point, consider a research design where an organizational leader is presented with a detailed list of multiple intervention options (e.g., imagined, vicarious, etc.) and asked to select the one they would be most likely to implement in their organization. This approach may provide an understanding of their *most accepted* intervention, but could not determine if they were unwilling to implement any intervention at all.<sup>4</sup>

A broader approach that has been used in treatment studies is to ask individuals how willing they would be to participate in interventions on a scaled response and compare responses between interventions (e.g., Garcia-Palacios, Botella, Hoffman, & Fabregat, 2007). This self-reported assessment of prospective acceptability could accurately assess low acceptability (if it were to exist) for all forms of contact provided to participants.

However, all forms of behavioural intentions have several limitations. First, this approach is susceptible to social desirability biases, as participants may wish to be seen as more or less egalitarian and accepting of other cultures and religions depending upon normative pressures within their ingroup. Second, it is imperfectly related to actual behaviours. Many models of behaviour change in health psychology identify how behavioural intentions predict actual behaviours (e.g., theory of planned behaviour,

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<sup>4</sup> The exclusion of an opt-out response may be more valid in instances where opting out of an intervention is not feasible or carries penalties. For example, asking workers to select between two diversity programs is seemingly valid because there is an implicit understanding that opting out is not an option.

Ajzen, 1988, 1991). However, this link is sometimes small and inconsistent (Webb & Sheeran, 2006), suggesting that intentions are not always representative.

Beyond measures of behavioural intentions, researchers could assess prospective acceptability through observing who is participating (vs. refusing) and identifying why. An informed individual who voluntarily engages in an intervention without coercion is inherently accepting. Nevertheless, recruiting a sample large enough to conduct well powered intervention evaluations does not mean that the intervention is acceptable. Most recruitment methods cannot isolate the influence of incentives or coercion. In a research context, participants are often incentivized to complete projects through monetary compensation or course credit. Similarly in institutional settings, individuals are incentivized to participate when it is an expectation of their role. Under these circumstances, it is impossible to determine if their choice to participate was derived from an internal motivation to engage in pro-diversity measures, or was considered a necessary act to earn money or pass a course. The difficulty arises because if incentives are *necessary* to evoke acceptance, social activists will never have the means for widespread program delivery. One approach to overcome this problem is to provide participants with the opportunity to opt out after granting the incentive.

Beyond the confounds of incentives, a pure examination of who elected to participate is limited without a comparison with those who avoided the intervention. Identifying who (individual or institution) is not participating in the interventions is logistically difficult, but could provide important information on the broader appeal and acceptability of the intervention (initial attempts to identify non-participants in naturalistic settings have been made, see Paolini, Azam, Harwood, & Hewstone, 2017; Paolini et al., 2018).

Dropout rates are related to refusal rates but assess concurrent acceptability. For example, reviews of anti-depressant (Cipriani et al., 2018) and transcranial direct

stimulation (Aparicio, Guarienti, Razza, Carvalho, Fregni, & Brunoni, 2016) treatments examined dropout rates due to adverse events during treatment. Similarly, longitudinal evaluations of contact-based interventions should consider who is dropping out of the intervention and why. Considering why participants remove themselves from an intervention is vital. Individuals may remove themselves from an intervention due to factors unrelated to their perception of the intervention, such as changes in circumstances and availability. ‘Exit’ or ‘termination’ surveys could be implemented to ensure the validity of dropout as an indicator of acceptability. However, in much the same way that refusal rates can be biased and logistically difficult, following up individuals who have ceased participating during the intervention can pose substantial ethical and logistical problems.

The research approaches listed here are not an exhaustive list of methodologies. Rather, they are listed to instil optimism that the question of acceptability can be answered with minor additions to intervention evaluations or with novel focused investigations. We reviewed established approaches and provided a discussion of their difficulties. This discussion was provided not to deter future research endeavours, but to highlight the need for a triangulation of approaches during a concerted effort to identify the acceptability of contact-based interventions before, during, and after their implementation. Addressing this research question can add to our knowledge of the processes that lead individuals to intergroup contact. Only once these baseline processes have been identified can researchers adapt, alter, and improve their interventions to facilitate widespread implementation.

## **5.6 Conclusion**

We began with the simple premise that contact-based interventions will not have the desired effect if individuals and institutions who would benefit from the intervention do not participate. Acceptability is an important topic for social psychologists and

activists to consider when developing, implementing, and improving contact-based interventions designed to ameliorate intergroup tensions. Unlike naturally occurring forms of contact, the success of interventions are reliant on individuals and institutions consenting to participate and doing so with compliance. We concluded with a range of testable predictions to encourage researchers to provide empirical evidence for the acceptability of their interventions. In doing so, we hope to facilitate new lines of research designed to enhance contact-based interventions to increase participation in these platforms of social change. Many people can be exposed to ingroup-outgroup interactions through appropriately designed interventions that are positive, efficacious, and inexpensive. Interventions with these advantages, augmented by factors that promote their widespread acceptability, could be instrumental in implementing social change.

We conclude by echoing the thoughts and musings of Montrose Wolf (1978) in his impassioned support of investigations into subjective experiences during interventions. Researchers and interventionists cannot rely on their informed expertise and qualifications to tell people what is good for them. Rather, people can be trusted to evaluate their own needs, procedural preferences, and post-intervention satisfaction. This may require education, multiple intervention options, and a lack of coercion. However, ultimately, if people run away from our interventions complaining loudly, society will be the worse for it (Wolf, 1978).

## Chapter 6 Preamble

In the previous chapter, I discussed how informal segregation can limit opportunities for intergroup contact, and how interventional forms of indirect contact are theoretically capable of overcoming this issue, but only when individuals and institutions perceive them as acceptable. The problem of intergroup avoidance is a central theme to this thesis, with previously reported empirical work (Chapter 4) exploring how avoidance is formed and other work discussing how it can be overcome (Chapters 5 and 7). Nevertheless, it is important to acknowledge that naturally occurring intergroup contact is impeded by a range of other factors. In this chapter, two additional limitations of intergroup contact are discussed: negative intergroup contact and trivial forms of contact. Like informal segregation, researchers have proposed that indirect forms of contact are capable of dealing with these issues. In order to synthesise the available evidence to support these claims, a systematic quantitative review was conducted on studies of imagined intergroup contact.

Studies identified through a systematic process ( $k = 71$ ) were evaluated based on whether they found evidence that imagined intergroup contact (1) promoted positive simulated interactions, and (2) incorporated Allport's (1954) optimal conditions. The findings suggest that imagined contact is mostly positive and the inclusion of the optimal conditions enhanced the effects of the intervention. I conclude the chapter with a discussion on the implications of these findings to the wider literature on indirect forms of contact more broadly, and for VRIC more specifically.

## **6. A Systematic Quantitative Review of Imagined Intergroup Contact:**

### **Implications for Virtual Reality Intergroup Contact**

In the previous chapter, intergroup contact interventions were introduced as a mechanism to improve intergroup relations. Interventional, or instructor-lead, forms of contact were argued to have advantages that may facilitate the reduction of prejudice. Of relevance to the current chapter, it was argued that they can overcome the limitations that prevent face-to-face contact having widespread success. One limitation, addressed in the previous chapter, is informal segregation and intergroup avoidance. Following an examination of imagined intergroup contact, it was concluded that contact-based strategies may overcome the limitations caused by intergroup segregation preventing more naturally occurring contact – but there is currently little evidence to support this claim. This finding spurred calls for future research in this area. However, intergroup contact is hindered by more factors than merely it being not often sought and, at times, actively avoided.

In this chapter, the evidence supporting the potential for interventional forms of contact to overcome the limitations of naturally occurring contact is again examined. A systematic review was conducted to evaluate whether imagined intergroup contact can be successfully developed to overcome two commonly cited limitations for face-to-face contact: (1) intergroup contact is not always positive, and (2) contact is typically trivial. In alignment with the overarching goal of the review, the challenges of intergroup contact are outlined to establish a novel set of criteria to use as a benchmark for the evaluation of imagined intergroup contact. Secondly, imagined intergroup contact is evaluated against the new criteria. The intended outcome of the evaluations is to provide a framework for future research in the field of indirect contact more broadly, in addition to providing knowledge that may contribute to the development of interventions using

indirect contact. As such, I conclude this chapter by outlining how the lessons learnt from this evaluation of imagined intergroup contact can be directly applied to a novel computer-mediated form of contact that utilised virtual reality technology.

### **6.1 Challenges for Intergroup Contact Strategies**

Having established the efficacy of positive intergroup contact with a comprehensive meta-analysis, Pettigrew and Tropp (2006) rightly identified that Allport (1954) assumed that most intergroup encounters would *not* lessen intergroup biases. Nevertheless, the published literature had focused on the beneficial effects of contact, as opposed to the factors that inhibit intergroup contact (Pettigrew & Tropp, 2006). Pettigrew and Tropp (2006) subsequently called for negative features of contact to be a major focus of future research. The work that followed successfully answered this call, leading to recent critical reviews of intergroup contact theory (Dixon, Durrheim, & Tredoux, 2005; Hewstone, 2015; McKeown & Dixon, 2017; Pettigrew, 2008).

A frequently cited limitation to intergroup contact reiterated throughout this thesis is intergroup segregation and avoidance (Dixon, et al., 2005; Hewstone, 2015; McKeown & Dixon, 2017). However, additional limitations to intergroup contact were routinely observed. Specifically, ingroup-outgroup interactions can be negative and unpleasant (Hewstone, 2015; McKeown & Dixon, 2017; Pettigrew, 2008), and intergroup contact often occurs in mundane circumstances leading to trivial interactions free from intimacy (Dixon et al., 2005).

These challenges, detailed below, form the basis of this review. The recent focus on these limitations of intergroup contact in critical reviews highlight them as prominent and well-established barriers to social cohesion. Addressing these barriers would thus represent a key advancement in efforts to enrich intergroup contact. To that end, it can be reasonably argued that *researcher designed* forms of indirect contact could be

uniquely placed to overcome these challenges. Evidence-based manipulations and carefully designed interventions can control the intergroup experience, thus ensuring that detrimental components of naturalistic intergroup contact are omitted and beneficial features can readily occur.

The first challenge for intergroup contact strategies examined in this review is that the interaction should be positive. Research on intergroup contact has traditionally focused on positive intergroup interactions due to the emphasis on improving intergroup relations. However, ignoring negative intergroup contact is problematic due to negativity bias, defined as a tendency to focus on and learn from negative information more so than positive information when making an evaluative decision (Ito, Larsen, Smith, & Cacioppo, 1998; Vaish, Grossmann, & Woodward, 2008). Research into the valence of intergroup contact has found that negative contact can promote the salience of an ingroup category and produce intergroup bias (Paolini, Harwood, & Rubin, 2010). Additionally, research has shown that contact valence moderates the relationship between quantity of contact and prejudice, with the relationship being stronger (and positive) when the valence of the contact is negative in comparison to the weaker (and negative) relationship when the valence of contact is positive (Barlow, Paolini, Pedersen, et al., 2012). Another study identified that, despite positive contact occurring more often, negative contact was still a stronger predictor of intergroup bias (Graf, Paolini, & Rubin, 2014). For indirect forms of contact to address this challenge, there is a need to both promote positive indirect contact and prevent negative indirect contact. Research on indirect intergroup contact should be assessed to determine if the intervention protocol routinely induces a positively valenced mental simulation of an interaction with an outgroup member.

The second notable challenge for intergroup contact strategies is to implement the optimal conditions of intergroup contact. The four optimal conditions are that (1) there is equal status between the groups, (2) there is explicit sanction of intergroup contact from institutions, (3) the groups are pursuing common goals, and (4) there is intergroup cooperation (Allport, 1954). A review of the optimal conditions in intergroup contact research has found that face-to-face contact is reliably enhanced when the optimal conditions are present (Pettigrew & Tropp, 2005). Additionally, the review suggested that support from authorities, in particular, plays an important role in enhancing the effect of intergroup contact.

Evaluations of contact have been widely criticised for commonly including conditions ideally placed to enhance the effects of contact (Dixon et al., 2005; Pettigrew, 2008; Pettigrew & Tropp, 2006). However, the majority of interactions between different groups occur in trivial ways (e.g., customer and service provider role at a supermarket), for shortened time frames, and do not lead to personalised exchanges (Dixon et al., 2005). Therefore, it is unlikely that the optimal conditions can be met in natural settings (Pettigrew & Tropp, 2000). Imagined intergroup contact is derived from an instructor-led manipulation that could potentially facilitate the inclusion of the four optimal conditions. The optimal conditions have been integrated into other indirect contact interventions (e.g., e-contact, White & Abu-Rayya, 2012) providing evidence that the conditions can be successfully included. As such, the available research needs to be evaluated to determine if the optimal conditions have been investigated and whether they enhance the imagined intervention.

## **6.2 Evaluation of Indirect Intergroup Contact Strategies**

The challenges noted above for intergroup contact strategies can be translated into criteria against which imagined intergroup contact approaches can be evaluated. First,

procedures should prevent the possibility of negative imagined intergroup contact occurring, instead ensuring the promotion of positive imagined intergroup contact. Second, the optimal conditions should be incorporated in the imagined intergroup contact in a standardised manner. Ensuring the optimal conditions can be incorporated in every instance of imagined contact overcomes the issue that the optimal conditions are idealised events that rarely occur naturally.

As outlined previously, face-to-face contact would struggle to meet these criteria, potentially preventing it from having wide-ranging success. Alternatively, indirect forms of intergroup contact could be well-suited to overcome these challenges with specific design features to enhance prejudice-reduction. If demonstrated to overcome the limitations of face-to-face contact, indirect forms of intergroup contact present themselves as valuable alternatives to naturalistic face-to-face contact. Indeed, given the potential costs associated with the widespread implementation of any intervention, it could be argued that indirect forms of intergroup contact should be subject to the same stringent scrutiny.

The aim of the current review is to place one commonly studied contact-based intervention (imagined contact) under scrutiny to explore if there is evidence that the administration of these mentally stimulated interactions can overcome the limitations of face-to-face contact. The conclusions of this review should have wider implications for existing and new forms of indirect contact. Thus, at the conclusion of this chapter, I relate the conclusions back to virtual reality intergroup contact (VRIC) and provide an overview of its development and validation in subsequent chapters.

In alignment with the aims of the review, the frequency and proportion of studies that adhere to or measure each of the criteria will be reported. The current review will accept the findings of the recent meta-analysis concluding that imagined contact is

reliably efficacious (Miles & Crisp, 2014). However, novel findings using an alternative methodology should reveal important research questions that remain unanswered. The most appropriate method to achieve the goals of the current paper is a systematic quantitative literature review. Systematic quantitative reviews provide information about what is known based on the available research, in addition to providing information about what is still unknown (Pickering, Grignon, Steven, Guitart, & Byrne, 2015). As outlined by Pickering and Byrne (2014), this review is systematic because the methodology used to select research literature is explicitly stated and reproducible. The quantitative component of the review comes from the literature being described using a quantifiable procedure. Distinct from a meta-analysis, the quantifiable procedure is more orientated towards classifying and describing the literature, as opposed to combining findings statistically.

## **6.3 Method**

### **6.3.1 Inclusion Criteria**

The current systematic quantitative review evaluated the available evidence on imagined intergroup contact by identifying empirical, peer-reviewed articles that met specific inclusion criteria. The first inclusion criteria was only peer-reviewed published journal articles were considered. Book chapters, conference presentations, and unpublished studies were not included as they do not have the same rigorous peer review process. Only articles written in English were considered.

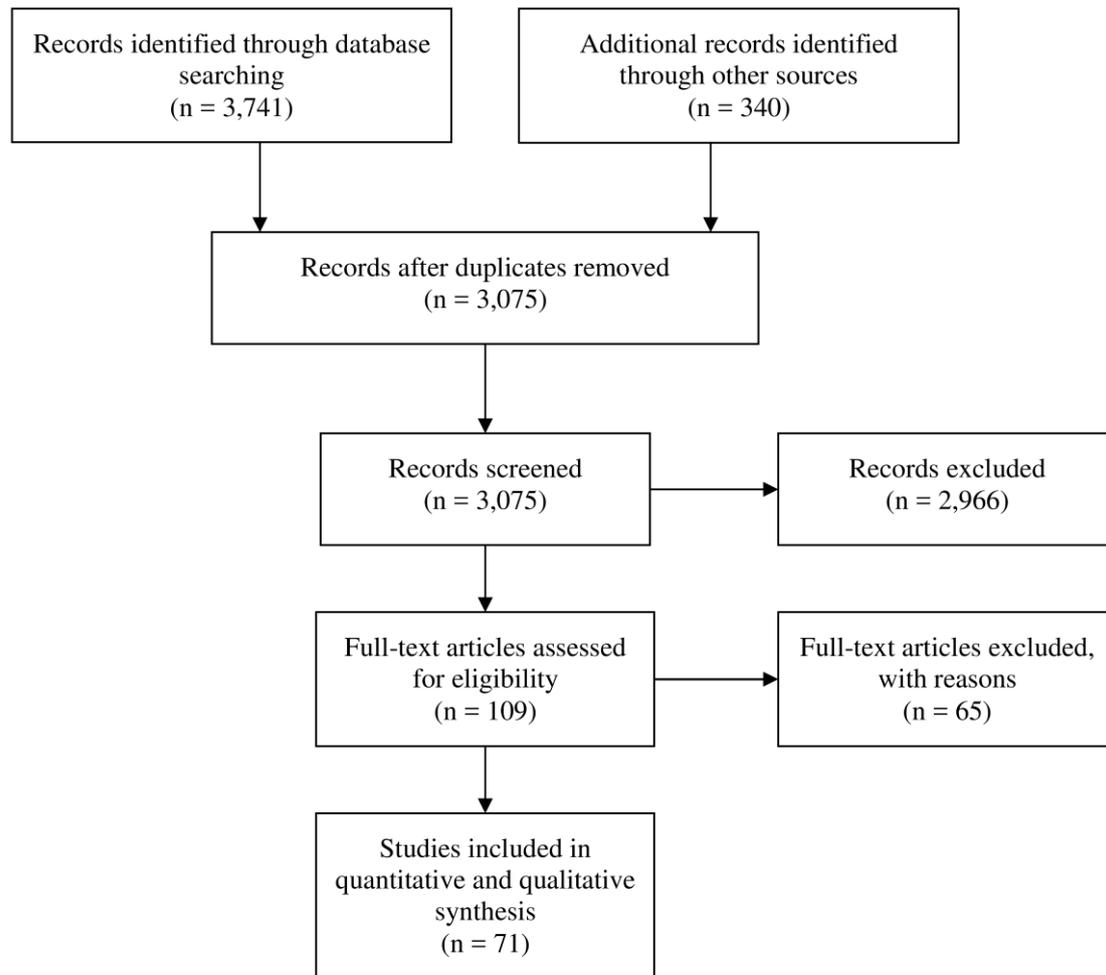
The second inclusion criterion was that the study involved participants imagining themselves interacting with an outgroup member. This was operationally defined as participants being required to actively engage in a mental simulation procedure designed to induce an image of themselves interacting with a person from a different group than their ingroup. Studies that involved a mental simulation of an outgroup

member that did not include an interaction with themselves were not eligible for inclusion. Additionally, studies where participants were not personally involved in the imagined interaction were excluded. Thirdly, the imagined interaction also had to occur with a person from a different ethnicity, background, or other group-based classification. This criterion excluded studies related to robots but included different socially defined human groups (e.g. the elderly).

The fourth inclusion criterion was that the outcome variable needed to reflect interpersonal or social factors directed towards the outgroup. The assessment also had to be conducted following the imagined interaction. Eligible outcome variables were measurements of affect towards the outgroup, implicit and explicit attitudes, actual or observed behaviours, self-reported behavioural intentions, stereotypic views of the outgroup, and intergroup anxiety.

### **6.3.2 Search Strategy**

The literature search followed a systematic process outlined in Figure 6.1. The search strategy involved searching two online databases (Scopus and Science Direct) for articles published prior to the 6th of May, 2017. Searches were conducted looking for the search terms in the article title, abstract, and keywords. The search terms were adapted from the search terms used for the meta-analysis of imagined intergroup contact conducted by Miles and Crisp (2014). Words related to intergroup contact (contact, interaction, intergroup, and outgroup), mental simulation (imagine, mental simulation, hypothetical, simulated, vicarious, and mental imagery), intergroup bias (outgroup, ingroup, intercultural, and prejudice), and specific outgroups (disability, ethnic, nationality, and schizophrenia) were all used in the search protocol. In total, 34 different combinations of key search terms were used in each database (these are the same search terms used in Chapter 5). Across the 68 searches, 3741 research papers were found.



*Figure 6.1.* A flow diagram detailing the number of articles found, screened, excluded, and retained in the systematic quantitative review process (figure based on Moher, Liberati, Tetzlaff, Altman, the PRISMA group, 2009).

Following the database searches, Scopus was used to gain a list of research papers that cited two prominent papers in the field (Crisp & Turner, 2007; Turner, Crisp, & Lambert, 2009). This second search procedure was conducted to ensure that all relevant papers were included in the current review. A total of 340 research papers were found from the citation information.

The research papers found using the database searches and the citation information were combined, and duplicates were removed. There were 1006 duplicates, leaving 3075 research papers to be screened. After reviewing the title and abstract of the

research papers, 2966 were excluded for not complying with the inclusion criteria. Two reviewers examined the full text of the remaining 109 articles to determine the final studies to be included in the review. The two reviewers initially disagreed on the inclusion of only three studies, therefore having near perfect agreement ( $\kappa = .96$ ; Landis & Koch, 1977). The reviewers discussed the three disagreements to come to an agreement. It was determined that Klein and colleagues (2014) would be excluded as it was a synthesis of multiple replication attempts; Rivers (2011) would be excluded because the outcome variable was in relation to perceptions during the imagined interaction; and Miller, Markman, Wagner, and Hunt (2013) met the inclusion criteria and was included in the review.

Consequently, 65 further articles were excluded for a variety of reasons. Review papers (e.g., Crisp, Birtel, & Meleady, 2011), conceptual frameworks (e.g., Crisp, Husnu, Meleady, Stathi, & Turner, 2010), meta-analyses (Miles & Crisp, 2014), and commentaries (e.g., Lee & Jussim, 2010) were all excluded as they were not novel research contributions to the field. Several studies were excluded because the imagined protocol did not directly involve the participant imagining interacting with an outgroup member. Studies excluded for this reason required participants to imagine interacting with a fictional outgroup from another planet (e.g., Vezzali, Stathi, Crisp, & Capozza, 2015), simulate the adoption of an outgroup infant (Gulkar & Monteith, 2013), or engage in a nostalgia exercise (e.g., Turner, Wildschit, Sedikides, & Gheorghiu, 2012). Another reason for a research paper to be excluded was that the research was not designed to assess imagined intergroup contact as a method of reducing prejudice. Some examples of this were studies that sought to improve the experience of imagined intergroup contact (Husnu & Crisp, 2010a, study 3), examined perceptions of the ingroup (e.g., Birtel & Crisp, 2012a, study 2b), and studies that did not have a measure

of prejudice as an outcome variable (e.g., Rivers, 2011). At the conclusion of the full text screening, 71 studies were included for the systematic quantitative review from 44 published journal articles. These studies were classified based upon criteria, detailed below, by two reviewers. Inconsistent classifications were cross-checked by a single reviewer.

### 6.3.3 Evaluation Criteria

**The contact is positive.** To assess if a study ensured the imagined intergroup interaction was positively valanced, studies were classified in three different ways. The first classification method was based on whether or not the instructions provided to participants prior to the commencement, or during, the imagined intergroup interaction included wording to prompt them to imagine a positive interaction. Words such as “comfortable”, “relaxed”, “positive”, “pleasant”, and other variations were regarded as consistent with this intention. Additionally, instructional sets requesting participants to imagine learning something new about an outgroup member were considered to prompt a positive, simulated interaction. The second classification was based on whether or not the research article provided a citation to indicate that their positive imagined contact manipulation was an established method of inducing positively valanced simulated interactions with an outgroup member or enhanced the mental simulation. For the third classification, studies were assessed to determine whether or not a formal manipulation check was included to provide a statistical assurance that the participants in the experimental condition had positive imagined interactions.

**Optimal conditions are included.** Published studies on imagined intergroup contact were screened to determine if the manipulation they employed adhered to Allport’s (1954) optimal conditions for intergroup contact. The four conditions each served as a separate classification. Studies were classified as including each of the

optimal conditions if the authors explicitly stated they intended to implement the optimal conditions or if a reasonable inference could be made based upon the reported methodology of the imagined intergroup contact manipulation.

## 6.4 Results

### 6.4.1 Descriptive Statistics

Across all the studies (see Table 6.1), there was a mean sample size of 91.12 ( $SD = 76.70$ ). Most studies (76.1%) were conducted with University students as participants. Adult community samples (15.5%), child samples (5.6%) and adolescent samples (2.8%) were also used. The studies were conducted across several countries. The United Kingdom was the location of most studies (36.6%), followed by Italy and the United States of America (14.1% each), Germany (5.6%), Cyprus (4.2%), Canada and Australia (2.8% each). Mexico, Korea, and Jamaica were home to one study (1.4%) each.

Table 6.1.

*Information and Classifications to Evaluate the Effectiveness and Valence of Imagined Intergroup Contact for the Studies Included in the Systematic Quantitative Literature Review ( $k = 71$ ).*

Source	Study	Country	Outgroup	Contact is Positive		
				Positive Imagination	Established Method	Manipulation Check
Asbrock et al., 2013	1	Germany	Turkish	✓	✓	✗
	2	Germany	Gypsie/Romani	✓	✓	✗
Birtel & Crisp, 2012a	1	Not Stated	Mentally Unwell	✓	✗	✗
	2a	Not Stated	LGBT	✓	✗	✗
	3	UK	Muslims	✓	✗	✗
Birtel & Crisp, 2012b	1	UK	Elderly	✓	✗	✗
	2	UK	International Students	✓	✗	✗

Brambilla et al., 2012	1	Italy	(1)Canadian (2)Chinese (3)Peruvian (4)Albanian	✓	✓	✓
Cameron et al., 2011	1	UK	Disabled	✓	✗	✗
Chen et al., 2017	1	USA	Elderly	✗	✗	✗
Crisp & Husnu, 2011	1	Not Stated	Elderly	✓	✓	✗
Dermody et al., 2013	1	Australia	LGBT	✓	✗	✗
Falvo et al., 2015	1	Italy	Homeless	✓	✓	✗
Falvo et al., 2014	1	Italy	Disabled	✓	✗	✓
Giacobbe et al., 2013	1	Australia	Mentally Unwell	✓	✓	✗
Harwood et al., 2011	1	USA	Illegal Immigrant	✓	✓	✓
Hodson et al., 2015	1	Canada	Homeless	✓	✓	✗
Hoffarth & Hodson, 2016	1	USA	LGBT	✓	✓	✗
	2	USA	Muslims	✓	✓	✗
Husnu & Crisp, 2010a	1	UK	Muslims	✓	✓	✗
	2	UK	Muslims	✓	✓	✗
Husnu & Crisp, 2010b	1	Cyprus	Greek Cypriots	✓	✓	✗
Husnu & Crisp, 2011a	1	Not Stated	Elderly	✓	✗	✗
	2	Not Stated	Elderly	✓	✗	✗
Husnu & Crisp, 2011b	1	Cyprus	Greek Cypriots	✓	✓	✗
Kuchenbrandt et al., 2013	1	Germany	Gypsie/Romani	✓	✓	✗
Lai et al., 2014	1	USA	Black	✓	✗	✗
	2	USA	Black	✓	✗	✗
LeBouff & Ledoux, 2016	2	USA	Atheists	✓	✓	✗

Lee & Cunningham, 2014	1	(1) USA (2) South Korea	LGBT	✓	✓	✗
Miller et al., 2013	1	USA	LGBT	✓	✓	✗
Na & Chasteen, 2016	1	Canada	Mentally Unwell	✓	✓	✗
	2	USA	Mentally Unwell	✓	✓	✗
Pagotto et al., 2012	1	Italy	Muslims	✓	✓	✓
Pennington et al., 2016	1	Not Stated	Mentally Unwell	✓	✓	✗
Stathi et al., 2014	1	UK	Asian	✓	✓	✗
Stathi & Crisp, 2008	1	Mexico	Indigenous populations	✓	✗	✗
	2	UK	French	✓	✓	✗
	3	UK	International Students	✓	✓	✗
Stathi et al., 2011	1	UK	Muslims	✓	✓	✗
	2	UK	Muslims	✓	✓	✗
	3	UK	Muslims	✓	✓	✗
Stathi et al., 2012	1	UK	Mentally Unwell	✓	✓	✗
Turner & Crisp, 2010	1	Not Stated	Elderly	✓	✗	✗
	2	UK	Muslims	✓	✓	✗
Turner et al., 2007	1	Not Stated	Elderly	✓	✗	✗
	2	Not Stated	Elderly	✓	✗	✗
	3	Not Stated	LGBT	✓	✗	✗
Turner & West, 2011	1	UK	Obese	✓	✗	✗
	2	UK	Muslims	✓	✗	✗
Turner et al., 2013	1	UK	Asylum Seekers	✓	✗	✗
	2	Not Stated	LGBT	✓	✗	✗

Vezzali, Capozza, Giovannini, & Stathi, 2012	1	Italy	Immigrant	✓	✓	✗
Vezzali, Capozza, et al., 2012	1	Italy	Immigrant	✓	✓	✗
Vezzali, Crisp, et al., 2015	1	Italy	Italian	✓	✓	✗
	2	Italy	International Students	✓	✓	✗
Vezzali, Stathi et al, 2015	1	Italy	Immigrant	✓	✗	✗
	2	Italy	Immigrant	✓	✗	✗
West & Bruckmüller, 2013	1	UK	Mentally Unwell	✓	✓	✓
	2	Germany	Muslims	✓	✓	✓
West & Greenland, 2016	1	UK	Asian	✓	✓	✗
	2	UK	LGBT	✓	✓	✗
West, Holmes, & Hewstone, 2011	1	UK	Mentally Unwell	✓	✓	✓
	2	UK	Mentally Unwell	✓	✓	✓
	3	UK	Mentally Unwell	✓	✓	✓
	4	UK	Mentally Unwell	✓	✓	✗
West, Hotchin, Wood, 2017	1	UK	Homeless	✓	✓	✗
	2	UK	LGBT	✓	✓	✗
West, Husnu, & Lipps, 2015	1	Cyprus	LGBT	✓	✓	✗
	2	Jamaica	LGBT	✗	✓	✗
West, Turner, & Levita, 2015	1	Not Stated	Mentally Unwell	✓	✓	✗

NOTE: The number in bracket indicates the number of outcome variables per category, if there is more than 1.

NOTE: Criteria two (optimal conditions) were not included as there were few studies that met those criteria, so they were all listed in text.

#### **6.4.2 The Contact is Positive**

A comprehensive number of the reviewed studies (93.0%) included in their imagined intergroup contact instructions language that was aimed to induce a positive imagined interaction (see Table 6.1). Additionally, 60.6% of reviewed studies provided a citation to a previous study to strengthen their claim that the instructional set would induce a positive imagined interaction or enhance the experience. However, only 12.7% of the reviewed studies included a manipulation check that the imagined interaction was positive. The majority (88.8%) of the studies that conducted a manipulation check provided evidence that the manipulation was successful in producing a positive imagined interaction with a member of the outgroup. Only one of the studies (West, Holmes, & Hewstone, 2011, study 1) reported the imagined intergroup contact was negatively valanced (compared to either a control group or above the mid-point of their scale). Interestingly, that particular study did not include words designed to induce a positive mental simulation. Moreover, this study found that imagined intergroup contact did not improve perceptions of the outgroup (who were individuals suffering from schizophrenia) and actually increased intergroup anxiety.

#### **6.4.3 The Intervention Incorporated the Optimal Conditions**

Three studies (4.23%) were deemed to have incorporated at least one of Allport's (1954) four optimal conditions for intergroup contact. Kuchenbrandt, Eyssel, and Seidel (2013) included manipulations to encourage intergroup co-operation. The authors argued that the inclusion of intergroup co-operation implies that there was equal status between the groups and that the groups were working towards shared goals. Similarly, Vezzali, Stathi, et al. (2015) included intergroup co-operation, equal status, and the pursuit of common goals in study 1 and study 2 of their research. The manipulation they employed in their imagined intergroup contact intervention included

instructions for participants to think of themselves as a common ingroup (equal status) working together as a team in a competition (co-operation) to achieve a shared goal. All three studies found that the imagined intergroup contact intervention that included some of Allport's (1954) optimal conditions resulted in greater reductions of intergroup bias in comparison to other conditions. To date, no study has examined all four optimal conditions in the same intervention.

### **6.5 Discussion**

The current review systematically investigated published research for information on positive and optimal imagined intergroup contact. In doing so, the current review evaluated imagined intergroup contact against novel criteria derived from the limitations of face-to-face contact. The overall conclusion derived from the examination of the literature is that imagined intergroup contact is mostly operationalised to be positively valanced, but the field is limited by a lack of studies including Allport's (1954) optimal conditions of intergroup contact. This systematic evaluation of the number of studies that have answered specific research questions and used different methodologies leads to recommendations for future research and has implications for the indirect contact literature beyond mentally simulated interactions.

The findings from the current review indicate that the vast majority of studies included a manipulation specifically designed to initiate a mental simulation of an interaction with an outgroup member that is positive. Previous investigations of negative intergroup contact have found that negatively valanced interactions with an outgroup member have a strong, detrimental impact on intergroup bias (Barlow et al., 2012; Graf et al., 2014). A strength of the reviewed studies is that the majority attempted to overcome the issue of negative contact. However, considerably fewer studies included a manipulation check. Manipulation checks are used to ensure that the

operationalisation of the manipulation was successful, leading to a valid interpretation of the results (Perdue & Summers, 1986). The importance of a manipulation check is highlighted by the first study in West, Holmes, and Hewstone's (2011) paper. The manipulation check indicated that the imagined intergroup contact intervention did not produce a positive mental simulation. For this reason, the finding that the intervention group reported higher intergroup anxiety and no changes in explicit attitudes can be argued as being due to the failure of the intervention to induce a positive simulation. Future research on indirect intergroup contact should include formal manipulation checks to ensure that positive imagined contact has indeed occurred.

Another important avenue for future research identified by the current systematic quantitative literature review is the incorporation of the optimal conditions of intergroup contact into future interventions. The review did not find any studies on imagined contact that incorporated all four of Allport's (1954) optimal conditions. However, three studies did incorporate elements of optimal intergroup contact (Kuchenbrandt et al., 2013; Vezzali, Stathi et al., 2015, study 1 and study 2), with these studies finding that interventions including such elements were more effective than standard imagined intergroup contact and control groups. This is in alignment with research on face-to-face intergroup contact, where the optimal conditions have been shown to reliably enhance the effects of face-to-face intergroup contact (Pettigrew & Tropp, 2005).

Future research should build upon these promising findings and continue to develop imagined intergroup contact instructional sets that include the optimal conditions. Mental construction of the optimal conditions through imagery presents fewer obstacles compared to facilitating the optimal conditions in face-to-face interactions. Many intergroup exchanges involve members from groups with differential

power status and unmoderated interactions can lead to hostility (Maoz, 2011). In contrast, imagined contact instructions can construct an outgroup member with attributes to ensure equal status and in contexts that facilitate co-operation to achieve a goal (e.g., team mate on a sporting team, fellow student in a group project). Future research should also compare imagined intergroup contact interventions that systematically vary the specific optimal conditions to differentiate the relative benefits of the four optimal conditions individually. For example, despite support from authorities having an important role in enhancing face-to-face intergroup contact (Pettigrew & Tropp, 2005), that particular optimal condition has yet to be tested in imagined intergroup contact.

Although this review provides a comprehensive overview of the current state of imagined intergroup contact research, it is not without limitations. Firstly, the review was limited by the requirement that articles be written in English. Despite more than 75% of the research articles in social sciences being written in the English language (Hamel, 2007), the restriction to research articles written in English could explain the lack of research from Africa, South America, and Asia included in the review. If research written in non-English languages were added (if it exists), it could illuminate new and novel advancements on the current understanding of imagined intergroup contact.

### **6.6 Summary of Chapters 5 and 6**

Across Chapters 5 and 6, many of the purported advantages of contact-based interventions were outlined and evaluated. Chapter 5 described the problems associated with informal segregation and proposed an acceptability model to evaluate the premise that interventions can overcome this problem. The review evaluated imagined intergroup contact and identified a lack of evidence that individuals who would

otherwise avoid face-to-face contact will imagine an interaction with an outgroup member. Chapter 6 then identified two other limitations of face-to-face contact: the occurrence of (1) negative and (2) trivial interactions with outgroup members. Again, imagined contact was the focus when evaluating the evidence that contact-based interventions can overcome these limitations. This review systematically analysed the available evidence on imagined intergroup contact and found that the manipulations used were mostly successful in creating a positive mental stimulation. In contrast, few studies explored the role of the optimal conditions, but those that did found that intervention conditions characterised by the optimal conditions had greater effects than the standard imagined contact paradigm.

The arguments presented in the two reviews in Chapter 5 and 6 can be combined to identify a set of minimum criteria that new indirect forms of contact-based interventions should meet. These criteria are derived from the position that the use of indirect forms of contact can overcome the limitations of face-to-face contact:

1. Individuals should accept the administration of the intervention (in part demonstrated by willingness to engage in the intervention);
2. The contact-based intervention should promote positive experiences with outgroup members and does not promote negative experiences, and;
3. The contact should be intimate or incorporate the optimal conditions (Allport, 1954) to facilitate greater effects.

The recommendations that accompany the reviews of imagined contact in Chapters 5 and 6 could be utilised by researchers to improve the current understanding and application of all contact-based interventions. For example, e-contact incorporates the optimal conditions in a standardised manner (criterion 3; White & Abu-Rayya, 2012). However, to date, there is no empirical evidence that individuals would be

willing to engage in e-contact outside of structured classroom activities instigated by teachers (criterion 1). It is also difficult to ensure that some forms of e-contact are positively valanced (criterion 2). Unsupervised online interactions can lead to negative and counterproductive conversations. Negative content is likely to be shared online because individuals feel less accountable for their actions and delayed replies can increase tension when the people interacting online are not well acquainted (White, Harvey, & Abu-Rayya, 2015).

Taken together, I assert that traditional investigations of face-to-face contact have identified a number of limitations impeding naturally occurring contact from evoking widespread social harmony. Interventions, which can be specifically designed to overcome these limitations, are vital to future efforts to improve intergroup relations. Thus, these criteria listed above can be used to evaluate new forms of indirect intergroup contact, such as virtual reality intergroup contact (VRIC).

To conclude this chapter, I outline why VRIC can provide an approach that meets these criteria. To further justify why I seek to add to the established forms of contact, I outline potential benefits of VRIC in comparison to existing indirect contact approaches. I conclude with a discussion of the potential drawbacks of VRIC to provide a balanced overview of this intervention's potential impact.

### **6.7 Implications for Virtual Reality Intergroup Contact**

One of the goals of the proposed research is to develop VRIC and to empirically test (1) if it can overcome the limitations of face-to-face contact, and (2) its efficacy. The next chapter will empirically assess people's prospective acceptability of engaging in VRIC (criterion 1). Additionally, as VRIC is a researcher-developed intervention, the content of the immersive content can be specifically designed to ensure it is positively valanced (criterion 2) and include additional scenes and other features to adhere to the

optimal intergroup contact conditions (criterion 3). The second and third criterion are not tested in the current research program, but the versatility of artificially-created immersive content provides researchers with a level of control to explore these factors in future research. The empirical investigation into the acceptability of VRIC stems from a scarcity of evidence that indirect contact can overcome this particular limitation of face-to-face contact. Alternatively, as reviewed in this chapter, there is evidence that indirect forms of contact can overcome the limitations of negative and trivial face-to-face contact. The study of acceptability is therefore provided to make the most meaningful contribution to the literature by advancing novel research questions and methods.

### **6.7.1 Benefits of Virtual Reality Intergroup Contact**

In addition to identifying that VRIC may overcome limitations of face-to-face intergroup contact, I assert that VRIC contains features and components with advantages over existing indirect contact interventions. These include controlled interactivity and presence.

**Controlled Interactivity.** Virtual reality presents people with content that they can interact with. Immersive videos are interactive because the viewer can direct their gaze towards salient content and alter the speed of the video, which allows a volitional approach towards the stimuli (Krish et al., 2016). Computer-generated graphics are also interactive as they can be animated to allow people to engage with the virtual environment with the use of controls. Examples of animated behaviours are walking, picking up objects, and opening doors (Bouchard, Cote, & Richard, 2007). Additionally, animated out-group members can be created to positively respond in real-time to the users' actions enhancing the interactive experience.

Other forms of indirect contact often do not have an interactive component. For example, individuals vicariously viewing outgroup members do not have control over the content, duration, or progression of the exposure. Alternatively, other forms of contact offer participant interactivity, but limit control and oversight from an experimenter. For example, imagined intergroup contact allows the participant to mentally simulate an interaction with an outgroup member, but the experimenter has limited control over what is being imagined. VRIC can provide participants with the opportunity to interact with both the outgroup presented and the wider virtual environment. Importantly, as the experimenter develops, codes, and controls the content, the experimenter can easily ensure that the interactivity in the virtual environment strictly adheres to a protocol that facilitates positive outcomes.

**Presence.** Presence is defined as being located in one physical location, but having a subjective sense of being in another environment (Witmer & Singer, 1998). Presence is largely dependent upon immersion, which relates to the technological capability to create a realistic virtual environment (Slater & Wilbur, 1997). Technologically capable devices can create immersive virtual environments that provide a sense of presence by removing vision of the outside world, providing graphically rich content, and having the virtual environment remain consistent with the real world (Oscillada, 2015; Sanchez-Vives & Slater, 2005; Witmer & Singer, 1998). Presence provides participants with a ‘real-life’ experience that mimics the world in ways other interventions can not. Participants can be placed in specific contexts and be repeatedly exposed to outgroup members with the subjective experience that they are actually in another location with an actual outgroup member in front of them. The virtual intergroup encounter that follows can be pre-programmed to mimic realistic features of interactions (e.g., facial changes) to prepare individuals for real-life intergroup contact.

Congruent with this approach, scholars have identified a key benefit from imagined intergroup contact is the purported 'behavioural script' that follows the mental simulation (Crisp, Husnu, Meleady, Stathi, & Turner, 2011). Following imagined contact, participants form mental representations of intergroup behaviours that can be used to guide future behaviours and intentions during interactions with outgroup members (Crisp et al., 2011). In an extension of this, VRIC should be capable of enhancing behavioural scripts by placing individuals in an intergroup setting that mirrors real life. This argument is derived from evidence that more vivid perceptions create a richer behavioural script that is easier to recall, and therefore more readily implemented in real-life (Crisp et al., 2011).

### **6.7.2 Limitations of Virtual Reality Intergroup Contact**

VRIC has the potential to offer distinct advantages over both face-to-face and other indirect forms of contact. Nevertheless, there are limitations that could impede the broader success of VRIC as a mechanism of social change. These limitations include potential adverse physiological responses and the financial and technical resources required to set up the virtual environment. The limitations are discussed below to provide a balanced overview of the advantages and disadvantages of VRIC.

**Motion Sickness.** A considerable obstacle that could impede the application of VRIC is motion sickness. Movement and motion in immersive content viewed through a HMD can induce motion sickness. Symptoms include, but are not limited to, nausea, vomiting, cold sweating, and drowsiness (Durlach & Mavor, 1995). Experiences of motion sickness are closely related to the quality of the technology being used. For example, Bush (2008) identified that prolonged exposure to virtual content and slow image refresh rates can induce motion sickness. Motion sickness could impede the efficacy of VRIC in multiple ways. First, individuals who experience motion sickness

may be less likely to accept the interventions commencement or cease the intervention shortly after starting. Second, motion sickness when viewing outgroup members may create a negative experience that becomes associated with the outgroup, leading to an aversive response on subsequent exposures to the outgroup through aversive conditioning processes. The problems associated with motion sickness ensure that interventionists using virtual reality technology should include respites during the session and use technologically advanced HMDs. Recently produced high-end headsets have limited the occurrence of motion sickness by considering the orientation of the head in the HMD and improving screen refresh rates (Raaen & Kjellmo, 2015). However, the need for high-end HMDs presents another limitation of VRIC.

**Technological Requirements.** The investment of money and technical skills required to set up a VRIC intervention presents a serious limitation to the widespread efficacy of VRIC. Unlike other forms of mass-mediated contact, one HMD is needed for every person to experience the immersive content. Currently, the majority of households, schools, and workforces do not have a HMD. Single-person VRIC sessions are affordable, but mass administration will require substantial financial investments into the purchase and maintenance of many HMDs, corresponding computers (to run and program the headsets), and internet connectivity. Another technical restraint is the resources required for the development of immersive content. Immersive, 360-degree videos, require a high quality camera capable of filming 360-degrees and suitable outgroup actors/exemplars, filming locations, and culturally sensitive material to film. Alternatively, computer generated environments require considerable technical skills and expensive software to create realistic virtual environments.

## **6.8 Conclusion**

Chapters 5 and 6 identified the limitations of face-to-face contact and provided theoretical and empirical support that indirect contact interventions can overcome these limitations. At the conclusion of this chapter, I used these findings to argue the benefits of a new contact-based intervention: virtual reality intergroup contact. The remaining chapters are designed to empirically determine if VRIC can overcome the limitations of informal segregation by being more acceptable than face-to-face intergroup contact (Chapter 7), and its efficacy to improve intergroup relations (Chapter 8). These efforts are motivated by the knowledge that interactive and realistic features of virtual content could provide VRIC with advantages over other forms of indirect contact.

### Chapter 7 Preamble

Chapter 7 builds upon the acceptability model presented in Chapter 5 by empirically evaluating the prospective acceptability of VRIC. Specifically, this chapter reports on individuals' willingness to approach an outgroup in a novel virtual reality modality. It also reports a comparison between willingness to approach VRIC and face-to-face contact and examines intergroup anxiety as a key barrier for engaging in intergroup contact. Congruent with the theories advanced in Chapter 5, intergroup anxiety was expected to be a stronger deterrent for face-to-face interactions with outgroup members than virtual interactions with outgroup members. Therefore, VRIC may be suited to overcome avoidant behaviours exhibited in highly anxious individuals (Aim 3).

To test this hypothesis, self-report surveys were administered on an Australian University sample (Study 1,  $N = 478$ ) and an American online sample (Study 2,  $N = 450$ ). Participants reported their willingness to engage in face-to-face or virtual activities involving Muslims. In both samples, participants reported significantly higher willingness for face-to-face intergroup contact than VRIC. However, intergroup anxiety was a significantly stronger deterrent of willingness to engage in face-to-face contact than it was for VRIC. These results suggest that VRIC may be a viable alternative for individuals who avoid face-to-face interactions with outgroup members due to experiencing high anxiety. As such, the findings support the development of VRIC as a prejudice-reducing intervention (see Chapter 8) that may serve to overcome the issues of intergroup segregation. This chapter has been prepared for submission for publication in a journal.

## **7. Virtual Reality Intergroup Contact: An Acceptability Study Assessing Willingness to Approach in a Modern Form of Contact**

Intergroup contact, defined as the interaction between members of different social groups (Allport, 1954), is known to reduce intergroup bias. Meta-analytic reviews of the intergroup contact literature have found that face-to-face contact consistently reduces prejudice towards outgroups (Pettigrew & Tropp, 2005; Pettigrew & Tropp, 2006). However, a serious limitation of the direct intergroup contact approach is that individuals may not have the motivation to approach an outgroup member. In areas with high levels of entrenched intergroup conflicts, there is often segregation that prevents intergroup contact (Crisp & Turner, 2009). Additionally, even in ethnically heterogeneous areas, people tend to self-segregate by keeping physical and social distance from outgroup members (McKeown & Dixon, 2017). One way to address the issue of informal segregation has been to create indirect interventions that mimic key features of intergroup contact without needing an outgroup member to be physically present.

Indirect contact draws upon the principles of intergroup contact, but does not require a face-to-face interaction with an outgroup member (Turner & Cameron, 2016). Computer-mediated, or electronic-contact, has become a promising avenue for the promotion of indirect contact due to the increased connectivity among people afforded by modern technology (White & Abu-Rayya, 2009; White, Harvey, & Abu-Rayya, 2015). A growing body of evidence has found that interactions between, and exposure to, members of social groups on technological devices can reduce prejudice and improve intergroup relations (Cao & Lin, 2017; Kim & Wojcieszak, 2018; Maunder, White, & Verrelli, 2018; Schumann, Klein, Douglas, & Hewstone, 2017; Walther, Hoter, Ganayem, & Shonfeld, 2015).

The current study introduces a new type of technology-mediated indirect intergroup contact intervention that is based on virtual reality. Virtual reality is a new technology that offers novel applications for social psychologists. Due to the ability to recreate three-dimensional space, virtual reality has been touted as a tool for anyone needing to replicate a real-world environment (Craig, Sherman, & Will, 2009). We define virtual reality intergroup contact (VRIC) as the viewing of, or engagement in, interactions with members from different social or ethnic groups in an immersive video or computer-generated virtual environment that is designed to mimic the real world. The most common viewing apparatus for virtual reality is the head mounted display (HMD). HMDs are wearable devices with miniature visual displays that prevent the user from viewing the outside world whilst speakers provide parallel auditory information (Emmelkamp, 2005; Patterson, Winterbottom, & Pierce, 2006).

A considerable amount of research has validated the use of traditional, non-virtual reality multimedia (television, radio, and the internet) in the reduction of prejudice. Traditional multimedia involves the use of visual and/or auditory information (e.g., visual information from a television screen, auditory information from radio speakers), with the vicarious viewing of intergroup contact on these media platforms shown to establish positive expectations for potential face-to-face contact (Dovidio, Eller, & Hewstone, 2011) and reduce intergroup anxiety (Visintin, Voci, Pagotto, & Hewstone, 2016). However, this form of contact is a passive, two-dimensional activity. Modern virtual reality technology can place a person in an immersive, life-like virtual environment that provides a subjective sense of being present in the environment despite being physically located in another (Krisch et al., 2016). Accordingly, VRIC has the potential to facilitate a virtual interaction with an outgroup member by providing a closer approximation to the experience of an actual encounter. Moreover, VRIC could

be a more acceptable method than face-to-face contact because it offers more flexibility and will induce less anxiety before individuals engage in intergroup contact.

### **7.1 Acceptability of Intergroup Contact**

The research presented here is an investigation of the acceptability of VRIC. In this study, acceptability is conceptualised as the participants' willingness to partake in activities characteristic of intergroup contact. Acceptability is not a sufficient component of contact's success, but it is a necessary component (Sekhorn, Cartwright, & Francis, 2017). The most efficacious processes can not occur if no one is willing to initiate them. Evidence for this basic proposition is embedded in findings showing that prejudices are maintained in spite of increasing opportunities for the effective remedy (i.e., intergroup contact; Paolini et al., 2018).

Social psychologists who attempt to address this limitation have suggested that indirect forms of contact could be an effective precursor or bridge for face-to-face contact (Crisp & Turner, 2009; Dovidio et al., 2011; Harwood, 2010; Turner & Cameron, 2016). However, technologically mediated forms of intergroup contact still require active approach behaviours. In much the same way that individuals can choose how and when they interact with other people face-to-face, they can also select how and when they interact using different technologies. Identifying how accepted VRIC is should elucidate how effective this form of contact could be when applied to providing a bridge for face-to-face contact. To explore this issue, we used the acceptability of face-to-face intergroup contact as a benchmark for comparison. This methodological approach aligns with acceptability studies in the medical sciences that compare participant's preference and attitudes toward different medical interventions of varying intrusiveness (e.g., Arvidsson, Hellborg, Gemzell-Danielsson, 2005). Therefore,

assessing the acceptability of VRIC will indicate whether virtual reality is a viable solution for intergroup segregation.

The present study also examined VRIC and face-to-face contact in the context of a key cause of intergroup avoidance, namely intergroup anxiety. Researchers have consistently found that higher levels of intergroup anxiety are associated with lower behavioural intentions to interact with outgroup members (e.g., Barlow, Louis, & Hewstone, 2009). Intergroup anxiety can be defined as a subjective sense of anxiety in the presence of an outgroup member (Stephan & Stephan, 1985) and is based on the premise that future interactions with outgroup members will be harmful in some way to one's self or the entire ingroup (Stephan, Renfro, & Davis, 2008). Consequentially, individuals who feel threatened can mitigate the potential of this negative outcome arising by avoiding future interactions (Paolini, Harwood, Hewstone, & Neumann, 2018). Intergroup contact that can reduce potential threats should therefore offer a more acceptable intergroup experience, relative to a face-to-face encounter.

Indirect forms of contact typically evoke less anxiety than face-to-face contact because the person is not directly involved with the outgroup member and there are reduced communication channels (Harwood, 2010). These features were proposed to also decrease the *anticipated anxiety* experienced before engaging in intergroup contact because potential negative outcomes are lessened when an outgroup member is not present (O'Donnell et al., in prep, Chapter 5). Accordingly, it was argued that individuals higher in intergroup anxiety will prefer forms of contact that do not include a direct and synchronous interaction. The exposure-based form of VRIC does not directly involve the self in an interaction and should therefore be more accepted by those higher in anxiety.

Similar conceptualisations have been observed in the clinical anxiety literature. Much like intergroup anxiety, anxiety disorders are characterised by avoidance behaviours (Rachman, 1977). The similarities between intergroup and clinical forms of anxiety has resulted in calls to apply efficacious therapies for clinical anxiety to an intergroup context (Birtel & Crisp, 2015; O'Donnell, Neumann, Duffy, & Paolini, 2018). Indeed, virtual reality interventions are one application of this recommendation. Virtual reality exposure therapy is an efficacious option for the treatment of anxiety disorders (Powers & Emmelkamp, 2008). Of importance to the current study, patients with clinical anxiety have reported that viewing a phobic stimulus using virtual reality is more appealing in comparison to viewing the same stimulus in person (Bush, 2008), resulting in higher self-reported intentions to take up treatment (Garcia-Palacios, Botella, Hoffman, & Fabregat, 2007). As such, intergroup anxiety should be a stronger deterrent to face-to-face contact than to VRIC.

## **7.2 The Present Research**

The overarching aim of the current study is to assess the acceptability of VRIC. It was hypothesised that (1) participants would be more willing to engage in VRIC than face-to-face intergroup contact, and (2) intergroup anxiety would be a stronger deterrent of engaging in face-to-face intergroup contact than VRIC. The current research also examined non-group related processes to further isolate the relationship between intergroup anxiety and intergroup contact. The uptake of new technologies and interpersonal interactions are predicted by positive attitudes toward technology (Legris, Ingham, & Collette, 2003) and low communication apprehension (Yen et al., 2012), respectively. These factors were thus considered in the relationship between intergroup anxiety and willingness to approach outgroup members for each contact method.

## 7.3 Method

### 7.3.1 Participants and Procedure

A survey was administered to samples drawn from two nations (Australia and the United States of America). The collection of responses from two samples allows for a self-replication and sought to address recent concerns regarding the lack of consistency in psychological research (Earp & Trafimow, 2015), while also exploring the wider, international appeal of a VRIC intervention.

**Australian sample.** Students enrolled in a first year psychology course at an Australian university ( $N = 478$ ; 66.1% female, 33.5% male, 0.4% other;  $M_{age} = 23.00$ ,  $SD = 7.88$ , Age Range: 17 to 58) were recruited to participate in this study in exchange for course credit. Eight participants were excluded from data analyses because they reported having an Islamic religious background and, therefore, may not perceive Muslims as an outgroup. Most remaining participants reported either no religious background (51.0%) or a Christian background (39.1%).

**American sample.** All participants ( $N = 450$ ) resided within the United States of America and ranged in age from 18.80 to 79.26 years ( $M_{age} = 36.38$ ,  $SD = 12.45$ ). The sample were mainly females (64.4%), and two participants identified their gender as other. Christianity was the most common religion reported by participants (57.8%), followed by no religion (32.2%). Individuals who nominated themselves as Islamic (1.8%) were excluded from analyses. Participants were recruited via MTurk, a website that allows individuals to complete small tasks for monetary compensation.

### 7.3.2 Materials

**Willingness to approach intergroup contact.** Two measures were used to assess participants' willingness to engage in VRIC and face-to-face intergroup contact. For VRIC, participants were asked to rate how willing they would be to engage in a list

of virtual reality activities, assuming they owned a virtual reality headset. Embedded within a larger list of 22 items were five Islamic specific statements (e.g., Go on a virtual tour of a local mosque with the Iman as your tour guide). To assess willingness to engage in face-to-face intergroup contact, participants were provided with a list of 23 items, with five related to face-to-face events asking participants to rate how willing they would be to participate in them (e.g., Tour a local mosque with Islamic students). Participants were informed that these face-to-face events were hypothetical programs that could be conducted by University clubs and organisations on campus (Australian sample) or by clubs and organisations in the local area (American sample). The items of interest were matched on context (e.g., viewing work done in the community by Islamic organisations) and/or activities (e.g., view/wear Islamic garments). All items were rated on a scale from 1 = *not at all willing* to 5 = *very willing*. Responses for willingness to approach VRIC ( $\alpha_{AUS} = .91$ ,  $\alpha_{AUS} = .93$ ) and face-to-face contact ( $\alpha_{AUS} = .90$ ,  $\alpha_{AUS} = .92$ ) were internally consistent.

**Intergroup anxiety.** The 14-item Cognitive, Affective, and Psychophysiological measure of Intergroup Anxiety (CAP-IA) assessed three components of intergroup anxiety, as identified by Stephan (2014). Items assessing the cognitive domain measured maladaptive thoughts regarding potential consequences of interacting with a Muslim (e.g., *Muslims pose a danger to me*). The affective domain measured the emotional response an individual might have when interacting with a Muslim (e.g., *Scared*). The physiological domain assessed the bodily responses that participants might experience when interacting with a Muslim (e.g., *Faster heartbeat*). Responses to items were on a 5- point scale ( $1 = never$  to  $5 = always$ ) and were internally consistent ( $\alpha_{AUS} = .94$ ,  $\alpha_{AUS} = .95$ ).

**Technological enjoyment.** An 8-item scale measuring enjoyment towards technology (Walters, Turner, & Casey, 2016) was administered ( $\alpha_{\text{AUS}} = .83$ ,  $\alpha_{\text{US}} = .85$ ). Participants were presented with a list of statements regarding technological devices in general and asked to state their agreement (1 = *strongly disagree* to 5 = *strongly agree*). The items included statements to assess if using technological devices makes the participant happy, excited, and relaxed (e.g., *I find myself smiling a lot when using most technological devices*).

**Communication apprehension.** Four items from the No Social Anxiety Scale from the International Personality Item Pool (IPIP; Goldberg et al., 2006) were used to assess communication apprehension ( $\alpha_{\text{AUS}} = .74$ ,  $\alpha_{\text{US}} = .72$ ). The items (e.g., *I am apprehensive about new encounters in real life*) were rated on a 5-point scale where higher scores indicate lower communication apprehension (1 = *a great deal* to 5 = *not at all*).

#### 7.4 Results

Initially, SPSS (v. 24) was used to conduct paired sample *t*-tests to determine if the mean of willingness to approach VRIC was significantly different from the mean of willingness to approach direct intergroup contact. These analyses determined if there was a significant difference in participant's self-reported willingness to partake in both forms of intergroup contact. In both the Australian sample ( $t[469] = -7.90$ ,  $p < .001$ ;  $d = 0.36$ ) and American sample ( $t[442] = -5.32$ ,  $p < .001$ ;  $d = 0.25$ ), the mean score (see Table 7.1) for willingness to approach face-to-face intergroup contact was significantly higher than the mean score for willingness to approach VRIC, indicating a preference for in-person interactions.

Table 7.1

*Descriptive Statistics and Bivariate Correlations between Willingness to Approach Intergroup contact, Intergroup anxiety, and Covariates in an Australian (lower quadrant; N = 470) and American (upper quadrant; N = 442) Sample.*

	Mean <sub>AUS</sub> (SD)	Mean <sub>USA</sub> (SD)	1.	2.	3.	4.	5.
1. Face-to-Face Willingness	3.11 (1.14)	3.11 (1.25)	-	.76**	-.30**	.11*	.07
2. VRIC Willingness	2.79 (1.14)	2.89 (1.26)	.71**	-	-.15**	.17**	.04
3. Intergroup Anxiety	1.34 (0.55)	1.55 (0.77)	-.30**	-.20**	-	-.05	-.22**
4. Technological Enjoyment	3.40 (0.67)	3.67 (0.71)	.10*	.18**	-.01	-	.05
5. Communication Apprehension	3.45 (0.81)	3.41 (.87)	-.01	-.04	-.12*	-.05	-

\*  $p < .05$ ; \*\*  $p < .001$

Subsequently, bivariate correlations were calculated (see Table 7.1). In both samples, willingness to approach the two types of intergroup contact were highly related. Additionally, intergroup anxiety and attitudes toward technology were associated with willingness to approach the outgroup in both face-to-face and virtual environments. Communication apprehension was only significantly correlated with intergroup anxiety.

Next, path analyses were conducted using Mplus (v7.4 Muthen & Muthen, 2012). Willingness to approach VRIC and willingness to approach direct intergroup contact were simultaneously entered as dependent variables in the analysis (see Table 7.2). Separate analyses were conducted for the two samples due to the different phrasing of the survey items for the dependent measures. Both models were fully saturated so model fit statistics were not available. The findings related to intergroup anxiety and willingness to approach intergroup contact across different contexts were replicated across the two samples. Firstly, higher intergroup anxiety was significantly related to lower willingness to approach face-to-face contact ( $B_{AUS} = -.63, p < .001$ ;  $B_{USA} = -.49, p < .001$ ) and VRIC ( $B_{AUS} = -.43, p < .001$ ;  $B_{USA} = -.24, p = .008$ ). In the Australian sample, higher technological enjoyment was significantly related to higher willingness to approach face-to-face contact ( $B_{AUS} = .16, p = .046$ ) and VRIC ( $B_{AUS} = .30, p < .001$ ). However, in the American sample, technological enjoyment was significantly related to willingness to approach VRIC ( $B_{USA} = .28, p < .001$ ) but not face-to-face contact ( $B_{USA} = .16, p = .060$ ). Communication apprehension was not significantly related to willingness to approach either face-to-face contact ( $B_{AUS} = -.06, p = .359$ ;  $B_{USA} = -.01, p = .940$ ) or VRIC ( $B_{AUS} = -.08, p = .222$ ;  $B_{USA} < .01, p = .981$ ).

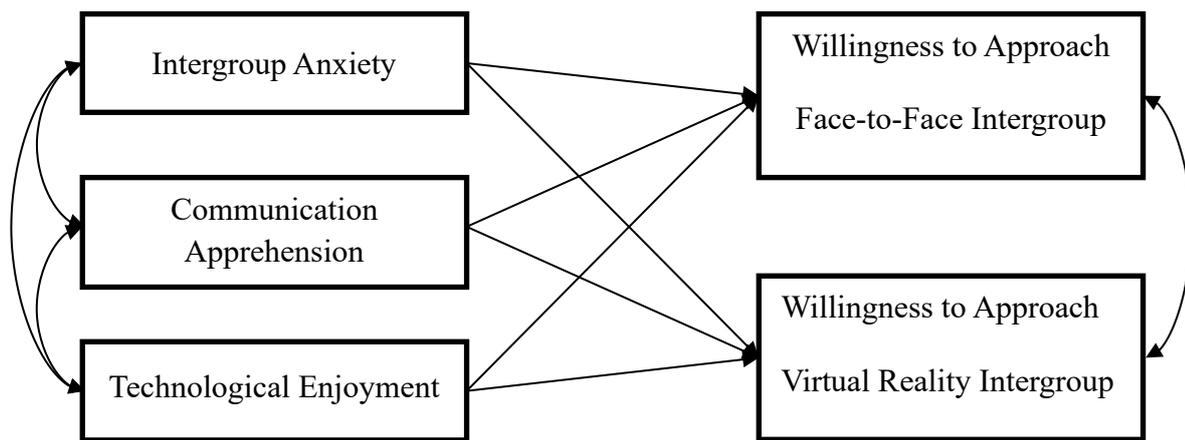


Figure 7.1. A schematic representation of the path analysis conducted, examining the relationship between intergroup anxiety and willingness to approach intergroup contact.

Table 7.2

*Standardised Regression [CI<sub>95%</sub>] Coefficients for the Full Path Analysis.*

	Australian Sample (N = 470)		American Sample (N = 442)	
	Face-to-Face	VRIC	Face-to-Face	VRIC
Intergroup Anxiety	-.30** [-.39 to -.22]	-.20** [-.29 to .12]	-.30** [-.41 to -.19]	-.15** [-.25 to -.04]
Technological Enjoyment	.10 [-.13 to .05]	.17** [.08 to .27]	.09 [-.01 to .18]	.16** [.06 to .25]
Communication Apprehension	-.04 [-.13 to .19]	-.06 [-.15 to .04]	-.01 [-.10 to .10]	.01 [-.10 to .10]

\*  $p < .05$ ; \*\*  $p < .001$

Finally, a Wald's test of parameter constraints was conducted to determine if the difference between the strength of the regression pathways between intergroup anxiety and the willingness to approach variables were significantly different from zero. In the Australian ( $\chi^2 [1] = 14.66, p < .001$ ) and American sample ( $\chi^2 [1] = 23.23, p < .001$ ) the test was statistically significant, indicating that the negative relationship between intergroup anxiety and willingness to approach face-to-face contact was significantly stronger than the relationship between intergroup anxiety and willingness to approach VRIC.

### 7.5 Discussion

The present study aimed to provide an initial assessment of the acceptability of a new form of intergroup contact that uses virtual reality technology. In contrast to the first hypothesis, mean willingness to approach face-to-face contact was significantly higher than mean willingness to approach VRIC in both samples. In the context of the wider literature on indirect intergroup contact, these findings provide initial evidence that individuals report more willingness to engage in a face-to-face interaction with an outgroup member in contrast to a technology-mediated method. This finding is contrary to the argument that indirect forms of intergroup contact have broader appeal or can act as a bridge that facilitates the uptake of face-to-face intergroup contact (Crisp & Turner, 2009; Dovidio et al., 2011; Turner & Cameron, 2016). However, the finding may also reflect that virtual reality technology is still new and unfamiliar. It may also reflect other factors, such as the low level of reported intergroup anxiety in the sample.

Consistent with the second hypothesis, the negative relationship between intergroup anxiety and willingness to approach VRIC was significantly weaker than it was for face-to-face contact. The significant negative relationship with both forms of contact illustrates that intergroup anxiety is a deterrent for interactions with outgroup members across a range of contexts and mediums (i.e., in real life and via technology). However, VRIC may provide a less aversive contact-choice than face-to-face contact when a person has elevated levels of intergroup anxiety. Future research could examine these findings further by considering how the features of indirect contact can mitigate the causes of intergroup anxiety. For example, a key component of intergroup anxiety is the anticipation of future threats (O'Donnell et al., 2019; Plant & Devine, 2003; Stephan et al., 2008). It is possible that participants foresee fewer potential threats when viewing and interacting with outgroup members in a simulated environment than in real life.

The strengths of the current paper include the replication of findings across two samples (University and Mturk) and two countries (Australia and the USA). However, the study has limitations. Firstly, the study examined willingness to interact with an outgroup member across two different contexts. The inclusion of the second contact type is a novel expansion on existing studies assessing volitional approach toward outgroup members, however, studies of this nature examine a preference to interact with the ingroup over the outgroup (Keon & Durrheim, 2010). The current study cannot conclusively conclude that the results observed are a product of intergroup preferences rather than a general preference for interactions through different mediums. However, the inclusion of the attitudes toward technology and communication apprehension measures in the analyses help to minimise this potential by removing variance related to evaluations of different contact mediums.

Secondly, the current study examined willingness to approach a single outgroup (Muslims). Current social trends indicate that Islamic persons experience a high level of discrimination (Markus, 2015), but they are only one minority among many that have this experience. For VRIC to be an effective intervention, it needs to be applicable to a wide range of social groups. Future research could assess the acceptability of VRIC for a wider range of social, ethnic, and religious groups.

In conclusion, participants report a greater willingness to engage in intergroup contact through face-to-face interactions than virtual interactions, but intergroup anxiety is a stronger deterrent for face-to-face intergroup contact than VRIC. The latter finding, combined with the observation that participants were overall willing to engage in VRIC, supports future efforts to develop this new form of indirect contact. VRIC could serve as a viable alternative for individuals who would otherwise avoid advantageous but anxiety-provoking interactions. Recent trends in filmmaking have seen an increase in

content that features members from minority groups in traditional media (Tukachinsky, Mastro, & Yarchi, 2017). If this trend continues into the development of immersive media content, individuals who would otherwise avoid face-to-face interactions with outgroup members, or who live in socially homogenous locations, could find themselves in a simulated social interaction that results in positive societal outcomes. Evaluating and implementing these forms of simulated intergroup contact is an important advancement for the field.

## Chapter 8 Preamble

In the previous chapters, I described how learning processes can underpin the formation of intergroup anxiety, which can subsequently predict intergroup avoidance (Chapters 2 and 4). Intergroup avoidance is purported to debilitate the wide spread efficacy of naturally occurring intergroup contact by reducing its occurrence. Therefore, a viable solution to this problem are interventions with which highly anxious individuals are more willing to engage (Chapter 5). These principles were applied in Chapter 7, where it was identified that intergroup anxiety may be a significantly weaker deterrent of VRIC than face-to-face contact. Thus, VRIC may be a suitable option to overcome the issue of intergroup avoidance.

The current chapter provides a preliminary investigation of the efficacy of VRIC in a sample of Australian undergraduates (Study 5,  $N = 82$ ). In a first test of VRIC, participants were exposed to repeated presentations of Black targets in immersive videos presented in a HMD (VR condition) or in still images on a computer screen (static condition). Participants in the VR exposure condition had greater increases in their subjective likeability of the outgroup exemplar following the experimental manipulation, compared to those in the static exposure condition. However, these effects did not generalise to a novel outgroup member. Participants experienced heart rate deceleration in the VR condition, irrespective of whether they viewed an ingroup or outgroup target. Additionally, this deceleration did not attenuate over time. These heart rate changes may reflect sensory processing and an orientating response, indicating that participants perceived the virtual environment with a level of realism. Whilst these results did not establish that VRIC can reduce intergroup anxiety, the findings suggest VRIC evokes a realistic and immersive experience. Future avenues to harness the immersion of virtual reality in an applied intergroup setting are discussed.

### **8. An Initial Test of the Efficacy of Virtual Reality Intergroup Contact**

Previous work has shown that virtual reality intergroup contact (VRIC) could prove instrumental in evoking social change by being more acceptable to people higher in intergroup anxiety, a characteristic typically associated with avoidant behaviours (Chapter 7). However, it remains to be determined whether VRIC is efficacious in improving intergroup relations. Accordingly, this chapter provides an initial empirical investigation of an exposure-based VRIC. We anticipate that exposure to outgroup members using immersive media will attenuate intergroup biases faster, compared to non-immersive exposure. This novel form of outgroup exposure should thus add to established exposure-based phenomena that improve intergroup relations.

Since Gordon Allport's influential contact hypothesis (1954), hundreds of studies have demonstrated that interactions with outgroup members can reduce prejudice (Pettigrew & Tropp, 2005). Nevertheless, these beneficial interactions do not occur readily. Contemporary work has thus extended the original intergroup contact hypothesis to incorporate a wide array of exchanges and exposures through different technological mediums (see Chapter 5). The ubiquitous availability of technological devices ensures that individuals can easily be exposed to outgroup members. Research shows these exposures are useful in improving intergroup relations. For example, vicarious intergroup contact using videos, or the viewing of an intergroup interaction, has been successful in increasing willingness to engage in future intergroup contact (e.g., Mazziotta, Mummendey, & Wright, 2011). Parasocial intergroup contact is a more basic approach that simply relies on exposure to outgroup representatives in traditional media (Schiappa, Gregg, & Hewes, 2007). This form of contact has also been shown to reduce prejudice and increase willingness to interact with outgroup members (e.g., Hoffner & Cohen, 2012). This body of work suggests that simply exposing people to outgroup members through media should increase their desire to

seek out opportunities to interact with outgroup members. By extension, the realism and immersion of virtual reality could enhance any exposure effects because there is greater similarity to the real world (Scheveneels, Boddez, Vervliet, & Hermans, 2016).

The consequences of virtual reality exposure to outgroup members remains untested, but studies on clinical anxiety suggest exposure-based techniques may be effective in reducing intergroup anxiety. Traditional exposure therapy treatments for clinical anxiety stipulate that the repeated in vivo exposure to feared stimuli will reduce the anxious response (Richard et al., 2007). Specifically, the habituation of anxiety occurs when the client feels anxious and learns that the anticipated negative outcomes are inaccurate (McGuire, Lewin, & Storch, 2014). In recent years, many clinicians have extended this traditional approach to expose anxious clients to representations of feared stimuli using virtual reality. This treatment option is known as virtual reality exposure therapy (VRET). Literature reviews and quantitative meta-analyses have consistently determined that VRET is effective at reducing clinical anxiety and specific phobias, with effect sizes comparable to traditional therapy techniques (Krijn, Emmelkamp, & Biemond, 2004; Powers & Emmelkamp, 2008; Meyerbröker & Emmelkamp, 2010; Opriş, Pineta, Garcia-Palacios, Botella, Szamosközi, S., & David, 2012). A key mechanism underpinning the success of VRET is the realism of the feared stimuli. Life-like stimuli induce greater anxiety, which facilitates a stronger habituation of anxiety that is maintained in other, life-like situations (Alsina-Jurnet, Gutiérrez-Maldonado, & Rangel-Gómez, 2011; Ling, Nefs, Morina, Heynderickx, & Brinkman, 2014).

The similarities between clinical and intergroup anxiety (see Chapter 2) provide a strong rationale to apply established methods from one domain to the other. The detrimental effects of intergroup anxiety, including greater intergroup avoidance (Plant & Devine, 2003) and prejudice (Stephan, Ybarra, & Bachman, 1999), on efforts to improve intergroup

relations highlights the importance of attenuating these responses. In the current study, the attenuation of intergroup anxiety was assessed through psychophysiological responses. Specifically, heart rate deceleration was considered as an objective measure of anxiety.

Heart rate deceleration occurs when the parasympathetic system has a dominant influence on cardiac responses, and is known to reflect a ‘freeze’ response (Roelofs, 2017). This type of response has traditionally been considered an orientating response that facilitated effective perceptual awareness and attentional focusing (Graham, 1992; Vila et al., 2007). Analogous fear responses are observed in animals. Deceleration of heart rate is commonly observed in animals when they are exposed to a threatening stimulus, such as a predatory animal. Thus, an organism’s initial response to a threat is to process the available information from the world around them.

Similar findings have also been observed in human subjects. Laboratory applications of aversive stimuli (e.g., a loud noise) routinely observe heart rate deceleration immediately prior to the onset of an expected aversive stimulus (Neumann & Waters, 2006). These physiological responses are commonly interpreted as an anticipatory response, indicating that the individual is preparing themselves for an event that threatens their safety and well-being. Consistent with this approach, Bradley, Moulder, and Lang (2005) found threatening pictures which cued an unpleasant electrocutaneous shock elicited heart rate deceleration, whereas pictures cueing safety did not. Thus, decelerating heart rate is an adaptive response to threat (Low, Lang, Smith, & Bradley, 2013).

The notion that heart rate deceleration reflects both sensory processing and fear suggests that more immersive content should elicit greater heart rate deceleration simply because there is more content to process, and that deceleration should be greater for more threatening stimuli. In relation to the amount of content, decelerating heart rate has been observed when reading both an unpleasant and pleasant piece of text. Decelerations of similar

magnitudes in this instance likely reflected the processing of the text, rather than an affective response (Bradley & Lang, 2007). In contrast, the immersive, 360-degree content observable in a virtual environment contains a large amount of information to be processed and this should initiate heart rate deceleration, with previous research supporting this notion. For example, heart rate decelerations were stronger for participants who reported greater immersion in the virtual environment (Wiederhold, Jang, Kaneda, Cabral, Lurie, May, Kim, Wiederhold, Kim, 2001). Evidence is also available to indicate that greater deceleration is apparent for more threatening stimuli. Specifically, in another study on social anxiety, viewing a male virtual avatar induced heart rate deceleration (Wieser, Pauli, Grosseibl, Molzow, Muhlberger, 2010), with this deceleration being greater when the avatar was closer to the participant's perspective (i.e., more threatening) than when further away (i.e., less threatening).. Thus, heart rate deceleration should occur when viewing immersive content in virtual reality, with fear-inducing content eliciting an even greater response.

### **8.1 Current Study**

The current study adopted the methodological approach of exposure to feared stimuli to improve intergroup relations. Participants received repeated exposure to outgroup members in a laboratory setting. Drawing from the established efficacy of VRET, repeated exposure to an outgroup member presented via an immersive HMD should reduce anxiety faster, and to a greater extent, than traditional non-immersive two-dimensional pictures, as the former more closely reflects real-life situations (Alsina-Jurnet et al., 2011). Additionally, VRIC's potential to reduce negative evaluations and increase intentions to interact with outgroup members was considered. The evaluation of VRIC was conducted using self-reported evaluations of the exemplars before and after the exposure procedure, as well as physiological markers of anxiety during the exposure procedure.

To ensure that any physiological response reflected threat, as opposed to sensory processing of the immersive media content, a within-subjects design was employed where participants were exposed to both in- and outgroup members. Furthermore, to examine the efficacy of immersive media compared to static images, a between-subjects methodology was employed to examine differences between these forms of exposure. To explore how VR and static exposure can impact perceptions of wider ethnic groups, a generalisation phase was included. In this phase, new exemplars were presented to participants to determine if changes in their responses as a result of their exposure were consistent across people of the same ethnic group. Similar protocols are commonly used in experimental studies of fear and anxiety (e.g., Dunsmoor & Paz, 2015; Lissek et al., 2008). The self-report questions also related to experimental and generalisation phase exemplars to ensure consistency in measurement approaches across the study.

By utilising this approach, several hypotheses were tested:

1. Greater heart rate deceleration to images of ingroup and outgroup members would be observed in the VR exposure condition than in the static exposure condition, reflecting sensory processing of the immersive media;
2. Exposure to outgroup members would induce greater heart rate deceleration compared to exposure to ingroup members, reflecting intergroup anxiety;
3. Differences in cardiac responding when viewing ingroup and outgroup members would attenuate over time, and this attenuation would be expedited for the VR exposure condition, relative to static exposure;
4. Participants in the VR exposure condition would have greater increases in their subjective likeability and willingness to meet outgroup members following the experimental manipulation, compared to those in the static exposure condition;

5. The attenuated fear responses for individuals in the VR exposure condition would continue in the test of generalisation, and;
6. The effects of VR-exposure on subjective likeability and willingness to meet outgroup members would generalise to a novel outgroup member.

## 8.2 Method

### 8.2.1 Participants

Students ( $N = 82$ ) completing a first year psychology course at an Australian university were recruited in exchange for course credit. Participants were randomly allocated to one of two exposure conditions (VR exposure, Static exposure). Only self-identified Caucasian participants were included in the analytical sample ( $N = 48$ ). Most of these participants were female (58.3%), with ages ranging from 17 to 47 ( $M = 22.17$ ,  $SD = 7.55$ ).

### 8.2.2 Materials

**Self-Report Measures.** Subjective likeability and willingness to meet outgroup members were each assessed by a single self-report item. Specifically, participants were provided with a picture of the faces included in the experimental procedure and asked to rate how likable they thought they were based upon their recent experiences (1 = *Very Unlikeable* to 7 = *Very Likeable*). They were also asked to indicate how willing they would be to meet them in person based upon their recent experiences (1 = *Not at all Willing* to 7 = *Very Willing*).

**Heart Rate.** Heart rate (HR) was measured in beats per minute (bpm) using electrocardiography (ECG). Ambu Blue Sensor R gel-based Ag/AgCl electrodes were placed below the participants' right and left clavicle to record heart rate, with the ground electrode placed over the lower right rib bone. Responses were recorded using an 8/36 Powerlab data acquisition system. ECG signals were recorded in conjunction with an ADInstruments ML116GSR Bio Amp. Heart rate R-peaks within each 0.5 s epoch were identified using a

custom written software. Artefacts in the ECG signals (e.g., spurious peaks or missed R-peaks due to movement) were identified and removed. The baseline measurement was taken 500 ms prior to the stimulus onset. Heart rate changes relative to baseline were calculated for each second of the stimulus duration (see Neumann & Waters, 2006). Accordingly, scores above 0 (i.e., positive scores) denote heart rate acceleration and scores below 0 (i.e., negative scores) denote heart rate deceleration, relative to the time immediately prior to stimulus-onset. Finally, scores were computed for blocks of 2 trials, to account for single trial artefacts.

**Control variable.** Participants completed the Reality Judgement and Presence Questionnaire (RJPQ; Baños, Botella, Gacia-Palacios, Villa, Perpina, & Alcaniz, 2000) to test for differences in the level of presence in the virtual environment across the conditions ( $\alpha = .95$ ). The 17-item measure included three subscales assessing how real the virtual world appeared (Reality Judgement), how congruent the virtual world was with the real world (Internal/External Correspondence), and how interactive the virtual world was (Attention/Absorption). Responses were on a 10-point scale (0 = *not at all* to 10 = *absolutely*).

**Stimulus selection.** Immersive videos and static images of 4 males (2 White and 2 Black) were developed to serve as the stimuli for the current study. Two groups of stimuli were created, with one White and Black exemplar matched on key features in each group. The key difference between these groups was hair (one pair had hair, the other pair was bald). The stimuli for the VR extinction condition were 10 s videos of the exemplars filmed with the Samsung Gear immersive 360° camera. The camera films 4096 x 2048 high resolution, live-action footage with a 360° field of view at 24 frames per second.

Immersive videos were filmed in the laboratory where data collection occurred. The room was set up for the experiment and the 360° camera was placed where the participants

sat at head height (using a tripod). This filming orientation was used so that the VR condition replicated the actual experience of the participants in the laboratory. The exemplars were filmed opening the door of the laboratory, walking toward the camera, and then standing still in front of the camera. All exemplars were male, as previous research has highlighted males are more readily associated with threat and should therefore elicit a greater physiological response (Navarrete et al., 2009). Thus, the immersive footage depicted a realistic scenario where the exemplars were entering the room participants were in and walking towards them. The static extinction condition used still shots taken from the end of the video so that the conditions were matched in content and context. These still shots were presented for 10 s.

### **8.2.3 Procedure**

Participants were informed that they were participating in an experiment designed to assess 'social interactions using virtual reality'. After granting consent, participants completed the self-report measures relating to willingness to engage in intergroup contact and the subjective likeability question. Subsequently, preparations for the ECG recordings were made. Participants assigned to the VR-exposure condition were then asked to place an Oculus Rift HMD on their head and adjust the straps so that the headset sat comfortably but firmly on their head. An unrelated immersive video was presented for 60 s to allow the participants to become familiar with immersive videos. The video was a standard office environment with furniture and no people. Participants were asked to direct their attention towards specific items displayed in the video so that they could become accustomed to interacting with the video. At the conclusion of the immersive video, participants removed the headset and were asked to verbalise their thoughts of the virtual reality system and their experiences using it. No participants indicated issues related to unpleasantness, nausea, and motion sickness.

Subsequently, all participants underwent the experimental protocol. In total, 24 10 s stimuli were presented to each participant. Each participant saw one White and one Black

target presented 12 times each. The order of stimulus presentation was randomised. The pairing of targets were based upon the stimulus-type (i.e., hair or bald). Stimulus-type was randomly allocated to participants ensuring equal representation in both conditions. The inter-trial interval randomly varied between 17 and 20 s. In the VR-exposure condition, immersive videos were presented through the Oculus HMD. Alternatively, the Static-exposure condition involved presentation of still images ( $472 \times 1056$ ) of the targets on a Tobbi TX Display 24" wide screen display with the participants sitting approximately 45 cm far away. At the conclusion of the experimental phase, participants were asked to complete a post-exposure questionnaire that included the RJPQ, subjective likeability questions, and intergroup willingness questions.

Following the post-exposure questionnaire, participants completed the experimental generalisation phase. Participants followed the same protocol detailed above with two differences: (1) participants viewed only 12 stimulus presentations (6 of a White target, 6 of a Black target), and (2) the targets were novel, in that they were the other pairing not presented during the experimental phase. Finally, participants were thanked and debriefed.

### 8.3 Results

Initially, group differences across condition were checked.<sup>5</sup> Independent sample *t*-tests indicated that the groups did not differ in their general anxiety,  $t(37) = 0.73$ ,  $p = .468$ , previous intergroup contact with the outgroup,  $t(37) = 0.80$ ,  $p = .429$ , or self-reported intergroup avoidance,  $t(37) = 0.44$ ,  $p = .663$ . Subsequently, all hypotheses were tested using

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<sup>5</sup> Participants completed additional measures in the pre-exposure questionnaire to ensure the groups did not differ in factors that may influence the results. These measures have been used in previous studies contained within this thesis. The measures included general anxiety (DASS-21, Lovibond & Lovibond, 1995,  $\alpha = .74$ , described in section 3.6.1), previous intergroup contact (*I have had a lot of positive/good interactions with Black people in the past six months*), and intergroup avoidance (Plant & Devine, 2003,  $\alpha = .89$ , described in section 4.4.2). **General rule-of-thumbs recommend at least 20 observations per cell (Simmons, Nelson, & Simonsohn, 2011) and so these variables were not included in the analyses, as the small sample size precludes robust findings from analyses.**

mixed factorial analysis of variance (ANOVA) in SPSS (v.25). The Huynh-Feldt correction was applied, with the adjusted degrees of freedom reported, when the assumption of sphericity was violated. All significant interactions were probed by Race, to determine if the presentation type (VR- or Static-exposure) impacted responses within each racial group presented. Participant's presence (RJPO) was controlled for in each analysis.

### 8.3.1 Self-Report Measures

Initial *t*-tests indicated the outgroup member was reported as *more likeable* than the ingroup member at pre-exposure,  $t(38) = 2.24, p = .031$ . Conversely, no initial differences in willingness to meet the ingroup or outgroup member were found,  $t(37) = 0.62, p = .539$ . A 2 (Condition: VR, Static)  $\times$  2 (Race: Black, White)  $\times$  2 (Time: Pre-exposure, Post-exposure) mixed ANOVA was conducted for indicators of subjective likeability and willingness to approach items separately. Separate analyses were conducted for the type of exemplar: Target or Test of generalisation. Condition was a between-subject factor, and Race and Time were within-subject factors. In all analyses, there were no significant main effects or interactions with the stimulus-type used (bald, haired) and so this was not entered into the model.

**Subjective likeability.** Initially, subjective likeability of the target exemplars were analysed (Figure 8.1). A significant main effect of Race was found,  $F(1,45) = 13.74, p = .001, \eta_p^2 = .23$ , whereby the Black exemplars ( $M = 3.52, SEM = .09$ ) were rated more likeable than the White exemplars ( $M = 3.06, SEM = .08$ ). These effects were moderated by a significant Condition  $\times$  Race interaction,  $F(1,45) = 4.79, p = .034, \eta_p^2 = .10$ . Additionally, the three-way Condition  $\times$  Race  $\times$  Time interaction was marginally significant,  $F(1,45) = 3.22, p = .079, \eta_p^2 = .07$ . Follow up analyses were conducted for the Black and White exemplars separately to determine if responses changed over time, depending upon Condition.

There was a marginal main effect of Time in subjective likeability of the Black exemplars,  $F(1,45) = 3.99, p = .052, \eta_p^2 = .08$ . This main effect was qualified by a marginal

Condition  $\times$  Time interaction,  $F(1,45) = 3.90$ ,  $p = .054$ ,  $\eta_p^2 = .08$ . In the VR-exposure condition, subjective likeability significantly increased ( $p = .001$ ) from pre-exposure ( $M = 3.12$ ,  $SEM = .15$ ) to post-exposure ( $M = 3.86$ ,  $SEM = .20$ ). There were no significant differences in subjective likeability reports for the Black exemplars in the static-exposure condition from pre-exposure ( $M = 3.48$ ,  $SEM = .15$ ) to post-exposure ( $M = 3.56$ ,  $SEM = .20$ ). There were no significant main effects or interactions for the analyses on subjective likeability of the White exemplars. Subsequently, an analysis on the subjective likeability of the test exemplars were conducted. This analysis was conducted to examination if any effect from the brief exposure could generalise to the wider social group, as indicated by responses to novel exemplars. No significant main effects or interactions were observed for responses to the test exemplars.

**Willingness to approach.** A significant main effect of Race was found for the willingness to approach the target exemplar (Figure 8.2),  $F(1,44) = 4.70$ ,  $p = .036$ ,  $\eta_p^2 = .10$ . Overall, participants reported greater willingness to interact with the Black exemplar ( $M = 3.12$ ,  $SEM = .13$ ) compared to the White exemplar ( $M = 2.87$ ,  $SEM = .12$ ). The main effect of Race was qualified by a marginal Race  $\times$  Time interaction,  $F(1,44) = 3.39$ ,  $p = .072$ ,  $\eta_p^2 = .07$ . Comparisons revealed significant increases ( $p = .002$ ) in willingness to interact with the Black exemplar from pre-exposure ( $M = 2.98$ ,  $SEM = .13$ ) to post-exposure ( $M = 3.30$ ,  $SEM = .15$ ). In contrast, there was a marginal decrease ( $p = .080$ ) in willingness to interact with the White exemplar from pre-exposure ( $M = 2.98$ ,  $SEM = .12$ ) to post-exposure ( $M = 2.76$ ,  $SEM = .16$ ). The three-way Condition  $\times$  Race  $\times$  Time interaction was not significant,  $F(1,44) = 2.32$ ,  $p = .135$ ,  $\eta_p^2 = .05$ . Like indicators of subjective likeability toward the test exemplar, there were no significant main effects or interactions in willingness to approach the test exemplars.

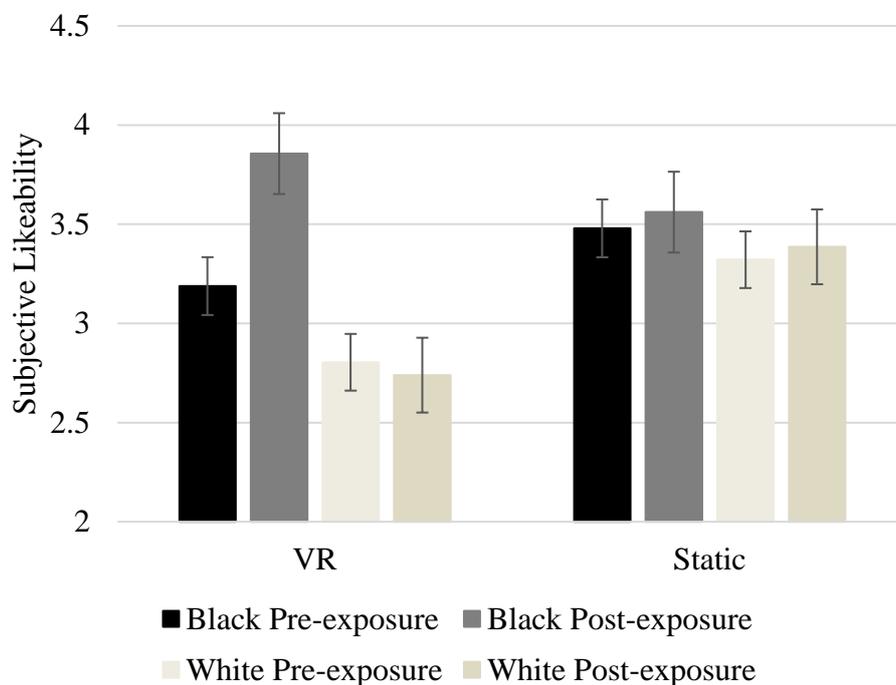
### 8.3.2 Heart Rate Change

Heart rate change was evaluated using a 2 (Condition: VR, Static)  $\times$  2 (Race: Black, White)  $\times$  6 (Block)  $\times$  10 (Epoch) mixed ANOVA. There were no significant main effects or interactions including stimulus type, and so it was not included in the analysis. A significant main effect of Condition was found,  $F(1,35) = 11.75$ ,  $p = .002$ ,  $\eta_p^2 = .25$ . Comparisons indicated that the VR-exposure condition had an overall lower heart rate ( $M = -1.01$ ,  $SEM = .34$ ) compared to the Static-exposure condition ( $M = 0.77$ ,  $SEM = .29$ ). There were no significant main effects for the within-person factors.

The significant main effect of Condition was qualified by a significant Condition  $\times$  Epoch interaction,  $F(9,315) = 2.66$ ,  $p = .006$ ,  $\eta_p^2 = .07$  (Figure 8.3). A multivariate simple effects analysis was conducted to determine if the degree of heart rate change significantly varied between Epochs within a Condition. This analysis provides a multivariate assessment of the combined pairwise comparisons of Epoch within each Condition, thus providing an overall significance test of whether heart rate change significantly varied across the duration of the stimuli presentation. Results indicated a simple effect of Epoch in the VR-condition,  $F(9,27) = 2.87$ ,  $p = .016$ ,  $\eta_p^2 = .49$ , suggesting significant changes in heart rate across the stimulus duration. As indicated by Figure 8.3, there is evidence of heart rate deceleration following the stimulus onset. In contrast, there was no significant simple effect of Epoch in the Static-exposure condition,  $F(9,27) = 1.18$ ,  $p = .349$ ,  $\eta_p^2 = .28$ . No other interactions were significant.

Heart rate during the Generalisation Phase was evaluated with a 2 (Condition: VR, Static)  $\times$  2 (Race: Black, White)  $\times$  3 (Block)  $\times$  10 (Epoch) mixed ANOVA. There were no significant main effects or interactions including stimulus type, and so it was not included in the analysis. There were no significant main effects. However, there was a significant Race  $\times$  Epoch interaction,  $F(4.89,41.42) = 2.46$ ,  $p = .036$ ,  $\eta_p^2 = .07$ , which was qualified by a

significant three-way Condition  $\times$  Race  $\times$  Epoch interaction,  $F(4.89,79.54) = 4.73$ ,  $p = .001$ ,  $\eta_p^2 = .13$ . No other interaction was significant. Separate analyses were conducted for each Race to explore the significant three-way interaction. When viewing the Black exemplars, the Condition  $\times$  Epoch condition was not significant (Figure 8.4),  $F(3.64,37.66) = 1.44$ ,  $p = .228$ ,  $\eta_p^2 = .04$ . In contrast, there was a significant Condition  $\times$  Epoch interaction for responses to the White exemplars (Figure 8.5),  $F(4.12,74.41) = 2.90$ ,  $p = .023$ ,  $\eta_p^2 = .08$ . The multivariate simple effect of Epoch was marginally significant in the VR-exposure condition,  $F(9,27) = 2.05$ ,  $p = .073$ ,  $\eta_p^2 = .41$ , suggesting more variation in heart rate across the presentation when viewing the White exemplar in virtual reality. As shown in Figure 8.5, there is an initial acceleration followed by sustained deceleration in heart rate. Conversely, there was no significant multivariate simple effect of Epoch in the Static-exposure condition,  $F(9,27) = 1.23$ ,  $p = .293$ ,  $\eta_p^2 = .30$ .



*Figure 8.1.* The estimated marginal means for subjective likeability toward the Black and White exemplars before and after exposure in each exposure condition. Error bars denote standard error of the mean.

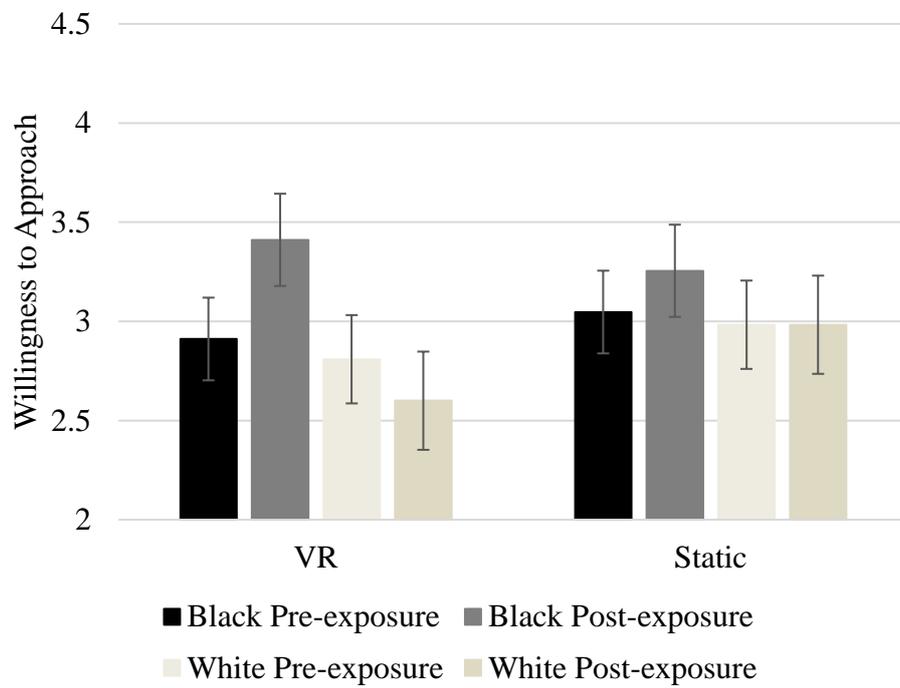


Figure 8.2. The estimated marginal means for willingness to approach the Black and White exemplars before and after exposure in each exposure condition. Error bars denote standard error of the mean.

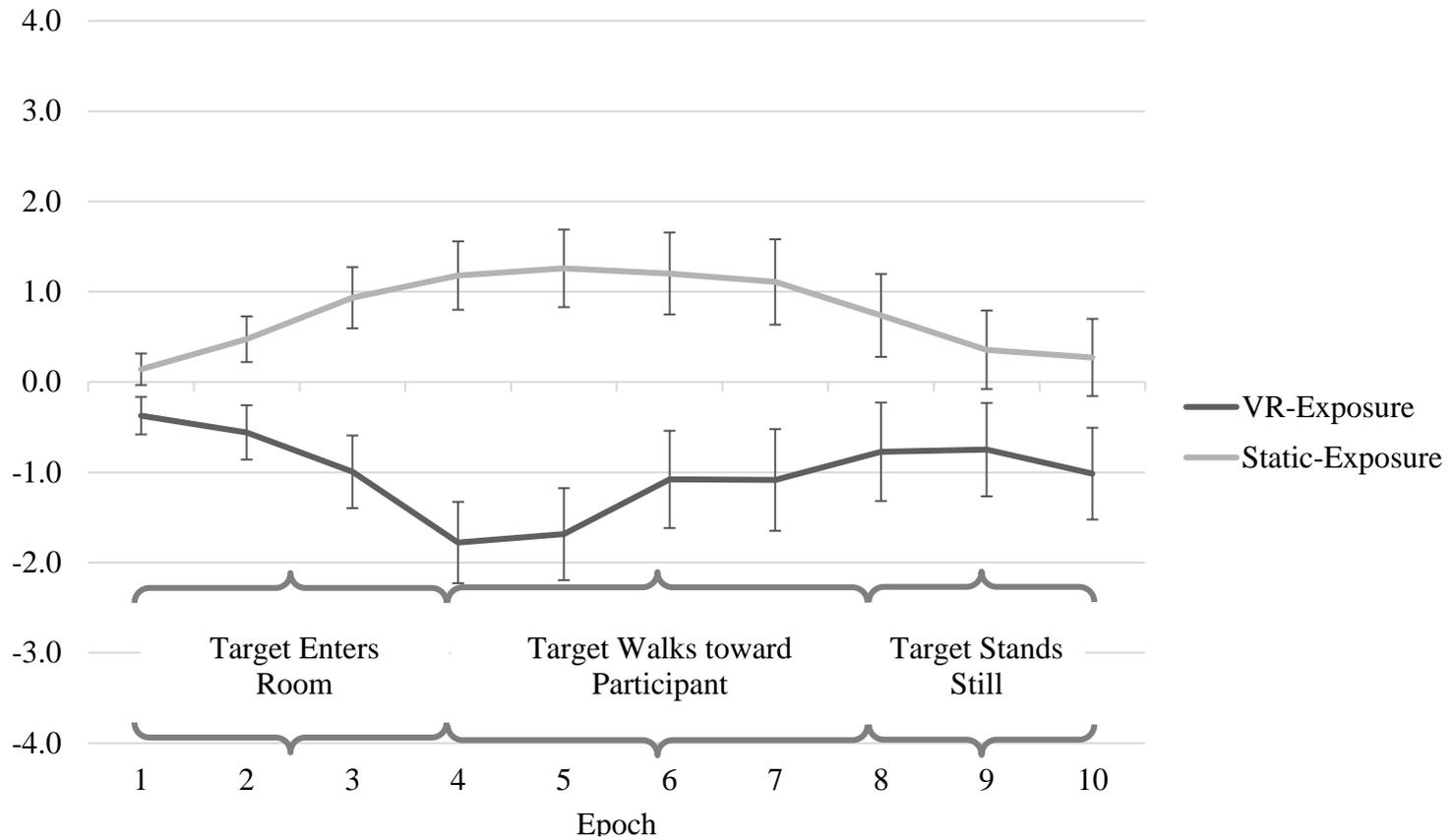


Figure 8.3. The estimated marginal means for heart rate change at each Epoch by Condition across the main experimental protocol. Error bars denote standard error of the mean.

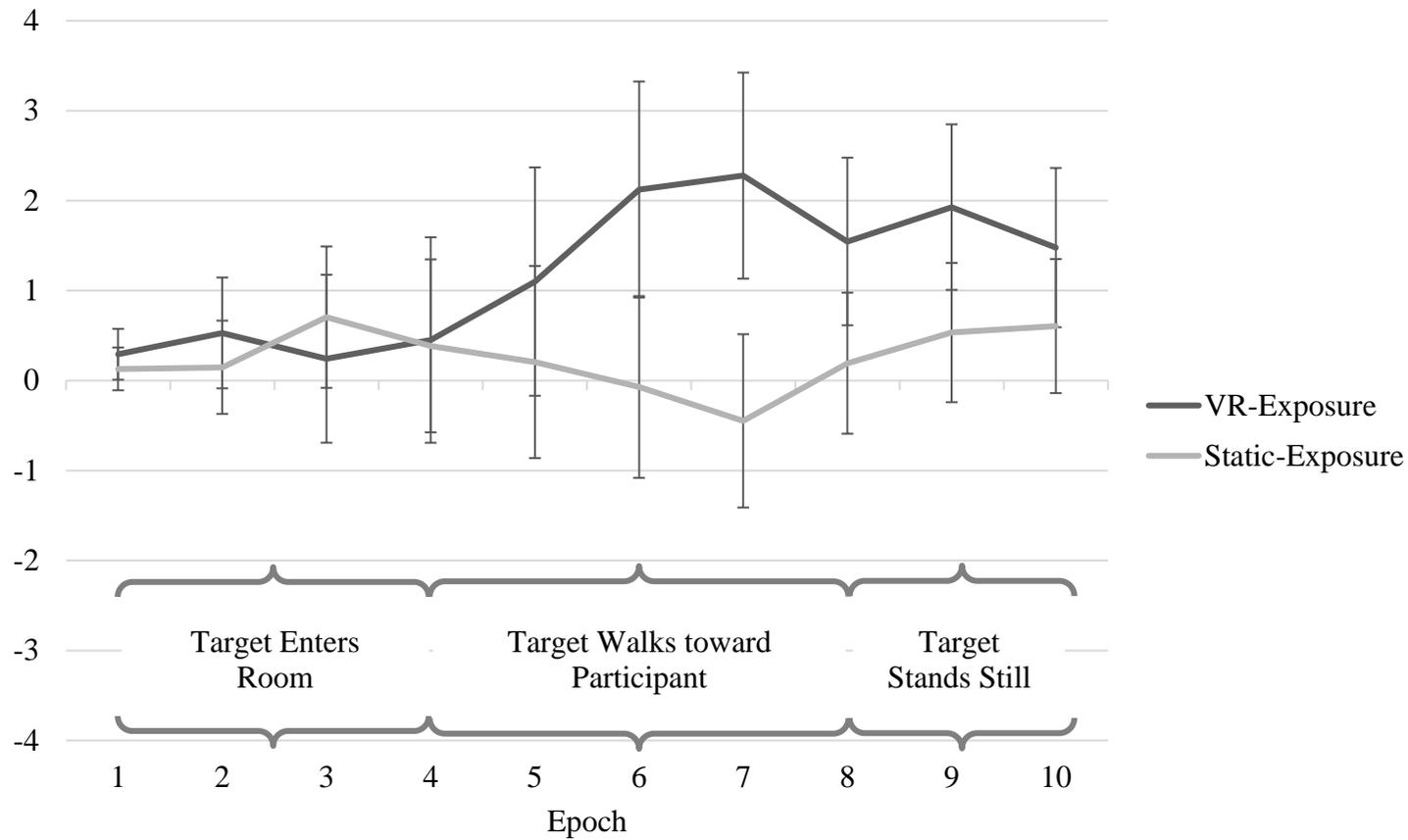


Figure 8.4. The estimated marginal means for heart rate change at each Epoch by Condition for responses toward the Black exemplar presented during the generalisation phase. Error bars denote standard error of the mean.

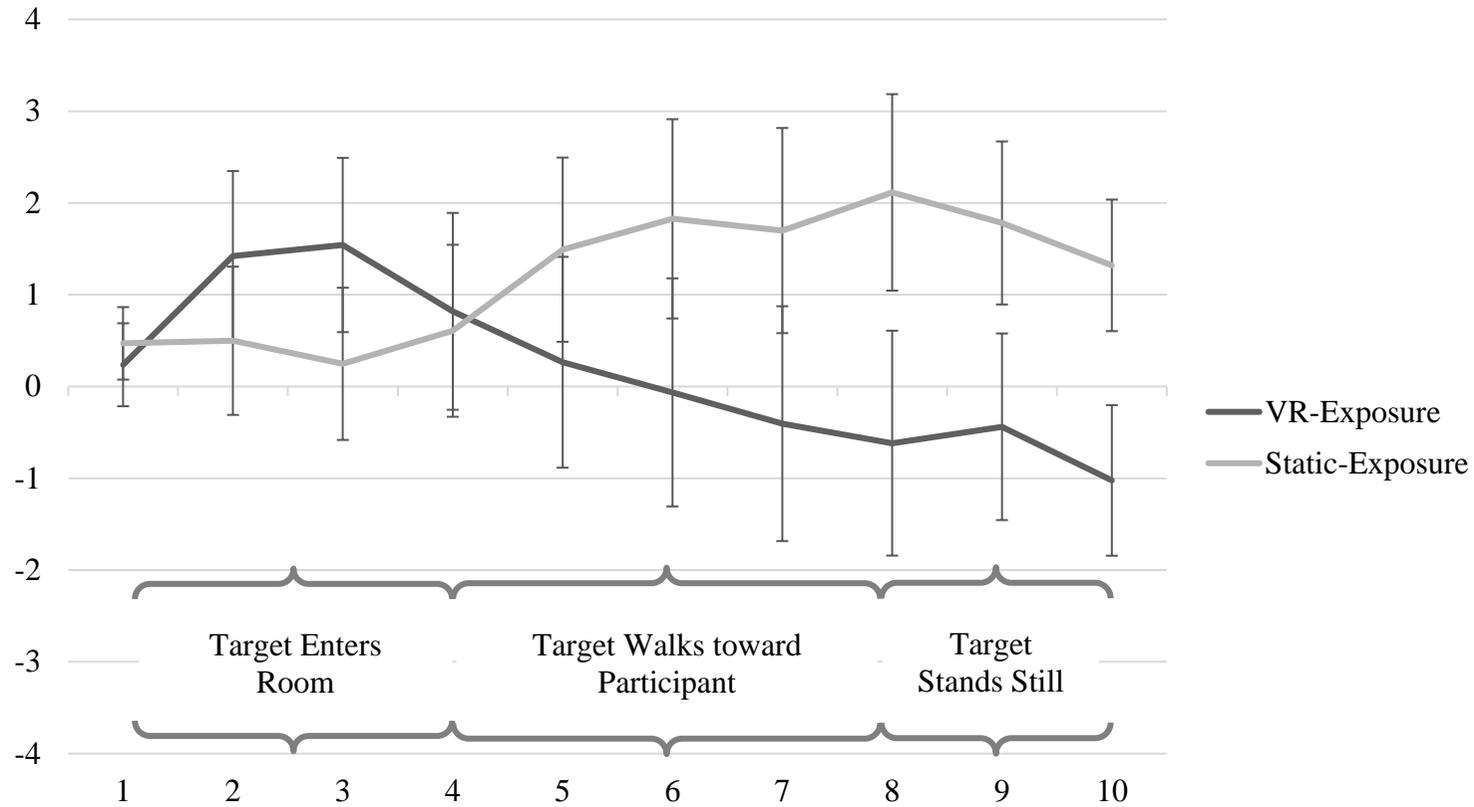


Figure 8.5. The estimated marginal means for heart rate change at each Epoch by Condition for responses toward the White exemplar presented during the generalisation phase. Error bars denote standard error of the mean.

## 8.5 Discussion

The current study was the first to explore the efficacy of VRIC as a method to reduce intergroup biases and segregation. Drawing inspiration from the clinical anxiety literature and established exposure therapy techniques, the anxiety-reducing capabilities of repeated exposure to an outgroup member in a 360-degree virtual environment was tested. The results did not provide conclusive evidence that virtual reality exposure can reduce intergroup anxiety and biases. Nevertheless, the current study has provided some insights that could be used in future endeavours to improve intergroup relations using immersive media.

Heart rate deceleration was observed during exposure to ingroup and outgroup members using VR, thus supporting the first hypothesis. This finding is congruent with previous studies that found heart rate deceleration was related to the degree of immersion in media (e.g., Wiederhold et al., 2001) and corresponds with evidence suggesting heart rate decelerates during the processing of sensory information (Graham, 1992; Vila et al., 2007). Compared to a static image, immersive media contains considerably more information to process regardless of the social stimuli included, thus explaining the main effect of condition.

In contrast, the second hypothesis was not supported as there were no significant differences in heart rate responses between ingroup and outgroup targets. There is a considerable body of evidence suggesting that viewing feared stimuli evokes a greater orientating response when individuals process potential threats (Bradley et al., 2005). Thus, the results from the current study suggest individuals did not find one target more threatening than the other. Congruent with this conclusion, the average heart rate change in the VR condition ( $M = -1.01$ ,  $SEM = .34$ ) was comparable to changes observed in previous studies examining non-fearful social stimuli in VR ( $M = 1.29$ ,  $SD = 1.87$ ,

Wieser et al., 2010) providing rudimentary evidence that the stimuli were not fear-inducing.

One explanation as to why participants may not have demonstrated a greater fear response toward the outgroup member was the sampling frame. The current study relied exclusively on undergraduate students enrolled in a psychology course. Younger (Stewart, von Hippel, & Radvansky, 2009) and more educated (Wagner & Zick, 1995) people tend to report lower intergroup biases. Accordingly, it is possible the younger and more educated individual's characteristic of a university sample genuinely had low (or no) biases to attenuate. Further evidence that the sample did not exhibit initial biases can be obtained from self-reported subjective likeability and willingness to engage in intergroup contact. Initial tests prior to exposure found the outgroup member was rated as more likeable than the ingroup member, with the average subjective likeability response around the mid-point of the scale. Both of these findings suggest a lack of intergroup bias. Whilst a direct measure of prejudice was not included in the current study, previous empirical work throughout this thesis can attest that undergraduate students have largely positive intergroup contact (Chapter 3), low levels of anxiety (Chapters 3, 4, & 7), and report low avoidance of outgroup members (Chapter 4). These findings provide further support that this sample likely had low initial intergroup biases. However, an alternative explanation is that the specific outgroup targets were interpreted as likeable and safe and any intergroup biases were not detected due to the inclusion of these specific exemplars. In either instance, it is apparent that the individual outgroup members presented were perceived as likeable.

The passive nature of the outgroup exposure could also potentially account for the perceived likeability of the outgroup members. Participants did not undergo contact and were not deceived into thinking any direct form of contact would occur. This passive

experience may not have evoked many of the maladaptive cognitions known to underpin anxious responses in an intergroup encounter, such as concerns regarding appearing prejudicial (Plant & Devine, 2003), being rejected by the outgroup (Barlow, Louis, & Terry, 2010), and outgroup hostility (Butz & Plant, 2006). More broadly, intergroup anxiety can be spurred within individuals by both perceived threats by the outgroup and apprehensions over their own actions in the presence of an outgroup member (Greenland, Xenias, & Maio, 2012). The current manipulation may not have induced either of these broad concerns, thereby contributing to the similar evaluation of both ingroup and outgroup exemplars that did not become more positive following repeated exposures.

The heart rate data did not provide evidence that brief VR-exposure to outgroup targets could attenuate heart rate deceleration. However, some intergroup effects were observed in the self-report measures. Subjective likeability to the outgroup target was shown to improve following the VR-exposure. In contrast, no changes were observed for subjective likeability of the ingroup target in the VR condition. Similarly, there were no differences observed for either the ingroup or outgroup target in the static-exposure condition. In relation to willingness to engage in future intergroup contact, individuals reported greater willingness to interact with the outgroup member following the brief exposure, regardless of the type of exposure, compared to the ingroup. Collectively, these results provide promising, but uncomprehensive, evidence for technologically mediated exposure to outgroups. Following exposure to an outgroup member in VR, participants reported they liked them more and would be more willing to interact with them (albeit to a similar magnitude as static-exposure). These results provide a promising first step in future explorations into the use of VR to alleviate intergroup

biases. Nevertheless, the lack of generalisation effects in subsequent analyses does restrict enthusiasm.

The psychophysiological results from the generalisation phase did not support the fourth hypothesis. Significant differences across epochs were observed, but only for responses when viewing the ingroup target in virtual reality. This unexpected effect was likely driven by the initial acceleration phase, followed by sustained deceleration. The acceleration component of this wave pattern is difficult to interpret. In typical examinations of anxiety, heart rate acceleration denotes a 'fight-or-flight' response (Roelofs, 2017) and is evoked in response to feared stimuli. For example, Hare (1973) found individuals with a spider phobia had heart rate acceleration when viewing images of spiders. This explanation is likely inapplicable to the current study, as the response was for ingroup members and did not emerge until the second phase of the study. It is unlikely that participants would exhibit a fear response toward their own ingroup, and if they did, that effect should have emerged during the initial exposure phase.

Another finding difficult to interpret is the lack of significant changes in epochs in the generalisation phase when viewing outgroup members in virtual reality. Simply from a sensory processing perspective, changes should have been observed when participants processed the immersive virtual content (Weiser et al., 2017). Taken together, the heart rate findings from the generalisation phase are difficult to reconcile. Future research should be conducted to determine whether the significant differences are replicable or merely spurious.

The results from self-report indicators of intergroup biases in the generalisation phase also did not adhere to expectations. In the generalisation phase, there were no significant differences from pre- to post-exposure for subjective likeability or willingness to interact for either of the new ingroup or outgroup targets, in either

condition. These findings suggest that the improvements observed for the initial targets reflected evaluations toward the individual presented, rather than the social group they represented.

The findings from the current study do not provide evidence that neutral exposure to outgroup members is effective in reducing physiological markers of fear or increasing willingness to interact with outgroup members. Nevertheless, the observed heart rate deceleration during VR exposure did indicate that immersive VR content is more life-like than static images. This finding does suggest that displaying diverse individuals in a 360-degree virtual environment could produce greater prejudice-reduction outcomes than more passive types of contact, when intergroup processes are more pronounced. Accordingly, future research should be encouraged by this initial study and continue to explore the role of VR in prejudice reduction strategies.

These strategies should consider facilitating an interaction in virtual reality, as opposed to merely providing exposure to outgroups. Additionally, researchers may implement processes known to enhance the efficacy of standard contact approaches. For example, future work should create immersive content with increased interactivity that adheres to the optimal conditions known to enhance the efficacy of face-to-face intergroup contact (Allport, 1954). The four optimal conditions are equal status between groups, explicit sanctions for intergroup contact from institutions, the pursuit of common goals, and intergroup cooperation (Allport, 1954; Pettigrew & Tropp, 2005). The optimal conditions could be integrated into immersive videos relatively easily. For example, a person of authority could introduce the film, outgroup members in the film could discuss issues related to both groups (common goals), and instances in which the two groups have cooperated in the past could be outlined. This could serve as an enhanced VR exposure condition. Optimal conditions have been successfully integrated

into previous investigations into computer-mediated contact. White and Abu-Rayya's (2012) novel e-contact program was developed to adhere to Allport's (1954) optimal conditions because there were equal numbers of ingroup and outgroup members, the students were working towards a common goal, and the program had the explicit support of school authorities. Evaluation of the program indicated that it induced sustained reductions in intergroup bias 6-months later. Subsequent research found the same results at a 12-month follow-up (White, Abu-Rayya, & Weitzel, 2014).

VRIC could also be improved by drawing upon established processes that facilitate individual-to-group generalisations of positive intergroup encounters (see Pettigrew, 1998 for a review of these processes). In particular, this might make it more likely that the increased subjective likeability of the outgroup target observed in the initial phase of the current study would generalise to a novel outgroup member. In addition to incorporating the optimal conditions, the e-contact program developed by White and Abu-Rayya (2012) was also specifically designed to evoke some of these individual-to-group processes. The intervention incorporated features to encourage a 'superordinate' group to emerge (Gaertner et al., 1993), where ingroup members began to consider the outgroup as members of a larger, common ingroup. Ingroup favouritism should then extend to members of the outgroup using this approach. This effect was evoked by asking participants to work together to ensure Australia's environmental future, thus creating a common identity (i.e., Australian). VRIC could benefit from similar approaches to ensure any beneficial effects transfer to the wider social group represented.

In sum, future research should be conducted to delineate how virtual reality can be used to improve intergroup relations. The initial efforts reported in this study found inconsistent results. Nevertheless, the available evidence suggests exposure to VR is

more immersive and evokes greater anxiety than standard images. The realism and immersion created through VR is purported to be instrumental in increasing the efficacy of exposure therapy (Scheveneels et al., 2016). Interventionists could use this information to develop VR interventions offering both intensive immersion and anxiety alleviating agents. Reducing intergroup anxiety could have wide reaching implications for intergroup relations. Lower anxiety could directly reduce prejudice and promote the occurrence of naturalistic intergroup contact (Paolini et al., 2018). The promise of a more inclusive and cohesive society is an enticing prospect that should spur continued efforts to promote intergroup relations. The preliminary results reported here suggest VR could play a role in these future efforts, but more work is required.

### **Chapter 9 Preamble**

This final chapter surmises the theoretical advancements and main empirical contributions reported across the thesis. I commence the discussion by restating the three aims of the thesis and identify the contribution of each chapter in addressing each aim. These contributions include (1) a theoretical synthesis of learning theory and social psychological theory as they relate to intergroup relations, (2) a validation of the Pavlovian conditioning framework in explaining the formation of intergroup fear and anxiety, (3) a new scale of intergroup anxiety that can be used by social psychologists, sociologists, and clinicians, (4) the advancement of a theoretical framework of acceptability as it relates to contact-based interventions, (5) a novel type of intergroup contact (VRIC) with the potential to reduce prejudicial attitudes. The limitations of the five studies are provided throughout the empirical chapters of this thesis. Nevertheless, these are summarised and extended, then linked to future research directions. Possible implications of this line of work for the scientific and wider community are embedded throughout. My concluding statement reiterates the importance of this research and details an optimistic outlook for future endeavours to promote social cohesion.

## **9. General Discussion**

### **9.1 Summary and Synthesis of Findings**

The extant literature suggested that positive and meaningful interactions between members of distinct social groups can improve intergroup relations (Allport, 1954; Pettigrew & Tropp, 2006). In contrast, avoidance of these interactions can prolong intergroup tensions and impede efforts aimed at improving social cohesion. Previous research has found a clear link between intergroup anxiety and avoidance (Cole & Yip, 2008; Duronto, Nishida, & Nakayama, 2005; Swart, Hewstone, Christ, & Voci, 2011), suggesting that identifying factors that promote the occurrence and reduction of intergroup anxiety could provide an important avenue to improve intergroup relations via the reduction of avoidance. The overarching goal of this research program was to further our understanding of intergroup anxiety and how it relates to avoidance, and then identify practical and viable solutions to reduce intergroup avoidance. Accordingly, this thesis addressed three aims:

- (1) To integrate associative learning and social psychological theories to explain the formation of intergroup anxiety
- (2) To understand how intergroup anxiety can contribute to a deterioration in intergroup relations, through intergroup avoidance, and;
- (3) To provide an acceptable form of intergroup contact using virtual reality technology.

More specifically, the thesis explored learning processes underpinning anxiety in intergroup contexts and how they relate to avoidance, and identified a potential method, theorised to be accepted and efficacious, to overcome intergroup avoidance using virtual reality technology. This program of research drew upon established principles from multidisciplinary research to deepen our understanding of anxiety and avoidance in

intergroup settings. A synthesis of these multidisciplinary literatures culminated in two theoretical reviews and one systematic review ( $k = 72$ ). The insights and applications derived from this theoretical work were subsequently tested in four empirical chapters utilising data collected from four survey-based studies ( $N = 2,095$ ) and one experimental investigation ( $N = 82$ ). This body of work should contribute practical solutions to decrease intergroup segregation and increase social cohesion. The key contributions of this thesis, and how these advance the literature, are discussed below.

## **9.2 Scientific Contributions**

### **9.2.1 A theoretical synthesis of learning theory and social psychological theory as they relate to intergroup relations.**

Aversive conditioning processes are known to contribute to the formation of anxiety disorders in a range of contexts (Fanselow & Sterlace, 2014). Recent experiments have also considered learning processes in intergroup settings by assessing how individuals can acquire fear responses toward individuals from distinct social and religious groups (Olsson, Ebert, Banaji, & Phelps, 2005). In these studies, social stimuli (i.e., CSs) are paired with pain-eliciting stimuli (i.e., USs) until participants learn to associate the presentation of the social stimuli with the aversive stimuli, leading to the formation of fear to the social stimuli. Whilst informative, these studies examine fear toward individuals and rarely consider generalisation effects or the broader effect of fear acquisition on intergroup relations. In contrast, social psychologists understand that negative experiences with outgroup members can lead to intergroup anxiety (e.g., Techakesari et al., 2015; Visintin, Voci, Pagotto, & Hewstone, 2016), yet critical reviews of this literature have identified that previous studies in this field rarely consider the mechanisms underpinning how these negative encounters lead to anxiety (McKeown & Dixon, 2017).

The theoretical and empirical work in Part One of this thesis incorporates these two approaches in an investigation of fear acquisition processes in intergroup encounters. By incorporating the two approaches, novel insights into how intergroup anxiety is formed following aversive events were provided. This work addressed the first aim of the thesis: *To integrate associative learning and social psychological theories to explain the formation of intergroup anxiety.*

A theoretical assertion was presented, whereby individuals who have negative encounters with outgroup members could experience fear (episodic anxiety) and learn to anticipate aversive outcomes in future interactions, contributing to the formation of intergroup (chronic) anxiety (Chapter 2). Across two studies (Chapter 4) this theoretical assertion was tested and supported. Participants who reported having an unpleasant encounter with an outgroup member reported more retrospectively recalled fear during the encounter, which subsequently predicted higher chronic anxiety toward the entire outgroup. Additionally, intergroup anxiety significantly predicted greater intergroup avoidance.

The inclusion of intergroup avoidance as the main outcome addressed the second aim of the thesis: *To understand how intergroup anxiety can contribute to a deterioration in intergroup relations, through intergroup avoidance.* Previous research has shown how intergroup anxiety predicts avoidance and several mechanisms have been proposed (Stephan, 2014). The intergroup threat theories (Stephan & Stephan, 2000; Stephan & Renfro, 2002) claim intergroup anxiety originates from a belief that the outgroup threatens the individual and their ingroup. Accordingly, anxiety is known to predict avoidance due to negative expectancies of future encounters (e.g., Plant & Devine, 2003). The work in Chapters 2 and 4 expand our knowledge on how individuals may come to believe future encounters will have adverse outcomes. Aversive events in

an intergroup encounter could lead to an individual *learning to anticipate* that something unpleasant will happen again when interacting with an outgroup member in later encounters, thereby contributing to intergroup avoidance.

The theoretical and empirical work in Chapters 2 and 4 could have broad applications to contemporary approaches aimed at reducing intergroup anxiety. The findings presented in this thesis suggest fear in both clinical and intergroup settings can be acquired through aversive conditioning. Due to their shared aetiology, it is possible that anxiety reducing processes in clinical settings could also be efficacious in intergroup settings. For example, the efficacy of both exposure therapy and intergroup contact are premised on repeated exposure to the feared stimulus in the absence of an aversive event (Chapter 2). Highlighting the similarities between clinical and intergroup anxiety provides a strong rationale to apply anxiety-reducing knowledge to an intergroup context.

The expansive literature detailing effective methods to attenuate and treat anxiety provides new and exciting opportunities for scholars and interventionists to reduce intergroup anxiety and improve intergroup relations. The numerous findings from laboratory and clinical studies established during the previous 100 years could yield a plethora of viable research directions beyond the scope of a thesis. To highlight some of these avenues for future consideration, Chapter 2 reviewed evidence that exploring cognitive factors to reduce the expectation that an outgroup member poses a threat (CS-US contingency, Luck & Lipp, 2016) could enhance the effects of intergroup contact.

Additionally, the review identified that most anxiety-reducing strategies are not permanent, and that fear can return depending upon the context of extinction (Bouton, 2002). As identified in subsequent chapters, research protocols that have examined

intergroup contact are typically limited to short-term investigations (Paluck & Green, 2009; 2018). Assessments and subsequent attenuation of a potential return of fear in an intergroup context could use established methodologies from the clinical anxiety literature (i.e., multiple context extinction, Bandarian-Balooch, Neumann, & Boschen, 2015). These future research questions were beyond the scope of the current research program. Nevertheless, the theoretical contribution that clinical and intergroup anxiety share a similar aetiology could inspire novel empirical investigations and future applications of anxiety-reducing processes. It was this realisation that inspired the development and validation of virtual reality intergroup contact (VRIC), as VR has been effective in reducing clinical anxiety (see section 9.2.5).

### **9.2.2 A validation of the laboratory-based Pavlovian conditioning framework in explaining the formation of intergroup fear and anxiety.**

The two empirical studies relying on retrospectively recalled conditioning events (Chapter 4) provided evidence that Pavlovian conditioning studies have ecological validity. Whilst empirical investigations of aversive learning processes in controlled laboratory settings have been used to develop understanding and treatments for clinical anxiety, these studies have been criticised. These experimental designs often unambiguously pair a strong, biologically-eliciting stimuli to a specific unconditioned stimulus. Accordingly, these studies have been criticised for relying on simplified and exaggerated learning procedures that cannot account for the complexity of human interactions and other learning opportunities (e.g., Beckers et al., 2013).

Addressing these criticisms in an intergroup context could support the validity of laboratory-based examinations of intergroup anxiety. Experimental manipulations that increase and decrease fear and anxiety in limited, contextually-specific, and contrived settings offer a methodologically robust and ethical way to conduct intergroup

relations research. Methodological benefits include sensitive measurements of bias (i.e., physiological responses), and the ability to isolate key mechanisms through random allocation to experimental groups and experimental manipulations. Additionally, conducting controlled manipulations within a laboratory limits unintended consequences, such as increased hostility toward an actual outgroup person. Knowing conditioning-based studies are analogous to real-world processes ensures that safe and thorough scientific advancements can be made in the laboratory with the confidence that they can lead to real-world outcomes. Thus, addressing criticisms regarding the ecological validity of these approaches has important implications for future research.

Previously, efforts have been made to reconcile the reliable and informative laboratory findings to more ecological assessments of anxiety aetiology in the clinical anxiety literature. Retrospective reports of direct conditioning events have predicted the origins of clinical anxiety disorders (e.g., Merckelbach, van den Hout, Hoekstra, & deRuiter, 1989), but these studies have also been the subject of criticisms (Menzies & Clarke, 1994; Menzies, Kirkby, & Harris, 1998). Specifically, the measurement instruments used in previous studies asserted fear onset as the result of a traumatic event indicated aversive conditioning had occurred (Menzies et al., 1998). However, aversive conditioning requires an *association* to be formed between a previously neutral stimuli and an unconditional stimulus that changes the affective evaluation of the previously neutral stimuli.

The methodology employed in Chapter 4 addressed concerns regarding the ecological validity of laboratory-based conditioning studies, while also addressing some of the methodological criticisms of retrospective studies. Participants were asked if they had previously had an encounter with an outgroup member they did not enjoy, and whether something unpleasant happened during this encounter. The unpleasant event

was recorded as an open-ended response and assessed to be a valid aversive event by two informed reviewers. The combination of the aversive event *paired with* the outgroup member was conceptualised to be analogous to a CS-US pairing in laboratory studies.

The mixed methods approach employed in Chapter 4 considered the diverseness of learning events as reported in participants' own words and found empirical support that unpleasant events during an interaction with an outgroup member can lead to anxiety. These findings should mitigate some concerns regarding the ecological validity of laboratory-based learning tasks in intergroup settings, leading to increased confidence that the outcomes and implications of these studies can also be applied in the real world.

### **9.2.3 A new scale of intergroup anxiety that can be used by social psychologists, sociologists, and clinicians.**

In order to acquire the novel insights contained within this thesis, the Cognitive, Affective, and Physiological Intergroup Anxiety scale (CAP-IA) was developed. In addition to the established cognitive and affective indicators of anxiety, physiological responses are reliable markers of anxiety in naturalistic intergroup contexts (e.g., Blascovich, Mendes, Hunter, Lickel, & Kowai-Bell, 2001). Physiological responses are therefore considered one of three important components in recent definitions of intergroup anxiety (Stephan, 2014). Despite the importance of physiological responses in the conceptualisation of intergroup anxiety, no established scale included a self-report assessment of physiological changes. Rather, all established scales measured the affective and/or cognitive components (e.g., intergroup anxiety scale, Stephan & Stephan, 1985). Of additional relevance to the current body of work, physiological responses are also widely measured in aversive conditioning studies. Thus, the CAP-IA

was developed to further connect findings from aversive learning experiments to the survey-based designs used in this body of work and to provide a theoretically comprehensive measurement tool.

Chapter 3 validated a self-report, three factor scale that included all three components of intergroup anxiety, as conceptualised by Stephan (2014). Across three studies, the three-factor solution of the survey instrument was supported. Congruent with theory and past research, the CAP-IA was significantly related to realistic intergroup threat, negative intergroup contact, concerns regarding the outgroup, communication apprehension, general anxiety, general evaluation of the outgroup, and intergroup avoidance. Collectively, the multi-study validation of the CAP-IA found robust evidence for the scale's construct and convergent validity.

As the first measure of intergroup anxiety that assesses all three components of intergroup anxiety, the CAP-IA is an important contribution from the current thesis and can be utilised in future research. Contemporary research is increasingly interested in multi-study, international, and large-scale scientific investigations. Many objective indicators of physiological responses are contingent on expensive equipment that often require laboratory space and considerable expertise to operate. Due to these restraints, studies examining physiological responses are typically restricted to single-site, small sample investigations. Whilst it is not claimed that a self-report indicator of physiological responses is as sensitive or robust as more objective indicators, the CAP-IA does provide an avenue for large scale and international investigations of self-reported physiological responses in an intergroup context.

The CAP-IA could be used in a wide array of contexts, including applied settings. The efficacy of many of the contact-based interventions discussed throughout this thesis (e.g., e-contact, imagined contact) have been assessed by their capacity to

reduce intergroup anxiety (e.g., White et al., 2019). As a brief, but informative measure of intergroup anxiety, the CAP-IA would also be well suited to evaluate contact-based interventions. Furthermore, the CAP-IA could be used as an important screening tool prior to the application of these interventions. As noted in Chapter 5, highly anxious and avoidant individuals are the ones who are the least likely to accept contact-based interventions but are the most likely to benefit from them. As the CAP-IA was reliably linked to intergroup avoidance, using the scale to identify individuals who may be less willing to engage in contact-based interventions in institutional settings could allow targeted and considered communications designed to promote their involvement in these activities (see section 5.4.2). In addition to potential future uses, the CAP-IA was instrumental to the empirical work conducted throughout this thesis, contributing to findings with wide ranging implications.

#### **9.2.4 The advancement of a theoretical framework of acceptability as it relates to contact-based interventions.**

A key theoretical contribution of the present body of research is the attempted validation of a dominating perspective in the study of intergroup contact: Indirect contact provides a viable alternative to naturalistic encounters because the latter are more likely to be avoided (e.g., Dovidio, Eller, & Hewstone, 2011; Turner & Cameron, 2016; White, Harvey, & Abu-Rayya, 2015). The assertion that indirect intergroup encounters can overcome intergroup avoidance is an exciting prospect. However, a sophisticated discussion of what promotes indirect contact in the first instance had not occurred. Consequentially, scholars and interventionists have not actually assessed the practical utility of interventions to improve intergroup relations. This feature is an important first step because the efficacy of an intervention is irrelevant if it is not available, or if people do not take up opportunities to participate. In the absence of

previous empirical research, a broad theoretical model was advanced to stimulate work in this area. The temporal model of acceptability (Sekhon et al., 2017; Chapter 5) considered the antecedents predicting the occurrence of the intervention as a starting point, and factors that could promote its longevity. This model was built using findings from research on medical interventions, health psychology, and naturalistic intergroup contact.

Following this broader theoretical review on institutional and individual acceptance, focused hypotheses on individual acceptance were empirically tested for virtual reality intergroup contact (VRIC, Chapter 6). Across two studies, people's willingness to engage in face-to-face intergroup contact was greater than their willingness to engage in VRIC, but intergroup anxiety was a stronger deterrent for face-to-face contact (Chapter 7). A plausible explanation for this finding is that individuals with lower initial biases may prefer face-to-face intercultural encounters compared to indirect forms of contact. However, individuals with thoughts and feelings known to contribute to elevated prejudice and avoidance of outgroup members would be more willing to interact indirectly with the outgroup.

These findings contribute to a broader discussion regarding encouraging engagement in indirect contact strategies using the temporal model of acceptability (Chapter 5). Encouraging participation in intergroup contact likely requires personalisation (e.g., Sturmer & Benbow, 2017). In turn, individualised campaigns to promote contact likely requires time and energy. By finding that those who could benefit the most from prejudice-reducing strategies are also more likely to prefer indirect intergroup contact, an argument for allocating restricted resources to promote indirect forms of contact to those higher in anxiety can be formed. This approach could ensure the maximised impact of contact-based approaches, where prejudice reducing

strategies are successfully targeted at those who have higher intergroup biases and are less likely to engage in naturalistic contact. Using this model of acceptability to test features that could promote the occurrence of efficacious contact-based interventions has profound practical implications. Developing targeted interventions that are tailored to individual motivations and tolerance for intercultural experiences should increase acceptance of contact-based programs. In turn, encouraging widespread uptake of these interventions would prove instrumental in reducing intergroup segregation, as intergroup contact interventions are demonstrated to reduce intergroup avoidance (e.g., Miles & Crisp, 2014).

### **9.2.5 A novel type of intergroup contact (VRIC) with the potential to reduce prejudicial attitudes and intergroup avoidance.**

The work in Part One showcases how multidisciplinary approaches can expose novel solutions to societal problems that may not have been identified otherwise. Furthermore, a key conclusion from Part One is that established methods to reduce clinical anxiety could be effective in attenuating intergroup anxiety. Accordingly, Part Two of the thesis (specifically, Chapter 8) implemented a recent anxiety-reducing intervention from the field of clinical anxiety and applied it to intergroup relations. Virtual reality exposure therapy (VRET) is known to reduce anxiety (e.g., Krijn, Emmelkamp, & Biemond, 2004). VRET is also known to be more accepted, compared to traditional face-to-face treatment options because clients have lower apprehension before the therapy session begins (Bush, 2008). The efficacy and acceptance of virtual reality in the treatment of clinical anxiety inspired a comprehensive assessment of the feasibility of VR exposure in an intergroup context to address the third aim of this thesis: *To provide an acceptable form of intergroup contact using virtual reality technology.*

Unfortunately, the initial test of VRIC did not provide unequivocal evidence that brief exposure to outgroup members through immersive media can improve intergroup relations. Previous research has found exposure to outgroup members across a range of audio-visual medias can improve intergroup relations (e.g., Schiappa, Gregg, & Hewes, 2005), but these effects were not replicated for brief, neutral exposure to outgroup members using immersive content. VRIC was demonstrated to improve subjective likeability of the outgroup target, but few other meaningful intergroup effects were observed. Nevertheless, improvements in subjective likeability indicates that the project provided preliminary evidence that VR could be instrumental in improving intergroup relations, pending future research. In undertaking the initial examination of VRIC, the theoretical and empirical work in Part Two also provided insights applicable to prejudice-reducing strategies by evidencing the immersive potential of VR.

An examination of the psychophysiological data suggested participants who were exposed to 360-degree immersive videos showed a greater heart rate deceleration, irrespective of whether the targets were ingroup or outgroup members. This effect is congruent with previous studies on presence in VR, suggesting that individuals were more immersed in the media content (Wieser, Pauli, Grosseibl, Molzow, Muhlberger, 2010). This result could spur future research seeking to apply immersive video content in a contact-based program. Presence in immersive content is known to enhance the experience of VRET (Alsina-Jurnet, Gutiérrez-Maldonado, & Rangel-Gómez, 2011) and could therefore enhance the efficacy of prejudice-reducing exposure-based contact.

Creating positive and intimate immersive content using established principles from the social psychology literature could yield a novel prejudice-reducing strategy. Future research should draw upon Allport's initial optimal conditions (Allport, 1954) and existing models of individual-to-group processes, such as recategorisation

(Pettigrew, 1998). These same processes have been successfully evoked in intergroup contact interventions, as indicated by the success of e-contact (White, Abu-Rayya, & Weitzel, 2014) and imagined contact (Vezzali, Stathi et al., 2015). The potential benefits of VRIC, including interactivity and presence (Chapter 6), suggests that future interventions could enhance the existing indirect contact strategies. Whilst more work is needed, efficacious and accepted VR interventions could add to the growing number of contact-based phenomena known to reduce prejudice and intergroup segregation.

### **9.3 Limitations**

Discussed below are common limitations across all five studies. These include a narrow focus on intergroup anxiety and majority members, limited sampling frames, the use of behavioural intention measures (c.f., actual behaviours), and cross-sectional research designs.

#### **9.3.1 Alternative Processes for Intergroup Avoidance.**

The current thesis drew upon established processes implicated in clinical anxiety and applied them to intergroup anxiety. A key rationale of this focus was the established link between anxiety and avoidance in intergroup contexts. Nevertheless, there are other processes known to predict intergroup avoidance. Disgust sensitivity and disease avoidance are implicated in intergroup biases and are reliably linked to intergroup avoidance behaviour. Disgust is a feeling of revulsion which typically coincides with a desire to withdraw from, or remove, the eliciting stimulus (Oaten, Stevenson, & Case, 2009). In much the same way that anxiety is argued to facilitate withdrawing from threatening stimuli, disgust is an evolutionary derived disease-avoidance function (Oaten et al., 2009). Research has demonstrated that individuals higher in disgust sensitivity also report greater prejudices (Choma, Haji, Hodson, & Hoffarth, 2016; Choma, Hodson, & Costello, 2012; Hodson & Costello, 2007). Disgust sensitivity is

also related to ingroup preferences (Navarrete & Fessler, 2006), and consequentially outgroup avoidance (Cottrell & Neuberg, 2005).

Disgust was outside the scope of the current thesis, and thus not included in the battery of measures or in analyses. Nevertheless, future endeavours to reduce avoidance of intergroup interactions will eventually need to consider all possible causes of avoidance to overcome them. Disgust and anxiety are related, but each uniquely motivate avoidance behaviours (Cottrell & Neuberg, 2005; Cisler, Olatunji, & Lohr, 2009). Therefore, integrating both anxiety and disgust into future research projects is vital.

### **9.3.2 Considerations of power imbalances in social groups following negative intergroup contact.**

A key contention throughout this body of empirical and theoretical work, is that direct and negative experiences with outgroup members may initiate subsequent intergroup avoidance. Understanding the unique outcomes associated with negative intergroup contact between groups of different standing are therefore important, as many of the results reported throughout this thesis may be impacted by the participants' majority status. Members of minority and disadvantaged groups have distinct concerns and perspectives than majority groups. Minority members are acutely aware that others may devalue them but are still required to engage in society despite their potential rejection (Tropp & Pettigrew, 2005). Due to their distinct concerns and histories of co-existing with majority members in society, many of the processes implicated in the current thesis may be moderated by power differentials across social groups.

Individuals from historically disadvantaged groups are more likely to have negative intergroup contact experiences in the form of overt discriminatory behaviours by members of advantaged groups (Hayward, Tropp, Hornsey, & Barlow, 2017).

Repeated negative experiences are likely to influence how aversive conditioning events can inform the formation of intergroup fear. As noted in Chapter 2, social factors can enhance or impede the rate of learning in an intergroup context. For example, a single direct negative experience can lead to the formation of intergroup anxiety (Chapter 4), and repeated negative experiences may serve to reinforce threat-cues resulting in anxiety more resistant to extinction. Congruently, Navarrete and colleagues (2009) found positive intergroup experiences can enhance the role of extinction in reducing learnt fear. Relative to majority members, the extinction of learnt fear may require additional presentations of the CS without any reinforcing cue in multiple different settings for minority members (i.e., more trials in multiple contexts during extinction), because negative events are more common (Hayward et al., 2017).

Researchers have also explored the implications of negative intergroup contact for disadvantaged and marginalised groups, finding distinct differences for disempowered individuals relative to historically advantaged groups. Although both majority and minority members may engage in subsequent avoidance of outgroup members following negative contact (Tropp, 2003), minority members are also more likely to engage in collective action (Reimer et al., 2017). That is to say, negative contact may in fact mobilize minority groups to redress their marginalisation (Paolini et al., 2018). Collective action is typically measured as monetary donations to causes or public demonstrations but could manifest in the active promotion of other efforts to decrease discrimination in society – including the advocacy for, or implementation of, contact-based interventions in organisations. Considering the complex power structures evident in multicultural societies, there is an imperative to consider how negative contact, intergroup avoidance, and the implementation of contact-based interventions can serve to empower minority groups by facilitating self-determination. The current

thesis did not tackle this important challenge, but future investigations of how minority members respond to negative encounters and work to address their marginalization are important.

### **9.3.3 Criticisms of Sampling Frames**

The conclusions of this thesis should be interpreted with regards to the sampling frames in the empirical investigations. All participants were recruited from a first-year undergraduate course or from Amazon's Mechanical Turk (MTurk) platform. Both sampling frames have been criticised for low generalisability and poor ecological and external validity. Criticisms of undergraduate samples have been discussed for a long time (e.g., Sears, 1986). Undergraduate students tend to have higher socioeconomic status and be less diverse than the general population. Additionally, higher education in the social science attracts individuals with more egalitarian attitudes and values (Chatard & Selimbegovic, 2007). Indeed, in all studies in this thesis the undergraduate student participants reported low levels of prejudicial attitudes and behaviours. Consequentially, these investigations of racial attitudes and behaviours may not yield conclusions generalisable to the wider population who would have more varied age, ethnicities, socioeconomic status, and egalitarianism.

Critical assessments of MTurk samples are also evident in the literature. Common critiques include inattentiveness and biased responses from MTurkers. Researchers have noted that MTurk users do not read instructions (e.g., Kapelner & Chandler, 2010), do not pass attention checks (e.g., Oppenheimer, Meyvis, & Davidenko, 2009), and multitask when completing studies (e.g., Clifford & Jerit, 2014). Additionally, researchers demonstrated that MTurk users are limited in number, and thus routinely complete many studies in succession and are fatigued (Berkinsky et al., 2012; Stewart et al., 2015). MTurk users are also claimed to be biased. For example,

13% of users have disclosed searching for information on specific projects from previous research participants on online blogs and discussion boards (Chandler, Mueller, & Paolacci, 2014).

These criticisms are commonly referred to when discussing the validity and generalisability of MTurk studies. However, as noted by Hauser and Schwarz (2016), these popular criticisms of MTurk have never garnered strong and equivocal empirical support. Moreover, there is alternative evidence suggesting that MTurk users provide data with either the same or higher levels of diligence and attention as other sampling frames used in psychological research (e.g., Berinsky, Huber, & Lenz, 2012; Buhrmester, Kwang, & Gosling, 2011; Klein et al., 2014; Paolacci, Chandler, & Ipeirotis, 2010).

The criticisms of both sampling frames were noted throughout this thesis and efforts were taken to increase confidence in the generalisability of findings. Specifically, the majority of findings were cross-validated. Every finding included in this thesis, with the exception of the final study, was replicated using a distinct new sample of participants. Replication does not necessarily negate issues related to generalisability, but the cross-validation provides additional confidence in the reliability and external validity of the results.

#### **9.3.4 Self-Reported Behavioural Intentions**

A common variable of interest across all five studies was behavioural intentions to interact with, or avoid, members of the outgroup. In each instance, participants were asked to indicate their behavioural preference on a self-report scale. A key limitation of this approach is that behavioural *intentions* do not always correspond to *actual* behaviours. The problems with this approach are outlined in Chapter 5 and reiterated here.

The discrepancy between behavioural intentions and actual behaviours is evident in studies on intergroup relations. Seminal work by LePiere (1934) detailed the service a Chinese couple received in 250 establishments in the United States of America. Despite 92% of the establishments reporting they would not serve Chinese people, the couple received service in 95% of the establishments. Other work has demonstrated an overestimation of behaviours when presented with a hypothetical situation (cf., a real situation). Participants asked to donate money to a cause typically donate less money than they suggest they would be willing to in a hypothetical situation (e.g., Ajzen, Brown, & Carvajal, 2004). Similarly, in this thesis, individuals were asked to consider a hypothetical situation where they can interact with outgroup members. Based upon previous work, it is entirely possible that their behavioural intentions do not align with their behaviours. Future research should use measures of actual behaviours to validate the conclusions derived from the empirical studies included in this thesis. The theoretical review in Chapter 5 provided several examples of actual behaviours that could be measured, including opting out of an intervention. As an example of future work, the acceptability of VRIC could be determined by inviting individuals to engage in the intervention and comparing the participants who showed up and used the VR headset with those who declined the invitation.

### **9.3.5 Temporality**

All five studies were cross-sectional. The absence of longitudinal assessments present distinct limitations depending upon the empirical research question being addressed. These limitations were discussed in each chapter, but are further elaborated here. For example, the development of the CAP-IA (Chapter 3) is limited because the cross-sectional nature of the studies ensured test-retest reliability could not be assessed. Thus, the scale development only provides information related to the validity and

internal consistency of the measure and not reliability. Additionally, the retrospective methodology employed to assess the ecological validity of aversive conditioning procedures in the formation of intergroup anxiety could be biased through recall biases (Chapter 4).

In the final study examining the efficacy of VRIC, there was no long-term follow-up assessment. In their comprehensive review of prejudice reduction strategies, Paluck and Green (2009, 2018) encouraged scholars to consider if the effects of their interventions endured over time. The importance of longitudinal follow-ups post intervention has also been stressed by investigators of computer-mediated contact. In their e-contact intervention, White and Abu-Rayya (2012) found the effects of their intervention were maintained 6 months later. This program was an intensive 6-session contact intervention with actual outgroup members which demonstrated large effects. Despite the brief nature of the VRIC study, a long-term follow-up would have strengthened any conclusions derived from the study.

#### **9.4 Overall Conclusion**

The modern world is interconnected and diverse. Many people live and work in neighbourhoods with a multiplicity of distinct social groups, defined by race, religion, and ethnicity (Hewstone, 2015). Whilst positive experiences in diverse communities improve social cohesion, this unprecedented diversity also poses risks for marginalised and minority groups. Experiences of prejudice and discrimination are consistently linked to lower well-being (e.g., Pascoe & Smart Richman, 2009; Schmitt, Branscombe, Postmes, & Garcia, 2014), physical health concerns (e.g., Black, Johnson, & Van Hoose, 2015), judicial inequality (Ojiambo & Louw, 2015), and housing exclusion (Korver-Glenn, 2018). The considerable health and social problems associated with prejudice provides a strong rationale to encourage strategies to ameliorate intergroup

tensions, thereby improving intergroup relations and the lives of individuals from marginalised groups.

Intergroup contact is known to reduce prejudices (Pettigrew & Tropp, 2006) and should also readily occur in multicultural societies. Nevertheless, scholars have identified that society does not yet reap the benefits from widespread interactions among members of distinct groups because these interactions are often avoided (Paolini et al., 2018). Ensuring individuals take up opportunities to engage in naturalistic intergroup contact is therefore vital to improve social cohesion and diminish the damages associated with prejudices (Paolini et al., 2018; Turner & Cameron, 2016; Crisp & Turner, 2009; Ron et al., 2017). Accordingly, the empirical and theoretical work in this thesis established principles from diverse literatures to further understand barriers to intergroup contact and provide exciting new mechanisms to encourage individuals to approach outgroup members.

Addressing the problem of intergroup segregation is a difficult task. Fundamentally, it requires persuading individuals to engage in unwanted behaviours that may cause them considerable anxiety or discomfort. As we continue to advocate the benefits of cohesive societies, social scientists should work together to develop new approaches that subtly guide individuals toward enriching intergroup encounters by addressing their needs. The work in this thesis has contributed to those attempts by highlighting the aversive experiences of those high in intergroup anxiety and developing a framework of acceptability that identifies and addresses the concerns of individuals avoiding diverse others. These efforts culminated with a novel intervention purported to be approached more, comparatively to face-to-face encounters.

Collectively, this body of work comprised a broad discussion on viable processes to facilitate contact-seeking. These processes included attenuating anxiety and

perceptions of threat, providing institutionally supported and accepted interventions, and with indirect contact using VR. By discussing a range of interrelated approaches to overcome intergroup avoidance, this thesis provides a sophisticated collection of tactics derived from questioning, expanding, and integrating multidisciplinary theories. These efforts to expand our potential response to intergroup segregation is important.

Intergroup contact remains a highly effective means to reduce prejudices and form an inclusive, tolerant, and cohesive society. By working to encourage contact, this thesis contributed to growing efforts to distribute the benefits of intergroup contact that society is yet to reap, potentially improving the lives of marginalised people.

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\* *Studies included in the systematic review of imagined contact (Table 6.1).*

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## Appendix A

### Evidence of Ethical Approval

Supplementary Table 1.1

*Approval from Griffith University's Human Research Ethics Committee.*

	<b>Study</b>				
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Reference Number	2017/205		2017/1022		2018/613
Date	5/4/2017		22/12/2017		6/9/2018
Chapters	3, 7		3, 4	4	8

<sup>a</sup> Aus: Australian undergraduates, USA: American Online

<sup>b</sup> Mus: Muslims; AA: African American, BI: Black

### GU HREC REF: 2017/205

GRIFFITH UNIVERSITY HUMAN RESEARCH ETHICS REVIEW

Dear Prof David Neumann

I write further to the additional information provided in relation to the provisional approval granted to your application for ethical clearance for your project "Social Interactions with Emerging Technologies and in Real Life" (GU Ref No: 2017/205).

This is to confirm that this response has addressed the comments and concerns of the HREC.

The ethics reviewers resolved to grant your application a clearance status of "Fully Approved".

Consequently, you are authorised to immediately commence this research on this basis.

Regards

Kim Madison | Human Research Ethics

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### GU HREC REF: 2017/1022

GRIFFITH UNIVERSITY HUMAN RESEARCH ETHICS COMMITTEE

Dear Prof David Neumann

I write in relation to your application for ethical clearance for your project "Exploring the formation of anxiety in interpersonal situations" (GU Ref No: 2017/1022). The research ethics reviewers resolved to grant your application a clearance status of "Fully Approved".

This is to confirm receipt of the remaining required information, assurances or amendments to this protocol.

Consequently, I reconfirm my earlier advice that you are authorised to immediately commence this research on this basis.

The standard conditions of approval attached to our previous correspondence about this protocol continue to apply.

Regards

Kim Madison | Human Research Ethics

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**GU HREC REF: 2018/613**

-----Original Message-----

From: rims@griffith.edu.au <rims@griffith.edu.au>

Sent: Thursday, 6 September 2018 3:14 PM

To: Amanda Duffy <A.Duffy@griffith.edu.au>; Alex O'Donnell <alex.odonnell@griffith.edu.au>; David Neumann <d.neumann@griffith.edu.au>

Cc: research-ethics <research-ethics@griffith.edu.au>

Subject: Full Research Ethics Clearance 2018/613

GRIFFITH UNIVERSITY HUMAN RESEARCH ETHICS REVIEW

Dear Prof David Neumann

I write further to the additional information provided in relation to the provisional approval granted to your application for ethical clearance for your project "E2: Social Interactions using Virtual Reality" (GU Ref No: 2018/613).

This is to confirm that this response has addressed the comments and concerns of the HREC.

The ethics reviewers resolved to grant your application a clearance status of "Fully Approved".

Consequently, you are authorised to immediately commence this research on this basis.

Regards

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## Appendix B

### Item Generation and Reduction for the CAP-IA

This information is presented to supplement the description of the scale development process in Study 1. The analyses conducted were on the same participants described in the Method section of Study 1. Included in this document is a description of the initial items generated to assess intergroup anxiety followed by a summary of various statistical analyses used to reduce the total number of items for the final scale. These analyses included excluding items without full response coverage, gender bias, high inter-item correlations, low item-total correlations, and poor factor loadings in a factor analysis.

#### Initial Item Development

Initially, 34 items were developed to measure the cognitive, affective, and physiological domains of intergroup anxiety. All 34 items can be observed in Supplementary Table 3.1.1. For the cognitive domain, 12 statements were included that related to thoughts individuals may have when interacting with Muslims. The statements were derived from common features of social anxiety (e.g., *That you will become embarrassed*; American Psychological Association [APA], 2013), and specific cognitions outlined by Stephan (2014; e.g., *That Muslims will physically harm you*). For the affective domain, 11 items were designed to assess the negatively valenced emotional state of anxiety. Some of these items were derived from the affective scale of intergroup anxiety (Stephan & Stephan, 1985). For the physical domain, 11 physical sensations were listed. The items were designed to assess somatic symptoms of anxiety (e.g., *blushing*; American Psychological Association [APA], 2013; *tense muscles*, APA, 2013; and *stomach pains*; DeGood & Tait, 1987).

Supplementary Table 3.1.1

*The initial items administered to participants and corresponding numbers*

Number	Item
Cognitive (COG)	
1.	That Muslims will physically harm you
2.	That you will be discriminated against because of your ethnicity
3.	That you could catch an infectious disease
4.	That you will become embarrassed
5.	That you will say something that is misunderstood
6.	That you will be disrespected
7.	That other Australians will disapprove of you
8.	That you will lose friends
9.	That you will develop negative feelings towards Muslims
10.	That you will be judged harshly by Muslims because of your beliefs
11.	That you will be made to look foolish
12.	That Muslims pose a danger to me
Affective (AFF)	
1.	Apprehensive
2.	Distressed
3.	Alarmed
4.	Embarrassed
5.	Worried
6.	Dread
7.	Afraid
8.	Uneasy
9.	Anxious
10.	Scared
11.	Stressed
Physical (PHY)	
1.	Sweaty/clammy hands
2.	Blood rushing to the head
3.	Blushing
4.	Tense muscles
5.	Breathing faster
6.	Faster heartbeat
7.	Stomach pains
8.	Unsteady hands
9.	Clenching jaw
10.	Sore muscles
11.	Butterflies in stomach

**Item Analyses**

Item analyses were initially conducted to remove unnecessary or inappropriate items. These analyses were conducted using SPSS (v. 24) and using listwise deletion for

missing data. Firstly, all 34 items were inspected to ensure they had coverage of all response options. Four items on the cognitive domain (Cog1, Cog3, Cog4, and Cog8) and two items on the physical domain (Phy7 and Phy10) were subsequently removed as participants did not employ full use of the response scale. Each of the six items removed did not have responses for the upper-most response option (5 = *Always*).

Secondly, item bias was examined by determining if the responses on the item differed based upon the participant's gender. Individual items assessing intergroup anxiety were not expected to differ across the genders, so gender bias resulted in the deletion of the item. Gender bias was investigated by exploring the bivariate correlations between a dummy coded gender variable (0 = *male*, 1 = *female*) and each of the remaining 28 items. Across each of the domains, gender was not significantly associated with responses to any item (all  $p$ 's > .05), with  $r$ 's ranging from -.05 to .08 for the cognitive domain, -.09 to .02 for the affective domain, and -.08 to .01 for the physiological domain.

Thirdly, inter-item correlations were examined to remove redundant items identified by a high correlation ( $r \geq .80$ ). The cut-off used is consistent with previous scale development studies (e.g., Creed & Hood, 2015). For the cognitive domain, Cog9 and Cog12 were highly correlated ( $r = .81$ ), with Cog12 subsequently deleted. Four items from the affective subscale (Aff8, Aff7, Aff4, and Aff13) and 3 items from the physiological subscale (Phy5, Phy4, and Phy9) were also removed as all were shown to be significantly correlated ( $p < .001$ ) at above the .80 cut-off with at least one other item from the same subscale.

Finally, for the remaining items, corrected item-total correlations were examined for each subscale independently, to ensure test homogeneity. Any items with low correlations ( $r \leq .30$ ) were excluded. This cut-off criteria was based upon previous research (e.g., Creed & Hood, 2015). Examination of the correlations between each item

and the corrected-item total (the sum of each subscale excluding the item of interest in the correlation) revealed that none of the correlation values fell below the cut-off criteria. The corrected item-total correlations ranged from .52 to .76 for the cognitive domain, .56 to .84 for the affective domain, and .62 to .83 for the physical domain.

At the end of these item analyses, 20 items remained. Of these, 7 items measured the cognitive domain, 7 items measured the affective domain, and 6 items measured the physical domain of intergroup anxiety.

### **Confirmatory Factor Analysis**

The 20 items retained for the CAP-IA were further refined using model re-specification within a confirmatory factor analysis (CFA). The cut-offs employed are consistent with the cut-offs described in the main text. The analytical strategy involved running several one factor congeneric models for each domain, making post-hoc adjustments by removing items until the factor analysis demonstrated acceptable fit statistics and model parameters. Traditionally, self-report survey instruments are developed using exploratory factor analysis (EFA), although this technique is often incorrectly used (Fabrigar, Wegener, MacCallum, & Strahan, 1999). EFA is only an appropriate statistical technique when the number of factors are not determined based upon a priori theory (Henson & Roberts, 2006). Both the items and measurement structure of the CAP-IA were based upon the review of Stephan (2014) and, therefore, an exploratory approach was not considered appropriate (Henson & Roberts, 2006). Post hoc adjustments were made to remove items when the item had an *R*-squared below 0.50. It should be acknowledged that the use of post-hoc adjustments results in an exploratory application of a confirmatory technique, but due to the theory-driven proposed factor structure and item development, CFA was the most appropriate statistical technique.

**Cognitive domain.** The 7 items measuring the cognitive domain of intergroup anxiety were initially analysed in a series of one factor congeneric CFA models (Supplementary Table 3.1.2). In the first model, Cog7 was removed as it had a low  $R^2$  ( $R^2 = 0.26$ ). In the subsequent 6-item CFA, Cog5 was removed ( $R^2 = 0.33$ ). Finally, Cog11 was removed ( $R^2 = .42$ ) leaving a 4-item solution with good model-fit.

Supplementary Table 3.1.2

*A Summary of the Model Re-Specification during the Congeneric Confirmatory Factor Analysis for the Cognitive Subscale.*

	Model 1 <sup>†</sup>		Model 2 <sup>‡</sup>		Model 3 <sup>§</sup>		Model 4 <sup>¶</sup>	
	$R^2$	Factor Loading						
COG2	0.59	1.00	0.60	1.00	0.60	1.00	1.00	0.62
COG5	0.33	0.85	<b>0.33</b>	<b>0.84</b>				
COG6	0.70	1.10	0.71	1.10	0.72	1.11	1.11	0.75
COG7	<b>0.26</b>	<b>0.62</b>						
COG10	0.67	1.27	0.68	1.23	0.66	1.25	1.22	0.65
COG11	0.45	0.67	0.44	0.66	<b>0.42</b>	<b>0.64</b>		
COG12	0.67	0.87	0.66	0.86	0.68	0.87	0.83	0.65

Note: Items in bold denote deletion after that model. No deletions were made at model 4.

<sup>†</sup>  $\chi^2(14) = 48.24, p < .001$ ; RMSEA = .07; CFI = .95; TLI = .92; SRMSR = .04

<sup>‡</sup>  $\chi^2(9) = 33.97, p < .001$ ; RMSEA = .08; CFI = .96; TLI = .93; SRMSR = .04

<sup>§</sup>  $\chi^2(5) = 14.25, p = .014$ ; RMSEA = .06; CFI = .98; TLI = .96; SRMSR = .03

<sup>¶</sup>  $\chi^2(2) = 3.46, p = .178$ ; RMSEA = .04; CFI = .99; TLI = .98; SRMSR = .01

**Affective domain.** In the first one-factor CFA examining the 7 items for the affective domain, Aff4 was removed for a low  $R^2$  ( $R^2 = 0.34$ ). In the next model, Aff1 was removed ( $R^2 = 0.47$ ). A 5-item model solution for the affective domain of intergroup anxiety yielded acceptable model-fit (Supplementary Table 3.1.3).

Supplementary Table 3.1.3

*A Summary of the Model Re-Specification during the Congeneric Confirmatory Factor Analysis for the Affective Subscale.*

	Model 1 <sup>†</sup>		Model 2 <sup>‡</sup>		Model 3 <sup>§</sup>	
	R <sup>2</sup>	Factor Loading	R <sup>2</sup>	Factor Loading	R <sup>2</sup>	Factor Loading
AFF1	0.47	1.00	<b>0.47</b>	<b>1.00</b>		
AFF2	0.72	0.98	0.72	0.98	0.70	1.00
AFF4	<b>0.34</b>	<b>0.75</b>				
AFF5	0.76	1.18	0.76	1.17	0.78	1.22
AFF8	0.77	1.24	0.78	1.25	0.78	1.29
AFF9	0.71	1.16	0.70	1.15	0.71	1.20
AFF10	0.74	1.04	0.74	1.03	0.74	1.08

Note: Items in bold denote deletion after that model. No deletions were made at model 3.

<sup>†</sup>  $\chi^2(14) = 55.19, p < .001$ ; RMSEA = .08; CFI = .95; TLI = .93; SRMSR = .03

<sup>‡</sup>  $\chi^2(9) = 33.97, p < .001$ ; RMSEA = .08; CFI = .96; TLI = .93; SRMSR = .03

<sup>§</sup>  $\chi^2(5) = 14.25, p = .014$ ; RMSEA = .09; CFI = .96; TLI = .93; SRMSR = .02

**Physical domain.** Finally, the 6 items measuring the physical domain of intergroup anxiety were analysed. Phy3 had an R-squared below 0.50 ( $R^2 = 0.39$ ) and was subsequently removed. The remaining 5 items, when analysed in a one-factor CFA, had a good model fit (Supplementary Table 3.1.4).

Supplementary Table 3.1.4

*A Summary of the Model Re-Specification during the Congeneric Confirmatory Factor Analysis for the Physiological Subscale.*

	Model 1 <sup>†</sup>		Model 2 <sup>‡</sup>	
	R <sup>2</sup>	Factor Loading	R <sup>2</sup>	Factor Loading
PHY1	0.75	1.00	0.75	1.00
PHY2	0.68	0.75	0.68	0.75
PHY3	<b>0.39</b>	<b>0.62</b>		
PHY6	0.76	1.02	0.77	1.03
PHY8	0.80	0.94	0.82	0.95
PHY11	0.54	0.81	0.52	0.80

Note: Items in bold denote deletion after that model. No deletions were made at model 2.

<sup>†</sup>  $\chi^2(9) = 16.62, p = .230$ ; RMSEA = .05; CFI = .98; TLI = .96; SRMSR = .03

<sup>‡</sup>  $\chi^2(5) = 5.55, p = .353$ ; RMSEA = .02; CFI = .99; TLI = .99; SRMSR = .02

## Appendix C

### Normative Data for the CAP-IA

Descriptive and normative data can be seen in the tables below. The subscale and total scores showed excellent variability. However, the subscale and total scores also had a large amount of positive skew.

Supplementary Table 3.2.1

*Descriptive and normative data for the subscales and total score of the CAP-IA toward Muslims for an Australian undergraduate student sample (N = 470)*

	Mean (SD)	Median	$Z_{skew}$	Range	Quartiles		
					25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>
Cognitive	29.44 (14.94)	20	19.11	20-100	20	20	35
Affective	27.70 (13.18)	20	21.35	20-100	20	20	32
Physiological	23.97 (9.75)	20	29.53	20-88	20	20	24
CAP-IA	81.10 (33.41)	68	22.83	60-278	60	68	87

Supplementary Table 3.2.2

*Descriptive and normative data for the subscales and total score of the CAP-IA toward Muslims for an American online community sample (N = 441)*

	Mean (SD)	Median	$Z_{skew}$	Range	Quartiles		
					25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>
Cognitive	34.07 (18.67)	25	12.47	20-100	20	25	40
Affective	32.71 (18.26)	24	13.91	20-100	20	24	40
Physiological	27.07 (14.95)	20	22.05	20-100	20	20	24
CAP-IA	93.84 (46.56)	73	15.59	60-300	60	73	110

Supplementary Table 3.2.3

*Descriptive and normative data for the subscales and total score of the CAP-IA toward African-Americans for an American online community sample (N = 533)*

	Mean (SD)	Median	Z <sub>skew</sub>	Range	25 <sup>th</sup>	Quartiles 50 <sup>th</sup>	75 <sup>th</sup>
Cognitive	33.88 (16.60)	27	12.47	20-100	20	25	44
Affective	32.86 (16.45)	28	13.91	20-100	20	24	39
Physiological	26.43 (12.47)	20	22.05	20-84	20	20	28
CAP-IA	92.88 (40.86)	76	15.59	60-284	60	76	109

## Appendix D

## Coding Rules for Content Analysis (Chapter 4).

A content analysis was conducted on open-response options allowing participants to indicate what unpleasant event occurred. These responses were coded as either a primary or secondary reinforcer. The coding rules were as follows:

Classification
<b>Primary Reinforcer</b>
<p><b>Threats to Physical Safety</b>  <i>This includes anything involving risk of, or actual risk to the safety of the person involved.</i></p>
Physical Alterations
Yelling or threats of violence
The wielding of guns, knives, or other weaponizable objects (e.g. bottles)
Non-verbal cues depicting potential aggression (e.g. angry face)
Sexual assault
<p><b>Withdrawal of Biologically Required Resources</b>  <i>This includes when an individual actively engages in a task that results in the withdrawal of a biologically required resource including food, water, and shelter.</i></p>
Forcible restriction of food and water intake (e.g. pressure to diet, active withdrawal of food)
Actions resulting in homelessness (e.g. room-mate/landlord kicking someone out of their usual residence unexpectedly)
<p><b>Withdrawal of Socially Required Resources</b>  <i>This includes when an individual actively engages in a task that results in a feeling of loneliness, isolation, or a lack of connectedness.</i></p>
Behaviour resulting in social exclusion and isolation (e.g. someone preventing friends from staying connected)
Behaviour resulting in confinement and/or the loss of freedom of movement without the direct threat of physical harm (e.g. locking someone in a room against their will)
Behaviour that creates shame and/or embarrassment
<b>Secondary Reinforcer</b>
<p><b>Loss of Money or secondary resource</b>  <i>This includes anything that indicates that the outgroup member did something that resulted in a lack of income or the removal of non-biologically required food or resource (e.g. car).</i></p>
Outstanding bills or invoice (including a boss or manager docking pay, preventing the payment of wages)
Vandalism of property
Theft (when no actual threats toward the safety of the person were recounted)
<p><b>Statements, Disagreements, and Non-Threatening Arguments</b>  <i>This includes any verbal stoush without risks of violence or physical threat. They can fall within a range of categories.</i></p>
Discriminatory comments (e.g. based on sexual orientation, gender, religion, or ethnicity).
Negative Cultural comments

Harassment or unpleasant comments not falling into other categories

### **Work Place Incidents**

*This includes events that occurred in either a workplace or educational setting that does not fall into other categories. Violence in the workforce (1) and discriminatory behaviours (2b) should not be included here.*

Colleague preventing work from progressing through slow or poor quality work

Colleague or customer preventing new business, growth, or chances for promotion due to their behaviour

Unpleasant work experiences due to the direct actions of a manager/supervisor (e.g. assigning unpleasant work tasks)

Undesirable outcomes that restrict freedom of movements due to working constraints (e.g. refusing leave requests, mandating specific working hours)

### **General Discomfort**

#### **Exclusionary Criteria**

Witnessing an interaction, without reference to concerns or fears that they would otherwise be involved/implicated in the interaction (not including acts toward children, friends, or family in the actual presence of the participant).

An event where the participant did not construe the event as unpleasant.

An event where the participant was not actively involved in the event (e.g. viewing something unpleasant on the television). Events that directly involve the person despite not being in the physical presence of an outgroup member are valid responses (e.g. receiving a threatening text message, reading an eviction notice nailed to a house's door).

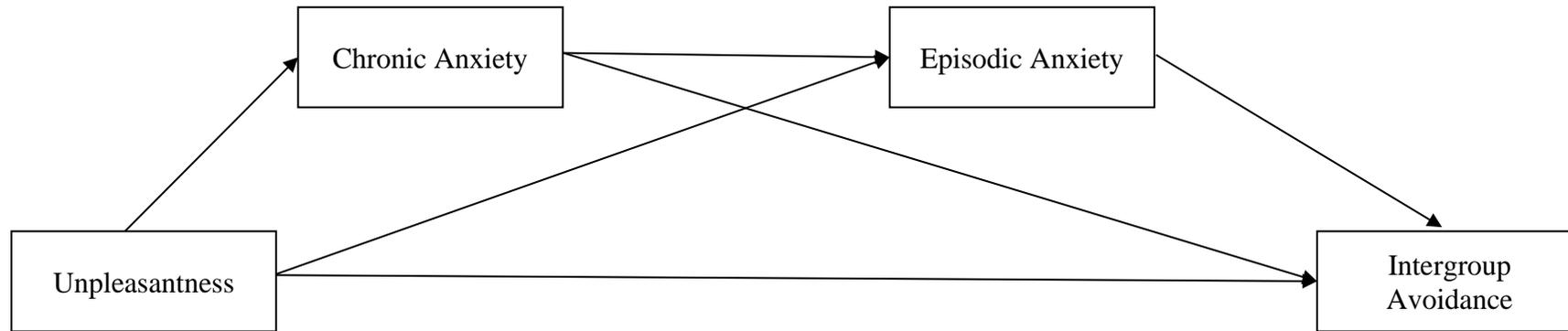
An event where the participant could not recall interacting with an outgroup member.

Participant provides no evidence of the unpleasant event.

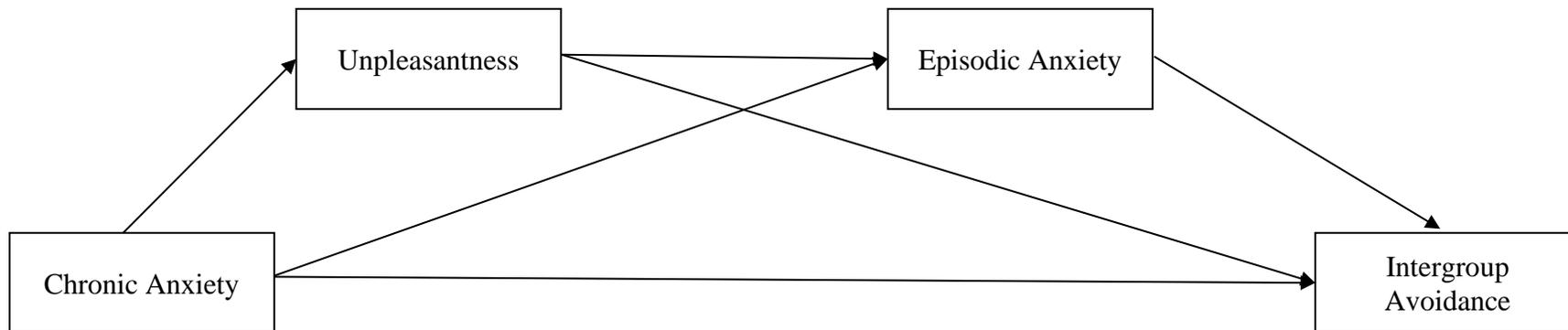
## Appendix E

### Alternative Serial Mediation Models (Chapter 4).

This information is to supplement the results provided in the path analysis section of the data analysis. In the results section, the mediation model presented was based upon theory and previous research. However, due to the nature of cross-sectional studies other models were conducted to explore alternative explanations for the ordering of the studies' constructs. In the first alternative model (Supplementary Figure 4.1), episodic and chronic intergroup anxiety were swapped, so that unpleasantness predicted chronic intergroup anxiety, and in turn episodic intergroup anxiety, and intergroup avoidance. In both samples, there was still a significant indirect relationship between unpleasantness and intergroup avoidance (*indirect effect*<sub>AA</sub> = .15, *CI*<sub>95%</sub> = .06 - .24; *indirect effect*<sub>Mus</sub> = .18, *CI*<sub>95%</sub> = .08 - .36). However, the indirect relationship between chronic intergroup anxiety and intergroup avoidance, through episodic intergroup anxiety, was not statistically significant (*indirect effect*<sub>AA</sub> = .01, *CI*<sub>95%</sub> = -.03 - .05; *indirect effect*<sub>Mus</sub> = -.05, *CI*<sub>95%</sub> = -.21 - .13). In the second alternative model (Supplementary Figure 4.2), chronic intergroup anxiety predicted unpleasantness, subsequent episodic intergroup anxiety, and finally intergroup avoidance. In this alternative model, chronic intergroup anxiety was not indirectly related to intergroup avoidance (*indirect effect*<sub>AA</sub> = .01, *CI*<sub>95%</sub> = -.05 - .06; *indirect effect*<sub>Mus</sub> = -.11, *CI*<sub>95%</sub> = -.31 - .09). Additionally, the indirect relationship between unpleasantness and avoidance, through episodic intergroup anxiety, was not significant (*indirect effect*<sub>AA</sub> = .01, *CI*<sub>95%</sub> = -.04 - .06; *indirect effect*<sub>Mus</sub> = -.02, *CI*<sub>95%</sub> = -.09 - .05). Taken together, these results indicate that the original model has the strongest statistical support.



*Supplementary Figure 4.1.* The first alternative model, showing the indirect effect between unpleasantness and avoidance through chronic and episodic intergroup anxiety.



*Supplementary Figure 4.2.* The second alternative model, showing the indirect effect between chronic intergroup anxiety and avoidance through the unpleasantness of the interaction and episodic intergroup anxiety.

**Appendix F****Articles Screened and Search Terms Used (Chapter 5)**

A list of search terms used to identify the 64 articles (109 studies) used to evaluate the acceptability of imagined intergroup contact.

*Imagined Intergroup contact*  
*Mental Simulation Intergroup Contact*  
*Simulation Intergroup Contact*  
*Mental Imagery Intergroup Contact*  
*Imagine Intergroup Contact*  
*Imagined Interaction*  
*Mental Simulation Interaction*  
*Mental Imagery Interaction*  
*Imagined Outgroup*  
*Mental Simulation outgroup*  
*Imagery Outgroup*  
*Hypothetical Intergroup Contact*  
*Hypothetical Outgroup Contact*  
*Hypothetical Outgroup Interaction*  
*Simulated Intergroup Contact*  
*Simulated Outgroup Interaction*  
*Vicarious Intergroup Contact*  
*Vicarious Outgroup Contact*  
*Vicarious Outgroup Interaction*  
*Imagined Contact outgroup*  
*Imagined Contact Ingroup*  
*Imagined Contact intercultural*  
*Imagined Contact prejudice*  
*Imagined Contact disability*  
*Imagined Contact ethnic*  
*Imagined contact nationality*  
*Imagined contact schizophrenia*  
*Mental Simulation Ingroup*  
*Mental Simulation intercultural*  
*Mental Simulation prejudice*  
*Mental Simulation disability*  
*Mental Simulation ethnic*  
*Mental Simulation nationality*  
*Mental Simulation schizophrenia*

## Articles Screened

† Studies included in the table evaluating the acceptability of imagined contact (Table 5.1).

Asbrock, F., Gutenbrunner, L., & Wagner, U. (2013). Unwilling, but not unaffected – Imagined contact effects for authoritarians and social dominators. *European Journal of Social Psychology*, 43, 404-412. doi: 10.1002/ejsp.1956

Bagci, S. C., Piyale, Z. E., & Ebcim, E. (2018). Imagined contact in high conflict settings: The role of ethnic group identification and the perspective of minority group members. *Journal of Applied Social Psychology*, 48, 3-14. Doi: 10.1111/jasp.12485

† Bagci, S. C., Piyale, Z. E., Bircek, N. I., & Ebcim, E. (2018). Think beyond contact: Reformulating imagined intergroup contact theory by adding friendship potential. *Group Processes & Intergroup Relations*, 21, 1034-1052. Doi: 10.1177/1368430217690237

† Bagci, S. C., Stathi, S., & Piyale, Z. E. (2019). When imagining intergroup contact mobilizes collective action: The perspective of disadvantaged and advantaged groups. *International Journal of Intercultural Relations*, 69, 32-43. Doi: 10.1016/j.ijintrel.2018.12.003

† Birtel, M. D., & Crisp, R. J. (2012a). “Treating” prejudice: An exposure-therapy approach to reducing negative reactions towards stigmatized groups. *Psychological Science*, 23, 1379-1386. doi: 10.1177/0956797612443838

Birtel, M. D., & Crisp, R. J. (2012b). Imagining intergroup contact is more cognitively difficult for people higher in intergroup anxiety but this does not detract from its effectiveness. *Group Processes & Intergroup Relations*, 15, 744-761. doi: 10.1177/1368430212443867

**[School Based Study]**

Birtel, M. D., Di Bernardo, G. A., Stathi, S., Crisp, R. J., Cadamuro, A., & Vezzali, L. (2019). Imagining contact reduces prejudice in preschool children. *Social Development*, 1-9. Doi: 10.1111/sode.12374

† Brambilla, M., Ravenna, M., & Hewstone, M. (2012). Changing stereotype content through mental imagery: Imagining intergroup contact promotes stereotype change. *Group Processes & Intergroup Relations*, 15, 305-315. doi: 10.1177/1368430211427574

**[School Based Study]**

Cameron, L., Rutland, A., Turner, R., Holman-Nicolas, R., Powell, C. (2011). ‘Changing attitudes with a little imagination’: Imagined contact effects on young children’s intergroup bias. *Anales de Psicologia*, 27, 708-717. Retrieved from <https://kar.kent.ac.uk/id/eprint/27770>

- Carvalho-Freitas, M. N., & Stathi, S. (2017). Reducing workplace bias toward people with disabilities with the use of imagined contact. *Journal of Applied Social Psychology, 47*, 256-266. Doi: 10.1111/jasp.12435
- Chen, C., Joyce, N., Harwood, J., & Xiang, J. (2017). Stereotype reduction through humor and accommodation during imagined communication with older adults. *Communication Monographs, 84*, 94-109. doi: 10.1080/03637751.2016.1149737
- †Crisp, R. J., & Husnu, S. (2011). Attributional processes underlying imagined contact effects. *Group Processes & Intergroup Relations, 14*, 275-287. doi: 10.1177/1368430210390721
- Dermody, N., Jones, M. K., & Cumming, S. R. (2013). The failure of imagined contact in reducing explicit and implicit out-group prejudice toward male homosexuals. *Current Psychology, 32*, 261-274. doi: 10.1007/s12144-013-9182-5
- Dunaev, J. L., Brocgu, P. M., & Markey, C. H. (2018). Imagine that! The effect of counterstereotypic imagined intergroup contact on weight bias. *Health Psychology, 37*, 81-88. Doi: 10.1037/hea0000545
- Falvo, R., Capozza, D., Di Bernardo, G., Pagani, A. (2015). Can imagined contact favour the 'humanization' of the homeless? *Testing, Psychometrics, Methodology in Applied Psychology, 22*, 23-30. doi: 10.4473/TPM22.1.2
- †Falvo, R., Capozza, D., Hichy, Z., & Di Sipio, A. (2014). Imagined contact favors humanization of individuals with intellectual disabilities: A two-wave study. *Life Span and Disability, 17*, 39-57.
- Giacobbe, M. R., Stukas, A. A., & Farhall, J. (2013). The effects of imagined versus actual contact with a person with a diagnosis of schizophrenia. *Basic and Applied Social Psychology, 35*, 265-271. doi: 10.1080/01973533.2013.785403
- †Harwood, J., Joyce, N., Chen, C., Paolini, S., Xiang, J., & Rubin, M. (2017). Effects of past and present intergroup communication on perceived fit of an outgroup member and desire for future intergroup contact. *Communication Research, 44*, 530-555. Doi: 10.1177/0093650214565926
- Harwood, J., Paolini, S., Joyce, N., Rubin, M., & Arroyo, A. (2011). Secondary transfer effects from imagined contact: Group similarity affects the generalization gradient. *British Journal of Social Psychology, 50*, 180-189. doi: 10.1348/014466610X524263
- Hodson, G., Dube, B., & Choma, B. L. (2015). Can (elaborated) imagined contact interventions reduce prejudice among those higher in intergroup disgust sensitivity (ITG-DS)? *Journal of Applied Social Psychology, 45*, 123-131. doi: 10.1111/jasp.12281

- Hoffarth, M. R., & Hodson, G. (2016). Who needs imagined contact? Replication attempts examining previous contact as a potential moderator. *Social Psychology*, 47, 118-124. doi: 10.1027/1864-9335/a000258
- †Husnu, S., & Crisp, R. (2010a). Elaboration enhances the imagined contact effect. *Journal of Experimental Social Psychology*, 46, 943-950. doi: 10.1016/j.jesp.2010.05.014
- Husnu, S., & Crisp, R. (2010b). Imagined intergroup contact: A new technique for encouraging greater inter-ethnic contact in Cyprus. *Peace and Conflict*, 16, 97-108. doi: 10.1080/10781910903484776
- Husnu, S., & Crisp, R. (2011a). Current problems and resolutions: Enhancing the imagined contact effect. *The Journal of Social Psychology*, 151, 113-116. doi: 10.1080/00224541003599043
- Husnu, S., & Crisp, R. (2011b). Perspective-taking mediates the imagined contact effect. *International Journal of Intercultural Relations*, 44, 29-34. doi: 10.1016/j.ijintrel.2014.11.005
- †Husnu, S., & Paolini, S. (2019). Positive imagined contact is actively chosen: Exploring determinants and consequences of volitional intergroup imagery in a conflict-ridden setting. *Group Processes & Intergroup Relations*, 22, 511-529. Doi: 10.1177/1368430217747405
- Ioannou, M., Hewstone, M., & Al Ramiah, A. (2017). Inducing similarities and differences in imagined contact: A mutual intergroup differentiation approach. *Group Processes & Intergroup Relations*, 20, 427-466. Doi: 10.1177/1368430215612221
- \*Kuchenbrandt, D., Eyssel, F., & Seidel, S. K. (2013). Cooperation makes it happen: Imagined intergroup cooperation enhances the positive effects of imagined contact. *Group Processes & Intergroup Relations*, 16, 635-647. doi: 10.1177/1368430212470172
- Lai, C. K., Marini, M., Lehr, S. A., Shin, J. E., Joy-Gaba, J. A., Ho, A. k. ... Nosek, B. A. (2014). Reducing implicit racial preferences: I. A comparative investigation of 17 interventions. *Journal of Experimental Psychology: General*, 143, 1765-1785. doi: 10.1037/a0036260
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- Lee, W., & Cunningham, G. B. (2014). Imaging that: Examining the influence of sport-related imagined contact on intergroup anxiety and sexual prejudice across cultures. *Journal of Applied Social Psychology*, 44, 557-566. doi: 10.1111/jasp.12247
- Lindau, N., Amin, T., Zambon, A., & Scior, K. (2017). The effect of brief digital interventions on attitudes to intellectual disability: Results from a pilot study.

*Journal of Applied Research in Intellectual Disabilities*, 31, 106-113. Doi: 10.1111/jar.12366

**[University Class]**

- \*Malott, K., Wahesh, E., & Crawford, E. (2019). Anxieties toward outgroup members: Use of an (elaborated) imagined contact intervention with undergraduate students. *Innovative Higher Education*, 44, 133-147. Doi: 10.1007/s10755-018-9453-z
- Meleady, R., & Seger, C. R. (2017). Imagined contact encouraged prosocial behavior towards outgroup members. *Group Processes & Intergroup Relations*, 20, 447-460. Doi: 10.1177/1368430215612225
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**[School Based Study]**

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- Stathi, S., Crisp, R. J., & Hogg, M. A. (2011). Imagining intergroup contact enables member-to-group generalization. *Group Dynamics: Theory, Research, and Practice, 15*, 275-284. doi: 10.1037/a0023752
- Stathi, S., Tsantila, K., & Crisp, R. J. (2012). Imagining intergroup contact can combat mental health stigma by reducing anxiety, avoidance, and negative stereotyping. *The Journal of Social Psychology, 152*, 746-757. doi: 10.1080/00224545.2012.697080
- Turner, R. N., & Crisp, R. (2010). Imagining intergroup contact reduces implicit prejudice. *British Journal of Social Psychology, 49*, 129-142. doi: 10.1348/014466609X419901
- Turner, R. N., Crisp, R., & Lambert, E. (2007). Imagining intergroup contact can improve intergroup attitudes. *Group Processes & Intergroup Relations, 10*, 427-441. doi: 10.1177/1368430207081533
- Turner, R. N., & West, K. (2011). Behavioural consequences of imagining intergroup contact with stigmatized outgroups. *Group Processes & Intergroup Relations, 15*, 193-202. doi: 10.1177/1368430211418699
- Turner, R. N., West, K., Christie, Z. (2013). Out-group trust, intergroup anxiety, and out-group attitude as mediators of the effect of imagined intergroup contact on intergroup behavioral tendencies. *Journal of Applied Social Psychology, 43*, E196-E205. Doi: 10.1111/jasp.12019

**[School Based Study]**

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**[School Based Study]**

- Vezzali, L., Capozza, D., Stathi, S., & Giovannini, D. (2012). Increasing outgroup trust, reducing inhumanization, and enhancing future contact intentions via imagined intergroup contact. *Journal of Experimental Social Psychology, 48*, 437-440. doi: 10.1016/j.jesp.2011.09.008
- Vezzali, L., Crisp, R., Stathi, S., & Giovannini, D. (2015). Imagined intergroup contact facilitates intercultural communication for college students on academic exchange programs. *Group Processes & Intergroup Relations, 18*, 66-75. doi: 10.1177/1368430214527853

**[School Based Study – Study 1]**

†Vezzali, L., Stathi, S., Crisp, R. J., Giovannini, D., Capozza, D., & Gaertner, S. L. (2015). Imagined intergroup contact and common ingroup identity: An integrative approach. *Social Psychology*, 46, 265-276. doi: 10.1027/1864-9335/a000242

Visintin, E. P., Birtel, M. D., & Crisp, R. J. (2017). The role of multicultural and colorblind ideologies and typicality in imagined contact interventions. *International Journal of Intercultural Relations*, 59, 1-8. Doi: 10.1016/j.ijintrel.2017.04.010

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**[University Class – Study 2]**

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**[University Class – Study 1]**

West, K., & Greenland, K. (2016). Beware of “reducing prejudice”: Imagined contact may backfire if applied with a prevention focus. *Journal of Applied Social Psychology*, 46, 583-592. doi: 10.1111/jasp.12387

†West, K., Holmes, E., & Hewstone, M. (2011). Enhancing imagined contact to reduce prejudice against people with schizophrenia. *Group Processes & Intergroup Relations*, 14, 407-428. doi: 10.1177/1368430210387805

West, K., Hotchin, V., & Wood, C. (2017). Imagined contact can be more effective for participants with stronger initial prejudices. *Journal of Applied Social Psychology*, 47, 282-292. doi: 10.1111/jasp.12437

†West, K., Husnu, S., & Lipps, G. (2015). Imagined contact works in high-prejudice contexts: Investigating imagined contact’s effects on anti-gay prejudice in Cyprus and Jamaica. *Sexuality Research and Social Policy*, 12, 60-69. doi: 10.1007/s13178-014-0172-7

West, K., Turner, R., & Levita, L. (2015). Applying imagined contact to improve physiological responses in anticipation of intergroup interactions and the perceived quality of these interactions. *Journal of Applied Social Psychology*, 45, 425-436. doi: 10.1111/jasp.12309

**[University Class – Study 1]**

Yetkili, O., Dominic, A., Giovanni, T. A., Giner-Sorolla, R. (2018). Imagined contact with atypical outgroup members that are anti-normative within their group can reduce prejudice. *Journal of Experimental Social Psychology*, 76, 208-219. Doi: 10.1016/j.jesp.2018.02.004

	Study	Sample <sup>a</sup>	Cover Story	Incentive <sup>b</sup>	Outgroup	Experimenter	Compliance
Asbrock et al., 2013	(1)	German (Onl)	Social attitudes and the perception of intergroup relations	<i>None Stated</i>	Turks	Absent (Onl)	✓
	(2)	German (Uni)	Creativity/Ethnic Diversity	CC or M	Gypsies	Present (Lab)	✓
Bagci, Piyale, & Ebcim, 2018	(1)	Turkish (Uni)	<i>Not Stated</i>	M	Kurds	Present (Lab)	✓
	(2)	Turkish (Uni)	<i>Not Stated</i>	CC	Kurds	Present (Lab)	✓
	(3)	Kurd (Com)	<i>Not Stated</i>	<i>None Stated</i>	Turkish	Absent (Onl)	✓
Bagci, Piyale, Bircek, Ebcim, 2018	(1)	Turkish (Com)	<i>Not Stated</i>	<i>None Stated</i>	Syrian	Absent (Onl)	✓
	(2)	Turkish (Uni)	<i>Not Stated</i>	<i>None Stated</i>	Syrian	Present (Lab)	✓
	(3)	Turkish (Uni)	<i>Not Stated</i>	<i>None Stated</i>	Syrian	Present (Lab)	✓
Bagci et al., 2019	(1)	Kurd (Com)	<i>Not Stated</i>	M	Turkish	Present	✓
	(2)	Turkish (Uni)	<i>Not Stated</i>	M	Kurds	Present (Lab)	✓
Birtel & Crisp, 2012a	(1)	Healthy Controls (Uni)	Imagery and Group Perceptions	CC	Mentally Ill	Absent (Onl)	✓
	(2)	Heterosexual (Uni)	As above	CC	Homosexuals	Absent (Onl)	✓
	(3)	British (Uni)	As above	M	Muslims	Absent (Onl)	✓
Birtel & Crisp, 2012b	(1)	Young (Uni)	Mental preparation, speech, and cognition.	CC or M	Older Adults	Present (Lab)	✓
	(2)	British (Uni)	People's experiences with and feelings about international students.	CC or M	International Students	Present (Lab)	✓
Birtel et al., 2019	(1)	Healthy Control (Com)	<i>Not Stated</i>	<i>None Stated</i>	Disabled	Present (Field)	✓
	(2)	White (Com)	<i>Not Stated</i>	<i>None Stated</i>	Black	Present (Field)	✓
	(3)	White (Com)	<i>Not Stated</i>	<i>None Stated</i>	Black	Present (Field)	✓
Brambilla et al., 2012	(1)	Italian (Uni)	Attitudes toward social issues.	<i>None Stated</i>	Albanian, Canadian, Chinese, Peruvian	Present (Lab)	✓

Cameron et al., 2011	(1)	Healthy Controls (Com)	<i>Not Stated</i>	<i>None Stated</i>	Disabled	Present (Field)	✓
Carvalho- Freitas, & Stathi, 2017	(1)	Healthy Controls (Uni)	<i>Not Stated</i>	<i>None Stated</i>	Disabled	<i>Not Stated</i>	✓
	(2)	Professionals (Com)	<i>Not Stated</i>	<i>None Stated</i>	Disabled	Absent (Onl)	✓
Chen et al., 2017	(1)	Young (Uni)	<i>Not Stated</i>	CC	Older Adult	Absent (Onl)	✓
Crisp & Husnu, 2011	(1)	Young (Uni)	<i>Not Stated</i>	CC	Older Adults	Present (Lab)	✓
Dermody et al., 2013	(1)	Heterosexual (Uni)	How mental imagery affects perceptions of others	CC	Homosexual	Present (Lab)	✓
Dunaey et al., 2018	(1)	Americans (Com)	Short mental imagery task	M	Obsese	Absent (Onl)	✓
Falvo et al., 2015	(1)	Italian (Uni)	Unrelated tasks: (1) imagery capacity, (2) word fragments, (3) intergroup relations	<i>None Stated</i>	Homeless	Present (Lab)	✓
Falvo et al., 2014	(1)	Healthy Control (Com)	To analyze intergroup attitudes	<i>None Stated</i>	Disabled	Present (Lab)	✓
Giacobbe, 2013	(1)	Healthy Control (Uni)	Processes meeting new people.	<i>None Stated</i>	Mentally Ill	Present (Lab)	✗
Harwood et al., 2017	(1)	Young (Uni)	<i>Not Stated</i>	CC	Older Adult	Absent (Onl)	✓
Harwood et al., 2011	(1)	American (Uni)	<i>Not Stated</i>	<i>None Stated</i>	Illegal Immigrants (and secondary groups)	Present (Lab)	✓
Hodson et al., 2015	(1)	Candian (Uni)	<i>Not Stated</i>	CC or M	Homeless	Present (Lab)	✗
	(1)	Heterosexual (Com)	<i>Not Stated</i>	M	Homosexual	Absent (Onl)	✓

Hoffarth & Hodson, 2016	(2)	Non-Muslim (Com)	<i>Not Stated</i>	M	Muslim	Absent (Onl)	✓
Husnu & Crisp, 2010a	(1)	Non-Muslim (Uni)	Attitudes about social attitudes.	CC	Muslim	Present (Lab)	✓
	(2)	Non-Muslim (Uni)	As above	CC	Muslim	Present (Lab)	✓
	(3)	Young (Uni)	As above	CC	Older adults	Present (Lab)	✓
Husnu & Crisp, 2010b	(1)	Turkish Cypriot (Uni)	Imagination and Social Issues	<i>None Stated</i>	Greek Cypriot	Present (Lab)	✗
Husnu & Crisp, 2011a	(1)	Young (Uni)	<i>Not Stated</i>	<i>None Stated</i>	Elderly	Present (Lab)	✗
	(2)	Young (Uni)	<i>Not Stated</i>	<i>None Stated</i>	Elderly	Present (Lab)	✗
Husnu & Crisp, 2011b	(1)	Turkish Cypriot (Uni)	Imagination and Social Issues	<i>None Stated</i>	Greek Cypriot	Present (Lab)	✓
Husnu & Paolini, 2019	(1)	Turkish Cypriot (Uni)	Social Issues in Cyprus	Volunteers	Greek Cypriot	Present (Lab)	✗
	(2)	Turkish Cypriot (Uni)	Social Issues in Cyprus	Volunteers	Greek Cypriot	Present (Lab)	✓
Ioannou et al., 2017	(1)	Greek Cypriot (Uni)	<i>Not Stated</i>	M (Raffle)	Turkish Cypriot	<i>Not Stated</i>	✓
	(2)	Greek Cypriot (Uni)	<i>Not Stated</i>	M (Raffle)	Turkish Cypriot	<i>Not Stated</i>	✓
Kuchenbrandt et al., 2013	(1)	German (Uni)	Creativity and Social Perceptions	M	Roma	Present (Lab)	✓
Lai et al., 2014	(1)	White	<i>Not Stated</i>	<i>None Stated</i>	Black	<i>Not Stated</i>	✓
	(2)	White	<i>Not Stated</i>	<i>None Stated</i>	Black	<i>Not Stated</i>	✓
LeBouff & Ledoux, 2016	(2)	Spiritual (Com)	<i>Not Stated</i>	M	Atheists	Absent (Onl)	✓
Lee & Cunningham, 2014	(1)	Heterosexuals	<i>Not Stated</i>	Volunteers	Homosexual	Absent	✗

Lindau et al., 2017	(1)	Healthy Control (Com)	<i>Not Stated</i>	M (Raffle)	Disabled	Absent (Onl)	✓
Malott et al., 2019	(1)	American (Uni)	<i>Not Stated</i>	CC	Self-Selected	Present (Field)	✗
Meleady & Seger, 2017	(1)	American (Com)	Financial Decision-making	M	Indian	Absent (Onl)	✓
	(2)	Indian (Com)	Financial Decision-making	M	American	Absent (Onl)	✓
	(3)	American (Com)	Financial Decision-making	M	Indian	Absent (Onl)	✓
Merritt et al., 2017	(1)	American (Uni)	<i>Not Stated</i>	<i>None Stated</i>	Higher Body Fat	<i>Not Stated</i>	✓
Miller et al., 2013	(1)	Heterosexual (Uni)	<i>Not Stated</i>	CC	Homosexual	Present (Lab)	✓
Moss-Racusin & Rabasco, 2017	(2)	Cisgender (Com)	Rating a Job Applicant	M	Gender Diverse	Absent (Onl)	✓
Na & Chasteen, 2016	(1)	Healthy Control (Uni)	An imagination study	CC	Mentally Ill	Present (Lab)	✓
	(2)	Healthy Control (Com)	An imagination study	M	Mentally Ill	Absent (Onl)	✓
Pagotto et al., 2012	(1)	Non-Muslim (Uni & Com)	<i>Not Stated</i>	<i>None Stated</i>	Muslim	Present (Lab)	✗
Pennington et al., 2016	(1)	Healthy Control (Uni)	<i>Not Stated</i>	Volunteers	Mentally Ill	Present (Lab)	✗
Prati & Loughnan, 2018	(1)	British (Uni)	<i>Not Stated</i>	CC	Gypsy	Present (Lab)	✓
	(2)	British (Uni)	<i>Not Stated</i>	CC	Gypsy	Present (Lab)	✓
	(3)	Italian	<i>Not Stated</i>	M	Japanese	Absent (Onl)	✓
Shamloo et al., 2018	(1)	Italian (Uni)	Imagining Social Situations	Volunteers	Immigrants	<i>Not Stated</i>	✓
	(2)	Italian (Uni)	Imagining Social Situations	Volunteers	Immigrants	<i>Not Stated</i>	✓
	(3)	Italian (Uni)	Imagining Social Situations	CC	Immigrants	Present (Field)	✓
Stathi & Crisp, 2008	(1)	Mexican (Mestizo & Indigenous) (Uni)	<i>Not Stated</i>	<i>None Stated</i>	Mexican (Mestizo & Indigenous)	<i>Not Stated</i>	✓

	(2)	British (Uni)	<i>Not Stated</i>	M	French	Present (Lab)	✓
	(3)	British (Uni)	<i>Not Stated</i>	CC	International Students	<i>Not Stated</i>	✓
Stathi et al., 2014	(1)	White British (Com)	<i>Not Stated</i>	<i>None Stated</i>	Asian	Present (Field)	✓
Stathi et al., 2011	(1)	Non-Muslims (Uni)	<i>Not Stated</i>	M	Muslim	Present (Lab)	✓
	(2)	Non-Muslims (Uni)	<i>Not Stated</i>	CC	Muslim	Present (Lab)	✓
	(3)	Non-Muslims (Uni)	<i>Not Stated</i>	M	Muslim	Present (Lab)	✓
Stathi et al., 2012	(1)	Healthy Control (Uni)	<i>Not Stated</i>	CC or Volunteers	Mentally Ill	Present (Lab)	✓
Turner & Crisp, 2010	(1)	Young (Uni)	Construction of experimental materials.	CC	Older Adults	Present (Lab)	✓
	(2)	Non-Muslims (Uni)	Construction of experimental materials.	CC	Muslims	Present (Lab)	✓
Turner, Crisp, & Lambert, 2007	(1)	Young (Uni)	Construction of experimental materials.	CC	Older Adults	Present (Lab)	✓
	(2)	Young (Uni)	Construction of experimental materials.	CC or M	Older Adults	Present (Lab)	✓
	(3)	Heterosexuals (Uni)	Construction of experimental materials.	CC	Homosexuals	Present (Lab)	✓
Turner & West, 2011	(1)	British (Uni)	Imagining and interactions	<i>None Stated</i>	Obese	Present (Lab)	✓
	(2)	Non-Muslim (Uni)	Imagining and interactions	<i>None Stated</i>	Muslim	Present (Lab)	✓
Turner et al., 2013	(1)	British (Com)	<i>Not Stated</i>	<i>None Stated</i>	Immigrants	Present (Lab)	✓
	(2)	Heterosexual (Uni)	<i>Not Stated</i>	<i>None Stated</i>	Homosexuals	Present (Lab)	✓
Vezzali et al., 2011	(1)	Italian (Com)	<i>Not Stated</i>	<i>None Stated</i>	Immigrants	Present (Field)	✓
Vezzali et al., 2012	(1)	Italian (Com)	<i>Not Stated</i>	<i>None Stated</i>	Immigrants	Present (Field)	✓
Vezzali, Crisp et al., 2015	(1)	International Students (Uni)	<i>Not Stated</i>	<i>None Stated</i>	Italian	<i>Not Stated</i>	✓

	(2)	Italian (Uni)	<i>Not Stated</i>	<i>None Stated</i>	Foreign	Absent (Onl)	✓
Vezzali, Stathi et al., 2015	(1)	Italian (Com)	<i>Not Stated</i>	<i>None Stated</i>	Immigrants	Present (Field)	✓
	(2)	Italian (Uni)	<i>Not Stated</i>	<i>None Stated</i>	Immigrants	<i>Not Stated</i>	✓
Visintin et al., 2017	(1)	British (Uni)	<i>Not Stated</i>	CC	Muslims	Absent (Onl)	✓
Warner & Villamil, 2017	(1)	Political Affiliations (Uni)	<i>Not Stated</i>	M	Political Affiliations	Absent (Onl)	✓
West & Bruckmiller, 2013	(1)	Healthy Controls (Uni)	<i>Not Stated</i>	CC	Mentally Ill	Present (Lab)	✓
	(2)	Non-Muslims (Uni)	<i>Not Stated</i>	<i>None Stated</i>	Muslims	Present (Field)	✓
West & Greenland, 2016	(1)	British (Com)	<i>Not Stated</i>	M	Asian	Present (Field)	✗
	(2)	British (Uni)	<i>Not Stated</i>	<i>None Stated</i>	Homosexual	Present (Lab)	✗
West et al., 2011	(1)	Healthy Controls (Uni)	<i>Not Stated</i>	CC	Mentally Ill	Present (Lab)	✓
	(2)	Healthy Controls (Uni)	<i>Not Stated</i>	CC	Mentally Ill	Present (Lab)	✓
	(3)	Healthy Controls (Uni)	<i>Not Stated</i>	CC	Mentally Ill	Present (Lab)	✓
	(4)	Healthy Controls (Uni)	<i>Not Stated</i>	CC	Mentally Ill	Present (Lab)	✓
West et al., 2017	(1)	British (Com)	<i>Not Stated</i>	M (Raffle)	Homeless	Present (Lab)	✗
	(2)	Cisgender (Com)	<i>Not Stated</i>	M (Raffle)	Gender Diverse	Absent (Onl)	✗
West, Husnu, & Lipps, 2015	(1)	Heterosexuals (Uni)	Contemporary social attitudes	<i>None Stated</i>	Homosexuals	<i>Not Stated</i>	✓
	(2)	Heterosexuals (Uni)	Contemporary social attitudes	<i>None Stated</i>	Homosexuals	<i>Not Stated</i>	✓
West, Turner, & Levita, 2015	(1)	Healthy Controls (Uni)	<i>Not Stated</i>	CC	Mentally Ill	Present (Lab)	✗

Yetkili et al., 2018	(1)	Psychology Students (Uni)	Social groups and social issues	CC	Immigration Officers	Present (Field)	✓
	(2)	Psychology Students (Uni)	Attitudes toward the School of Economics	CC	Economics Students	<i>Not Stated</i>	✓
	(3)	Christian (Com)	<i>Not Stated</i>	M	Muslims	Absent (Onl)	✓

<sup>a</sup> Com = Community; Uni = University sample, <sup>b</sup> CC = Course Credit, M = Monetary compensation, <sup>c</sup> Lab = Laboratory Study, Onl = Independent Online study, Field = Field Study