The Role of Risk Aversion in Morality

Benjamin Kai Ni

A thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy

School of Psychology, Faculty of Science

The University of Sydney

2025

Table of Contents

Statement of Originality vi

Acknowledgements vii

Authorship Attribution Statement viii

Artificial Intelligence x

Related Scientific Output xi

Glossary of Terms xiii

Statistical Terms xiv

List of Tables xv

List of Figures xvi

Abstract xvii

Chapter 1 Introduction 1

1.1 Overall Background 1
1.2 Research Aims 2
1.3 General Research Method 2
1.4 Thesis Structure 3

Chapter 2 Study 1: To kill or not to kill: A systematic literature review of high-stakes moral decision-making measures and their psychometric properties 6

2.1 Introduction 6
2.1.1 Moral Decision-Making: Concept and Definition 7
2.1.2 Which is the Focus, Action or Actor? 8
2.1.3 Sources of Individual Difference in Moral Decision-Making 9
2.1.4 The Present Systematic Review 12
2.2 Methods 14
2.2.1 Search Strategy 14
2.2.2 Inclusion Criteria 15
2.2.3 Exclusion Criteria 16
2.2.4 Selection Process 16

2.2.5 Data Extraction and Quality Assessment 16
2.3 Results 24
2.3.1 Measures based on Moral Dilemmas 25
2.3.2 Description of Self-Report Scales 29
2.3.3 Assessment of Psychometric Properties 36
2.4 Discussion 52
2.4.1 Aims 1 and 2: Identifying and Evaluating Measures of Moral Decision-Making. 52
2.4.2 Aim 3: Conceptualisation 55
2.4.3 Aim 4: Towards a Gold Standard 57
2.4.4 Limitations 59
Chapter 3 Study 2: Cooperation, different faces of morality, and their links to risk, fear, and personality during a crisis 62
3.1 Introduction 62
3.1.1 Cooperation: Different Types of Morality 63
3.1.2 The Role of Risk-Taking Propensity in Morality 64
3.1.3 Personality and Cognitive Ability 65
3.1.4 Fear and COVID-Related Concerns 68
3.1.5 Protective Behaviours in Different Stages of the COVID-19 Pandemic 68
3.1.6 The Current Study: Aims and Hypotheses 70
3.2 Methods 74
3.2.1 Participants 74
3.2.2 Data Quality 75
3.2.3 Measures 76
3.2.4 Planned Statistical Analysis 77
3.3 Results 81
3.3.1 Confirmatory Factor Analyses 81
3.3.2 Latent Profile Analysis 85
3.3.3 Differences between the Classes: Personality, Cognitive Ability, Demographics, and Behaviours 88
3.4 Discussion 92
3.4.1 Aim 1: Higher Order Morality and Risk/Impulsivity Factors 92
3.4.2 Aim 2: Identification of the Compliant and Non-Compliant subgroups 93
3.4.3 Aim 3: Hypothesised Differences between LPA classes 93
3.4.3.3 Morality, Risk Propensity, Fear, and Compliance 96
3.4.4 Limitations and Future Directions 97
3.4.5 Conclusions 99

Chapter 4 Study 3: The role of risk propensity in moral decision-making using the CNI model 100

4.1 Introduction 100
4.1.1 The Consequences, Norms, and Inaction (CNI) Model 101
4.1.2 Moral Identity 102
4.1.3 Dark Personality Traits 103
4.1.4 Self-regulation Constructs 105
4.1.5 Personality and Cognitive Ability 106
4.1.6 Latent Profile Analysis: A Person-Centred Approach 107
4.1.7 The Present Study 108
4.2 Methods 110
4.2.1 Participants 110
4.2.2 Measures and procedures 110
4.2.3 Planned analyses 110
4.3 Results 113
4.3.1 CNI Model Parameters 113
4.3.2 Latent Profile Analysis 113
4.3.3 ANOVA and Post-Hoc Comparisons 116
4.4 Discussion 120
4.4.1 Aims 1 & 2: Theoretical Implications of Profile Differentiation 120
4.4.2 Complexity in the Opportunistic Risk-Seeking Profile 121
4.4.3 Implications for Intervention and Policy 123
4.4.4 Limitations and Directions for Future Research 123
4.4.5 Conclusion 124

Chapter 5 Discussion 125

5.1 General Discussion 125
5.2 Contribution to Existing Literature 125
5.2.1 Aim 1: Systematically investigate and appraise current measures of high-stakes moral decision-making 126
Aim 2: Within the cooperative morality framework, examine the relationship between morality and risk propensity. 127
5.2.2 Aim 3: Identify distinct subgroups of individuals based on morality, risk propensity, and study-specific variables under different contexts (threat vs no threat) and the role of fear under threat. 128
5.3 General Strengths 129
5.3.1 Systematic Investigation of Moral Decision-Making Measurement 129

5.3.2 Adoption and Expansion of the Cooperative Morality Framework 129
5.3.3 Replication of findings under Threat and No-Threat Contexts across diverse samples 130
5.4 General Limitations 131
5.4.1 Lack of Validating Behaviours Under No-Threat Context 131
5.4.2 Sample Characteristics and Generalisability 131
5.5 Implications and Future Directions 132
5.5.1.1 Selection and Intervention 132
5.5.2 The Role of Incentive Structure in Moral Decision-Making 133
5.5.3 Personality States and Morl-Risk Profiles 133
5.6 Conclusion 134
References 135

Appendix A Search syntax for all databases 154

Appendix B Supplementary material for Chapter 3 158

Appendix C Supplementary material for Chapter 4 183

Statement of Originality

This is to certify that to the best of my knowledge, the content of this thesis is my own work. This thesis has not been submitted for any degree or other purposes.

I certify that the intellectual content of this thesis is the product of my own work and that all the assistance received in preparing this thesis and sources have been acknowledged.

Benjamin Kai Ni

Date: 15/09/2025

Acknowledgements

There is a famous Chinese proverb: Half of the journey is the first ninety miles, and the remaining ten miles is the other half. The PhD is a long and rewarding journey that taught me the value of consistency, perseverance, and patience. Nothing worthwhile comes quick and easy—a lesson that will benefit me for life. I have had the privilege of walking this path with some of the most supportive mentors and peers who kept motivating and pushing me towards the finish line, whom I owe an immense debt of gratitude. First and foremost, I would like to thank my primary supervisor, Professor Sabina Kleitman, for all of your guidance and support. You encouraged me to believe in myself and helped me find the strength to push through difficult times. I am profoundly grateful for your supervision.

Next, I want to extend my gratitude to my associate supervisor, Dr Bruce Burns. I am thankful for all the valuable insights and meticulous attention to detail you have provided in your feedback on my manuscripts. To the CODES lab people, particularly Marvin and Matt, thank you for all your guidance and support in helping me with my research.

I am also deeply grateful to my parents for their unwavering love, encouragement, and support. Thank you for giving me the freedom to embark on this journey of intellectual exploration. To my dear friends—thank you for your company and support during these challenges. To Lois, who vehemently asked for a place for her name here before I started my PhD. Here you go, thank you for being a great friend. To Arianna, thank you for all the thought-provoking conversations and new perspectives, and for inspiring me to stay positive even when things get difficult.

Authorship Attribution Statement

Publications presented in this thesis

Chapter 2 of this thesis has been published as a journal article with the peer-reviewed MDPI *Frontiers in Psychology*. Chapter 3 has been published in *Personality and Individual Differences*. Chapter 4 has been prepared for publication . The co-authors of this thesis include members of my supervisory team: Professor Sabina Kleitman and Dr Bruce Burns. The thesis author (B.K.N.) was a major contributor, the leading and corresponding author to all three manuscripts. The chapter publications and their respective author contributions are presented below.

Chapter 2: Ni, B. K., Burns, B. D., Mak, K. K., Lah, S., Silva, D. S., Goldwater, M. B., & Kleitman, S. (2023). To kill or not to kill: A systematic literature review of high-stakes moral decision-making measures and their psychometric properties. *Frontiers in Psychology*, *13*, 1063607.

Author Contributions: conceptualisation, all authors; methodology, B.K.N. and M.K.K.; formal analysis, B.K.N. and M.K.K.; investigation, B.K.N. and M.K.K.; data curation, B.K.N. and M.K.K.; writing—original draft preparation, B.K.N.; writing—review and editing, all authors; supervision—S.K. (main) and B.B. (associate)

Chapter 3: Ni, B. K., Burns, B. D., & Kleitman, S. (2025). Cooperation, Different Faces of Morality, and their Links to Risk, Fear, and Personality During COVID-19 Public Health Crisis. *Personality and Individual Differences, 247,* 113426.

Author Contributions: conceptualisation, B.K.N., S.K., and B.B.; methodology, B.K.N., S.K., and B.B.; formal analysis, B.K.N., S.K., and B.B.; investigation, B.K.N.; data curation,

B.K.N.; writing—original draft preparation, B.K.N.; writing—review and editing, B.K.N., S.K., and B.B.; supervision—S.K. (main) and B.B. (associate)

Chapter 4: Ni, B. K., Burns, B. D., & Kleitman, S. (2025). The Role of Risk Propensity in Moral Decision-Making Using the CNI Model.

Author Contributions: conceptualisation, B.K.N., S.K., and B.B.; methodology, B.K.N., S.K., and B.B.; formal analysis, B.K.N., S.K., and B.B.; investigation, B.K.N.; data curation, B.K.N.; writing—original draft preparation, B.K.N.; writing—review and editing, B.K.N., S.K., and B.B.; supervision—S.K. (main) and B.B. (associate)

I confirm that the authorship attribution statements above are correct.

Benjamin Kai Ni

15/09/2025

As supervisor for the candidature upon which this thesis is based, I can confirm that the authorship attribution statements above are correct.

Sabina Kleitman

30/09/2025

Artificial Intelligence

I acknowledge the use of OpenAI's ChatGPT in assisting with editing and language refinement during the preparation of this thesis. All substantive intellectual contributions, analyses, and interpretations remain my own.

Benjamin Kai Ni

30/09/2025

Related Scientific Output

This thesis includes the following peer-reviewed journal articles that have been published, submitted, or prepared for publication:

Chapter 2 **Ni, B. K.,** Burns, B. D., Mak, K. K., Lah, S., Silva, D. S., Goldwater, M. B., & Kleitman, S. (2023). To kill or not to kill: A systematic literature review of high-stakes moral decision-making measures and their psychometric properties. *Frontiers in Psychology*, *13*, 1063607.

Chapter 3 **Ni, B. K.,** Burns, B. D., & Kleitman, S. (2025). Cooperation, different faces of morality, and their links to risk, fear, and personality during a crisis. *Personality and Individual Differences, 247,* 113426.

Chapter 4 **Ni, B. K.,** Burns, B. D., & Kleitman, S. (2025). *The Role of Risk Propensity in Moral Decision-Making Using the CNI Model.* Manuscript prepared for publication.

Conference Proceedings and Other Key Presentations

Ni, B. K., Burns, B. D., Kleitman, S. (2024, Dec 02-04). The Intersection of Morality, Fear, Risk Propensity and Moral Decision-Making: Insights from the COVID-19 Pandemic. [Conference Presentation]. Australasian Congress on Personality and Individual Differences (ACPID), Sydney, Australia.

Ni, B. K., Burns, B. D., Kleitman, S. (2024, Dec 05-06). The Intersection of Morality, Fear, Risk Propensity and Moral Decision-Making: Insights from the COVID-19 Pandemic. [Conference Presentation]. Defence Human Science Symposium (DHSS), Melbourne, Australia.

Ni, B. K., Burns, B. D., Kleitman, S. (2023, Jun). The Role of Risk Aversion in Morality [Exchange Program Presentation]. Technische Universität Dresden, Germany.

Ni, B. K., Burns, B. D., Mak, K. K., Lah, S., Silva, D. S., Goldwater, M. B., & Kleitman, S. (2022, Nov 28-30). To kill or not to kill: A systematic literature review of high-stakes moral decision-making measures and their psychometric properties. [Conference presentation]. The Defence Human Science Symposium, Sydney, NSW, Australia.

Internships and Scholarships

Jun 2023	**ERASMUS+ Staff Mobility for Teaching or Training**
	Awarded by Technische Universität Dresden, Germany
Feb 2023	**Research Training Program Stipend**
	Awarded by the Faculty of Science, the University of Sydney
July 2021	**School of Psychology Postgraduate Research Scholarship**
	Awarded by the University of Sydney
July 2021	**University of Sydney Internal Booster Fund (Chapter 2)**
	Awarded by the University of Sydney

Glossary of Terms

Morality-as-Cooperation Theory – a theory proposed by Curry (2016) that conceptualises morality as game theoretic solutions to problems of social interactions. This theory highlights the practical utility of morality and its evolutionary implications.

Confirmatory factor analysis (CFA) – a statistical technique that is used to verify a factorial structure (usually theoretically driven) of variables and their underlying constructs (Kline, 2014).

Latent Profile Analysis (LPA) – a mixture modelling statistic technique that classifies individuals into distinct clusters based on a number of input predictor variables (Spurk et al., 2020).

Statistical Terms

Acronym/Symbol	Terms
M	Mean
N	Sample Size
p	Probability of obtaining the observation given the null hypothesis
r	Correlation coefficient
α	Cronbach's alpha
h^2	Communality
χ^2	Chi-squared
df	Degrees of Freedom
TLI	Tucker-Lewis Index
CFI	Confirmatory Fit Index
RMSEA	Root Mean Square Error of Approximation
CI	Confidence Interval
AIC	Akaike Information Criterion
BIC	Bayesian Information Criterion
SABIC	Sample-adjusted Bayesian Information Criterion
BLRT	Bootstrapped Likelihood Ratio Test
CFA	Confirmatory Factor Analysis
PCA	Principal Component Analysis
ML	Maximum Likelihood
LPA	Latent Profile Analysis

List of Tables

Table 2.1 Summary of Search Terms from Six Databases. 15

Table 2.2 Adapted criteria for quality of psychometric properties and scoring system (Terwee et al., 2007) 18

Table 2.3 Included study descriptions 31

Table 2.4 Summary of factorial structure, reliability estimates, and relationships of the measure with other variables/group differences. 37

Table 2.5 Overview of scoring of psychometric properties in the included studies 50

Table 3.1 Measures Employed in This Study. 78

Table 3.2 Model description and fit statistics for CFA with morality measures. 82

Table 3.3 Descriptive Statistics, ANOVA, and post-hoc tests of profile characteristics by Class. 87

Table 3.4 Descriptives, One-Way ANOVA, and post-hoc comparisons of personality, demographics, and cognitive ability between classes at Retrospective, Time 1, and Time 2. . 89

Table 3.5 Descriptives, Two-Way Mixed ANOVA, and post-hoc comparisons of protective behaviours between classes at Retrospective, Time 1, and Time 2. 91

Table 4.1 Measures employed in this study 111

Table 4.2 Fit Statistics, Class Distribution, and Posterior Probabilities of LPA models. 114

Table 4.3 ANOVA and pairwise comparisons between LPA Classes. 119

List of Figures

Figure 2.1 Flow Diagram of the Study Selection Process from Systematic Searches.....24

Figure 3.1 Theoretical factors expected from confirmatory factor analyses 72

Figure 3.2 Respondent flow diagram.....76

Figure 3.3 Model of the three-factor CFA model with standardised regression and correlations coefficients for moral variables (N=582).....84

Figure 3.4 Standardised scores of the 3-Class LPA solution (Error bars represent 95% CI)...86

Figure 4.1 Comparison of 2- vs 3-Class LPA Solutions. 116

Abstract

Moral decision-making is increasingly salient in the context of global political and economic instability. While prior research has examined moral reasoning and situational influences, less is known about the psychological mechanisms and individual differences that shape moral choices. From an evolutionary perspective, morality promotes long-term cooperative benefits over short-term self-interest; however, this is only one of several strategies, as some individuals prioritise immediate gains at others' expense. This thesis investigates how morality relates to self-regulation constructs (e.g., risk propensity, impulsivity, fears) and identifies distinct moral and amoral subgroups. Three aims guided the research: (1) systematically identify and appraise the quality and theoretical foundations of moral decision-making measures for individual differences research; (2) examine associations between morality, risk propensity, and related constructs; and (3) classify subgroups based on these variables. Across one systematic review and two empirical studies (Total N = 942 Australian adults), three key findings emerged. First, there is a lack of a unified theory of moral decision-making, where most measures were not developed with the goal of measuring individual differences. Second, within a cooperative morality framework, two pro-cooperative moral factors (individual- and collective-focused) and one anti-cooperative amoral factor were identified, with the latter strongly linked to risk propensity. Third, latent profile analysis consistently revealed two stable subgroups—moral risk-averse and amoral risk-seeking—plus a third group whose characteristics seem to be more influenced by the situation. These findings shed light on the interplay between morality and risk propensity, highlight subgroup heterogeneity, and underscore the importance of tailoring interventions to specific moral profiles. The thesis advances theoretical understanding of moral decision-making and offers practical implications for predicting and influencing moral behaviour in different situational contexts.

Chapter 1 Introduction

1.1 Overall Background

In recent years, the world has experienced profound social, economic, and political upheaval, including heightened racial tensions, the COVID-19 pandemic, rising inflation and unemployment, trade disputes and tariffs, and armed conflicts. These challenges create significant moral issues that require collective effort to address. Research has investigated how moral reasoning capacities develop over time (Kohlberg, 1984) and the reasoning and affective processes involved in moral decision-making (Greene et al., 2008). However, existing research does not capture the full spectrum of moral values, nor how and why people differ in moral behaviours. Moreover, there remains a gap in the literature regarding the conceptualisation of moral decision-making as an individual differences construct and the integration of existing frameworks into a unified theory.

A common thread among these crises is the tension between self-interest and collective welfare—whether expressed as self-versus-others or ingroup-versus-outgroup dynamics. Morality-as-Cooperation Theory (Curry, 2016) posits that morality evolved to facilitate cooperation, an adaptive strategy that enhances long-term benefits for all parties. Within this framework, self-regulation—the capacity to inhibit immediate self-interest in favour of long-term collective gains—emerges as a critical mechanism in moral decision-making. For example, individual differences in risk aversion may shape the extent to which people act in morally cooperative ways. Given the role of self-interest in morality, research also needs to investigate how contexts and threats (e.g., health, safety, finance) and responses to threats (e.g., fear) impact moral decision-making. Understanding this relationship has practical significance for predicting and promoting moral behaviour, with implications for addressing large-scale societal challenges.

1.2 Research Aims

The main research goals of this thesis are to:

1. Systematically investigate and appraise current measures of high-stakes moral decision-making.
2. Within the cooperative morality framework, examine the relationship between morality and risk propensity under different contexts (threat vs no threat) and the role of fear under threat.
3. Identify distinct subgroups of individuals based on morality, risk propensity, and study-specific variables.

1.3 General Research Method

The first study (Chapter 2) comprised a systematic literature review aimed at identifying existing instruments for assessing moral decision-making and critically evaluating their psychometric properties. The review highlighted a lack of unified theory and limited instrument development for capturing individual differences in moral decision-making. Studies 2 and 3 (Chapters 3 and 4 respectively) were empirical investigations exploring the relationship between moral decision-making and risk aversion within two different contexts. Study 2 examined this relationship within the ecologically valid context of the COVID-19 pandemic, a period in which individual compliance behaviour had direct implications for collective welfare. Theory-driven factor structures for morality and risk propensity were established through a series of confirmatory factor analyses (CFA). Subsequently, latent profile analysis (LPA) was employed to classify participants into three distinct profiles based on their morality, risk aversion, pandemic-related fears, and compliance attitudes.

Study 3 extended this work by drawing on one of the moral decision-making models identified in Study 1 to investigate more specific cognitive and dispositional processes underlying moral decision-making and their associations with risk aversion when things went to 'normal' and no immediate threat was present. As in Study 2, LPA was used to identify subgroups with distinct psychological characteristics, enabling partial replication and extension of the earlier findings. Chapters 3 and 4 present the individual literature reviews relevant to research presented in each Chapter/paper.

1.4 Thesis Structure

Chapter 1 introduces the thesis and presents its overall background, aims, and methodologies across the three studies conducted.

Chapter 2 presents Study 1, a systematic literature review: *To kill or not to kill: A systematic literature review of high-stakes moral decision-making measures and their psychometric properties.* The review identifies and appraises the psychometric properties of moral decision-making instruments against a standardised quality assessment framework. The findings demonstrate a lack of unified conceptualisation of moral decision-making and scarce cross-validation evidence between different measures. Furthermore, most measures involve hypothetical scenarios like the trolley dilemma but rarely examine real-life moral actions. This systematic literature review is a published peer-reviewed journal article (see Related Scientific Output).

Chapter 3 presents Study 2: *Cooperation, Different Faces of Morality, and their Links to Risk, Fear, and Personality During COVID-19 Public Health Crisis.* Building on the findings of the systematic literature review, Study 2 is an empirical investigation of the link between cooperative morality and risk propensity, utilising an ecologically

valid context of the COVID-19 pandemic using a large, relatively representative sample of the Australian public (N=582). Self-regulated compliance behaviours were used as a measure of real-life moral cooperation. Confirmatory Factor Analysis (CFA) is conducted to extract theory-driven morality and risk propensity factors. Latent Profile Analysis (LPA) is conducted to identify heterogeneous subgroups of individuals that differ in morality, risk propensity, COVID-related fear, personality, and compliant attitudes and behaviours. The findings suggest two stable subgroups—moral risk-averse and amoral risk-seeking—that support our hypothesis on the relation between morality and risk propensity. Furthermore, LPA identified a third group whose compliance seems to be driven by external factors (i.e., fear of COVID). Together, these findings provide support for the account of cooperative morality, yet also highlight that individuals' moral decision-making may differ in their susceptibility to external influence. This study is a manuscript submitted to a peer-reviewed journal (see Related Scientific Output).

Chapter 4 presents Study 3: *The Role of Risk Propensity in Moral Decision-Making Using the CNI Model.* This study expands on Studies 1 and 2 in two important ways. First, it adopts the Consequence, Norm, and Inaction (CNI) Model identified in Study 1, which outlines mechanisms of moral decision-making—sensitivities to consequences and norms, and a general tendency for inaction. Second, it measures a broader range of self-regulation constructs by including the Behaviour Inhibition and Activation Systems (BISBAS). Study 2 only measured risk propensity and impulsivity, which generally have a negative connotation and are associated with maladaptive risk-taking (e.g., alcohol/substance abuse). The inclusion of BISBAS captures self-regulation constructs (e.g., goal-directedness) that are related to adaptive risk-taking (e.g., innovation, leadership). It is also important to mention changes in the societal context

as Australia transitioned to the new post-COVID-19 dynamics. Study 3 employed a student sample (N=360) and the lab setting. Consistent with Study 2, the findings of Study 3 also identified two stable subgroups: moral risk-averse and amoral risk-seeking. However, as Australia transitioned to a post-pandemic context, a third group was again identified, but it is characterised by both high morality and high risk propensity. Overall, our findings align with the cooperative morality account and its relation with risk propensity, but also reveal important insights into the heterogeneity of mechanisms in moral decision-making. This study is a manuscript prepared for submission to a peer-reviewed journal (see Related Scientific Output).

Chapter 5 presents the general discussion of the thesis. It summarises the contribution of the systematic literature review and subsequent studies conducted. The theoretical and practical implications are presented. The need for moral decision-making research is growing in a world characterised by increasing social, political, and economic uncertainty, alongside rapid technological advancements. The implications for moral decision-making measurement, prediction, and intervention are discussed. Limitations and future directions are proposed. This chapter concludes the thesis.

Subsequent sections contain References and Appendices consisting of supplementary materials related to the research but not directly relevant to the focus of this thesis.

Chapter 2 Study 1: To kill or not to kill: A systematic literature review of high-stakes moral decision-making measures and their psychometric properties

This chapter presents Study 1 of this thesis, a systematic literature review conducted and published in the peer-reviewed journal *Frontiers in Psychology*. Minor revisions were made to conform to the University of Sydney style requirements. The complete reference is presented below:

Ni, B. K., Burns, B. D., Mak, K. K., Lah, S., Silva, D. S., Goldwater, M. B., & Kleitman, S. (2023). To kill or not to kill: A systematic literature review of high-stakes moral decision-making measures and their psychometric properties. *Frontiers in Psychology*, *13*, 1063607. (10 citations) https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2022.1063607/full

2.1 Introduction

Our world is full of volatile situations, including the current pandemic and recent wars, in which individuals must make high-stakes moral decisions. For example, in the first wave of the COVID-19 pandemic where medical staff and resources were overwhelmed, doctors and nurses were faced with moral decisions about whether to prioritise younger patients (who have a greater chance of survival) and whether to prohibit family visits to patients in ICU (Kuylen, Kim, Keene, & Owen, 2021).

Given how important these consequences can be, it is important to ask if there are individual differences in moral decision-making in high-stakes situations which involve life-

death decisions, and can we measure such differences? The existence of individual differences would imply that there are distinct and stable patterns in how people think, feel, and, importantly, act morally. Measuring individual differences would allow us to better understand, capture, and predict moral decision-making There are diverse government and private institutions that need to have established protocols of screening and selecting people who face high-stakes moral dilemmas (e.g., dealing with the sick, prisoners, victims of war) often in high-pressure situations. Having standardised and systematic information on measuring not moral reasoning, but moral decision-making is essential to generate and sustain trust in such organisations and to set the ground rules for their personnel. Thus, a systematic assessment of moral decision-making measures is vital as it will provide a much-needed foundation for screening and selection of personnel in fields where encounters with contentious high-stakes moral issues are likely, such as military, medical, and legal professions.

2.1.1 Moral Decision-Making: Concept and Definition

Moral decision-making refers to any decisions made within the 'moral domain', including judgments, evaluations, and response choices (Smetana, 2006). However, the term 'moral decision-making' has not always been used in past research, and instead terms such as 'moral reasoning', 'moral judgment', and 'moral cognition' (Garrigan, Adlam, & Langdon, 2018) have been used, sometimes interchangeably. Moral reasoning has also been defined as decision-making that includes moral and ethical components (Bucciarelli, Khemlani, & Johnson-Laird, 2008; Martí-Vilar, Escrig-Espuig, & Merino-Soto, 2021). However, moral decision-making may not be dependent on reasoning and cognition alone (Richardson, 2018), rather emotion and intuition may also play key roles (Greene et al., 2001; Haidt, 2001). Therefore, we consider moral decision-making an umbrella term that encompasses reasoning, emotions, and intuitions regarding ethical and moral questions.

2.1.2 Which is the Focus, Action or Actor?

Most contemporary research in moral decision-making has employed an act-based approach (Uhlmann, Pizzaro, & Diermeir, 2015). Specifically, researchers are interested in how individuals come to believe whether an *action* is morally right or wrong. A classic example is the Trolley Dilemma (Foot, 1967) where one must consider whether a trolley, which is on track to kill several people, should be actively diverted to another track where it will kill one person instead. Such sacrificial dilemmas have been adopted from philosophy and used to empirically probe what factors are taken into account in moral decision-making (see Christensen & Gomila, 2012, for a review). In the act-based approach, it is the characteristics of the situation that are the focus of moral decision-making.

In contrast to the act-based approach, recent research suggests that a *person*-centred approach may yield a better understanding of people's moral judgment. This approach focuses on individuals as the unit of analysis for moral evaluations rather than on acts (Uhlmann et al., 2015). This approach proposes that people are fundamentally motivated to acquire information about the moral character of others. Therefore, the features of an act that seem most informative of character often hold more weight than either the consequences of the act or whether a moral rule has been broken. Indeed, there is growing evidence to suggest that when faced with moral judgements people are focused on making inferences about moral character (Goodwin, Piazza, & Rozin, 2014; Pizzaro & Tannenbaum, 2012). Such moral character inferences are unlikely to be only a product of the features of the situation but also the traits of the maker of the inferences. This suggests that there could be robust individual differences in moral decision-making. That is, people make *systematic* choices about what is morally right or wrong despite varying situational factors. This paper systematically reviews evidence for individual differences in act-based moral research.

2.1.3 Sources of Individual Difference in Moral Decision-Making

There are two influential theories in moral psychology that may elucidate how individuals may differ in moral decision-making—Kohlberg's (1984) Moral Development Theory and Haidt's (2001) Social Intuitionist Theory. Given that there could be measures of individual differences in moral decision making that are based on each of these theories, we should first describe them.

2.1.3.1 Moral Development Theory

Kohlberg's Moral Development Theory posits that moral development entails employing increasingly complex *cognitive* rationales for moral decision-making (Lapsley, 1992). The increasing complexity in *cognitive* processes is detailed in six qualitatively different stages, where moral development entails progression from the first to the last stage (Mathes, 2021).

In the first two stages, known as the pre-conventional stages, moral decision-making is concerned with instrumental purposes. In other words, individuals' moral behaviours in these stages are acted out for the purpose of avoiding punishment and obtaining pleasure (Mathes, 2021). In Stages 3 and 4, known as the conventional stages, the moral behaviours of individuals are concerned with social norms and conventions, as well as interpersonal (e.g., family and friends) and social (e.g., authority) approval (Blasi, 1990). In the last two stages, known as the post-conventional stages, moral decision-making is driven by clearly defined moral principles that are independent of the authority of groups holding these principles and one's identification with these groups (Ísaksson, 1979).

According to Moral Development Theory, individual differences in moral decision-making may arise from differences in moral development and maturity. However, there are several unresolved issues with this approach. First, the Moral Development Theory argues for

a universal sequential trajectory of development. Attributing individual differences in moral decision-making merely to levels of moral maturity is almost certainly an oversimplification. Second, the theory's narrow focus on complex cognitive processes potentially excludes other factors (e.g., emotion, intuition) important to moral decision-making. Research on "moral dumbfounding" found that people can judge offensive yet harmless acts (e.g., incest with birth control) to be wrong but are unable to explain their reasoning or provide a justification (Haidt, Bjorklund, & Murphy, 2000). Therefore, Haidt et al. argued that judgment in moral dumbfounding tasks is based on automatic and intuitive processes (e.g., feelings of rightness or wrongness). Thus, differences in moral decision-making between individuals cannot be explained by *cognitive* processes alone.

Despite these criticisms Kohlberg's theory has been influential on psychological research into moral decision making. As a result, there are measures of individual differences based on this theory that we expect to be part of this systematic review.

2.1.3.2 The Social Intuitionist Model

The second influential theory in moral psychology is Haidt's (2001) Social Intuitionist Model. The Social Intuitionist Model argues against a rationalist model where moral judgments and decisions are reached through complex *cognitive* processes. Instead, Haidt (2001) argues that moral judgments and decisions are dependent primarily on one's moral *emotions* and *intuitions*. Moral reasoning, in his view, mostly serves as a post hoc process to justify the established moral judgment.

The Social Intuitionist Model argues that moral intuition, much like language, evolved as a major adaptation for a social species while also requiring shaping from social and cultural institutions (Haidt, 2001). Therefore, it is both innate and enculturated. One's moral intuition can be considered a mixed product of innate predispositions (Fiske, 1991,

1992) and a unique developmental environment consisting of family, peers, and culture (Harris, 1995; Whiting & Child, 1953). Variation in people's moral intuitions may provide a basis for individual differences in moral decision-making that are not dependent on reasoning alone.

Emotions also play an important role for individuals in moral decision-making. Haidt (2003) discusses several families of emotions that are of relevance: other-condemning (contempt, anger, disgust), self-conscious (shame, embarrassment, guilt), other-suffering (sympathy, compassion), other-praising (gratitude, awe, elevation). Haidt (2003) argues that emotions place the person in a motivational and cognitive state in which there is an increased tendency to engage in actions that fulfills the emotion-related goals (e.g., revenge, comforting). Malti and Krettenauer (2013) conducted a meta-analysis and found that the ability to attribute emotion to moral actions (e.g., guilt over moral transgression, pride over prosocial actions) is linked to prosocial and antisocial behaviours among children and adolescents. Therefore, variability in the ability and tendencies for a broad range of moral emotions certainly has implications for moral decision-making. Thus, a comprehensive theory of the psychology of moral decision making should bring these theories together by positing that moral decision-making is a broad construct that encompasses *reasoning*, *emotions*, and *intuitions*.

A comprehensive systematic literature review, using a standardised quality appraisal tool, is needed to apprehend and evaluate psychometric properties of the different high-stakes moral decision measures that are rooted in the different theories, aiming to clarify and possibly integrate them for future research. The findings will inform theories of moral decision-making, including their key models and definitions. We will first outline the findings from existing literature reviews, including their shortcomings. Second, we will define the key aims of this review. Third, we will situate different measures within their relevant

frameworks while evaluating their psychometric properties, providing a key foundation for an informed assessment of their usefulness to capture high-stakes moral decision-making. We will then determine a gold standard measure of moral decision-making using the focus and definition proposed in this review.

2.1.4 The Present Systematic Review

Two influential psychological theories outlined the possibility that people can differ meaningfully in moral decision-making. The next step is to ask how empirical research has tried to measure these differences in moral decision-making.

2.1.4.1 Existing Systematic Reviews and Meta-Analyses

To date two studies systematically reviewed existing measures of moral decision-making. Villegas de Posada and Vargas-Trujillo's (2015) meta-analysis found that the development of moral reasoning positively correlated with domain-specific actions (real life, honesty, altruism, and resistance to conformity) and domain-general actions. Martí-Vilar et al. (2021) conducted a systematic review of existing moral reasoning measures and their reported psychometric properties. They identified 21 measures that could fall under one of four categories: 1) Kohlbergian Models, 2) Prosocial Moral Reasoning Models, 3) Moral Dilemmas, and 4) Other or Unspecified Models. While 21 measures were identified, only a few measures were represented in most of the studies examined and the rest received limited testing. The Defining Issues Test (Rest, 1974), based on the Kohlbergian Model, was one of the most commonly used measures. While these systematic reviews are informative of the current state of empirical research in moral decision-making, they have two shortcomings that the present review seeks to address. First, the quality of the evidence for the moral decision-making instruments' psychometric properties was not evaluated against pre-determined criteria. A standardized criteria framework for measuring the quality of evidence

allows for a *systematic* examination of each measure's psychometric properties, as well as a comparison of their relative strengths. One measure may reliably measure a narrow aspect of moral decision-making, whereas another measure captures broader aspects but less reliably. These differences across measures can inform our selection of measures for different purposes.

Second, the studies considered were not only focused on high-stakes (life and death) situations. Instead, they allowed substantial variability in the context in which moral decisions were made (e.g., business, education, medicine, engineering, and science). However, this contextual variability may be problematic. The context often included domain-specific moral issues that are already addressed by guidelines and policies (e.g., there is a "correct" answer determined by an authority) and thus cannot capture meaningful differences in individual choices that do not follow prescribed rules. In contrast, measures of moral decision-making that involve life and death result in dilemmas where there is less consensus on what the right decision or judgment is. Importantly, determining whether systematic individual differences exist here can help us to understand, and predict, moral decision-making and behaviours, and thus aid development of theories of moral decision-making. From the applied perspective, this information provides a key platform for the screening and selection of personnel in various fields where people have to face high-stakes decisions, such as military, medical, and legal professions.

2.1.4.2 Systematic Review: Aims

Therefore, the present systematic review aims to: (1) identify and examine existing measures of moral decision-making that involve life/death content when no clear and agreed rules exist; (2) evaluate the psychometric properties presented in construction and validation studies against a standardised quality appraisal tool (Terwee et al., 2007); (3) discuss the

conceptualisation of the construct and assess the usefulness of the identified measures; and (4) ascertain whether a gold standard measure of moral decision-making using the broad definition adopted in this review exists, and if not whether promising measures exist. The present review will follow the PRISMA Statement and guidelines for conducting and reporting systematic reviews (Liberati et al., 2009).

2.2 Methods

2.2.1 Search Strategy

Electronic searches were conducted in six databases (see Table 2.1): PsycINFO, Web of Science, Scopus, Medline, Embase, and the ProQuest Military Database. These databases were selected based on the focus of this systematic literature review on life-or-death content, thus we included medical and military databases in addition to the three more general scientific databases. The final search was conducted in all databases on 13th May 2021. Relevant studies were identified using a combination of keywords. PsycINFO, Medline, and Embase also allow searching by subject headings, which are subsequently used to attain additional papers not captured by keyword searches. Generally, the search strategy aims to identify an intersection of studies that focused on 1) moral decision-making, and 2) measurement.

Reference lists of all included studies were also manually screened for potentially relevant publications. Additionally, potential validation studies were searched by manually screening studies that cited the original measure construction studies on Google Scholar. The search for additional validation studies through Google Scholar was conducted between 14th July 2021 and 29th July 2021.

Table 2.1
Summary of Search Terms from Six Databases.

Database	Search Terms
PsycINFO	((Decision Making **AND** (Morality **OR** Ethics)) **OR** "moral decision making" "ethical decision making" **OR** "moral reasoning") **AND** (*Measurement*[a] OR "moral dilemma")
Embase[b]	(*Decision-Making* **AND** (*Morals* **OR** *Ethics*)) **AND** ("moral decision making" **OR** "ethical decision making" **OR** "moral reasoning")
Medline[c]	(*Decision-Making* **AND** (*Morals* **OR** *Ethics*)) **AND** ("moral decision making" **OR** "ethical decision making" **OR** "moral reasoning")
Web of Science	("ethical decision making" **OR** "moral decision making" **OR** "moral reasoning") **AND** (measurement **OR** psychometr* **OR** "moral dilemma")
Scopus	("ethical decision making" **OR** "moral decision making" **OR** "moral reasoning") **AND** (measurement **OR** psychometr* **OR** "moral dilemma")
Proquest Military Database	("ethical decision making" **OR** "moral decision making" **OR** "moral reasoning") **AND** (measurement **OR** psychometr* **OR** "moral dilemma")

Note. Subject headings are in *italics*. Keywords are in quotation marks ("").
[a] Related subheadings for Measurement are also selected to include more relevant results. For the full syntax of search terms, see Appendix A.
[b] Embase and Medline do not have "Measurement" as a subject heading. Therefore, searches of subject headings and keywords were solely focused on moral decision-making. Relevant papers are screened and selected manually.
[c] See b.

2.2.2 Inclusion Criteria

Peer-reviewed journal articles, book chapters, and unpublished dissertations were included in the review if they were an original quantitative research study that developed and/or validated a measure of moral decision-making. Studies were included if their aims were to develop or validate a measure of moral decision-making: 1) contain life/death content, or 2) include sacrificial moral dilemma(s). Studies were included if the sample consisted of at least 50% adults (i.e., over 18 years of age). Thus, some studies that tested high school students were also included, but this characteristic was recorded. Studies published in the English language were included, regardless of whether the study used a non-English speaking sample, but this characteristic was also recorded.

2.2.3 Exclusion Criteria

Studies were excluded if more than 50% of the sample were not adults, were from non-peer-reviewed journals, conference proceedings, non-empirical studies, or were not written in the English language. Studies were excluded if the measures of moral decision-making: 1) did not contain life/death measures, or 2) did not include sacrificial moral dilemma(s).

2.2.4 Selection Process

The entire selection process was conducted by BN and KM authors. Search results were initially screened by title and abstract to exclude studies that did not meet the inclusion criteria. For the remaining papers, full-text papers were obtained and evaluated in accordance with the inclusion/exclusion criteria.

2.2.5 Data Extraction and Quality Assessment

The psychometric properties of all measures in the included studies were assessed using a published quality appraisal tool (Terwee et al., 2007) developed to assess the quality of health status questionnaires' validity, reliability, and responsiveness. Although moral decision-making is not in the domain of health status, the quality appraisal tool has been used in reviews that assessed the psychometric properties of individual difference measures (e.g., imposter phenomenon; Mak, Kleitman, & Abbott, 2019). Therefore, this measurement framework was considered an appropriate tool for evaluating studies that examined the psychometric properties of moral decision-making measures.

The appraisal framework evaluates nine properties: 1) content validity, 2) internal consistency, 3) criterion validity, 4) construct validity, 5) reproducibility-agreement, 6) reproducibility-reliability), 7) responsiveness, 8) floor or ceiling effects, and 9) interpretability. The definitions and criteria of quality for each psychometric property are

displayed in Table 2.2. Similar to Mak et al.'s (2019) study, certain criteria from the original framework were amended due to the nature of the moral decision-making measures. These amendments were noted in Table 2.2. For example, item selection, a criterion of content validity, should only be applied to the original test construction studies and not follow-up validation studies.

Each assessed criterion received a rating score of "+" as good, "?" as intermediately rated, "-" as negatively rated, or a "0" if no information was provided on that criterion for a specific study. An "N/A" (not applicable) rating was assigned for a particular criterion if it is impossible to evaluate the criterion due to the research design used in the study. For example, responsiveness is a criterion assessing how well the measure detects clinically important changes over time, which is not applicable to studies that are non-longitudinal.

The two researchers (BN and KM) independently evaluated each included study and evaluated their psychometric properties against the amended quality framework. Discrepancies in scoring were discussed at calibration meetings to arrive at a consensus.

Table 2.2
Adapted criteria for quality of psychometric properties and scoring system (Terwee et al., 2007)

	Property	Definition		Quality Criteria	Criteria Amendment
1	Content Validity	The extent to which the domain of interest is comprehensively sampled by the items in the questionnaire	+	A clear description is provided of the measurement aim, the target population, the concepts that are being measured, and the item selection **AND** target population and (investigators OR experts) were involved in item selection;	1) Target population - clear description of the **sample characteristics** (e.g., undergraduate students, M and SD and/or range of age, gender). 2) Item selection should be theoretically driven - only relevant to test construction papers.
			?	A clear description of above-mentioned aspects is lacking **OR** only target population involved **OR** doubtful design or method;	
			-	No target population involvement;	
			0	No information found on target population involvement.	
2	Internal Consistency	The extent to which items in a (sub)scale are intercorrelated, thus measuring the same construct	+	Factor analyses performed on adequate sample size (7 $*$ # items and $\geqslant$100) AND Cronbach's alpha(s) calculated per dimension AND	

				Cronbach's alpha(s) between 0.70 and 0.95;	
			?	No factor analysis OR doubtful design or method;	
			-	Cronbach's alpha(s) <0.70 or >0.95, despite adequate design and method;	
			0	No information found on internal consistency.	
3	Criterion Validity	The extent to which scores on a particular questionnaire relate to a gold standard	+	Convincing arguments that gold standard is “gold” AND correlation with gold standard ⩾0.70;	
			?	No convincing arguments that gold standard is “gold” OR doubtful design or method;	
			-	Correlation with gold standard <0.70, despite adequate design and method;	
			0	No information found on criterion validity.	There is a gold standard that the researchers haven't referred to
			N/A		No gold standard mentioned

4	Construct Validity	The extent to which scores on a particular questionnaire relate to other measures in a manner that is consistent with theoretically derived hypotheses concerning the concepts that are being measured	+	Specific hypotheses were formulated AND at least 75% of the results are in accordance with these hypotheses;	1) Main hypothesis confirmed. 2) 50% instead of 75% are in accordance with these hypotheses. 3) Hypotheses should be about proposed relationships between the measure and other theoretically related constructs or about proposed group differences as opposed to hypothesised factor structure. 4) Statements of examining convergent and divergent validity are sufficient to be considered as hypotheses when assessing construct validity.
			?	Doubtful design or method (e.g., no hypotheses);	
			-	Less than 75% of hypotheses were confirmed, despite adequate design and methods;	
			0	No information found on construct validity.	No hypotheses or exploratory hypotheses only.
5	Reproducibility: Agreement	The extent to which the scores on repeated measures are close to each other (absolute measurement error)	+	MIC < SDC OR MIC outside the LOA OR convincing arguments that agreement is acceptable;	
			?	Doubtful design or method OR (MIC not defined AND no convincing arguments that agreement is acceptable);	
			-	MIC $\geqslant$ SDC OR MIC equals or inside LOA, despite adequate design and method;	
			0	No information found on agreement.	
			N/A		Study is non-longitudinal.

6	Reproducibility: Reliability	The extent to which patients[a] can be distinguished from each other, despite measurement errors (relative measurement error)	+	ICC or weighted Kappa ⩾ 0.70;	
			?	Doubtful design or method (e.g., time interval not mentioned);	
			-	ICC or weighted Kappa < 0.70, despite adequate design and method;	
			0	No information found on reliability.	
			N/A		Study is non-longitudinal.
7	Responsiveness	The ability of a questionnaire to detect clinically[a] important changes over time	+	SDC or SDC < MIC OR MIC outside the LOA OR RR > 1.96 OR AUC ⩾ 0.70;	
			?	Doubtful design or method;	
			-	SDC or SDC ⩾ MIC OR MIC equals or inside LOA OR RR ⩽ 1.96 OR AUC < 0.70, despite adequate design and methods;	
			0	No information found on responsiveness.	
			N/A		Study is non-longitudinal.

8	Floor and ceiling effects	The number of respondents who achieved the lowest or highest possible score	+	⩽15% of the respondents achieved the highest or lowest possible scores;
			?	Doubtful design or method;
			-	>15% of the respondents achieved the highest or lowest possible scores, despite adequate design and methods;
			0	No information found on interpretation.

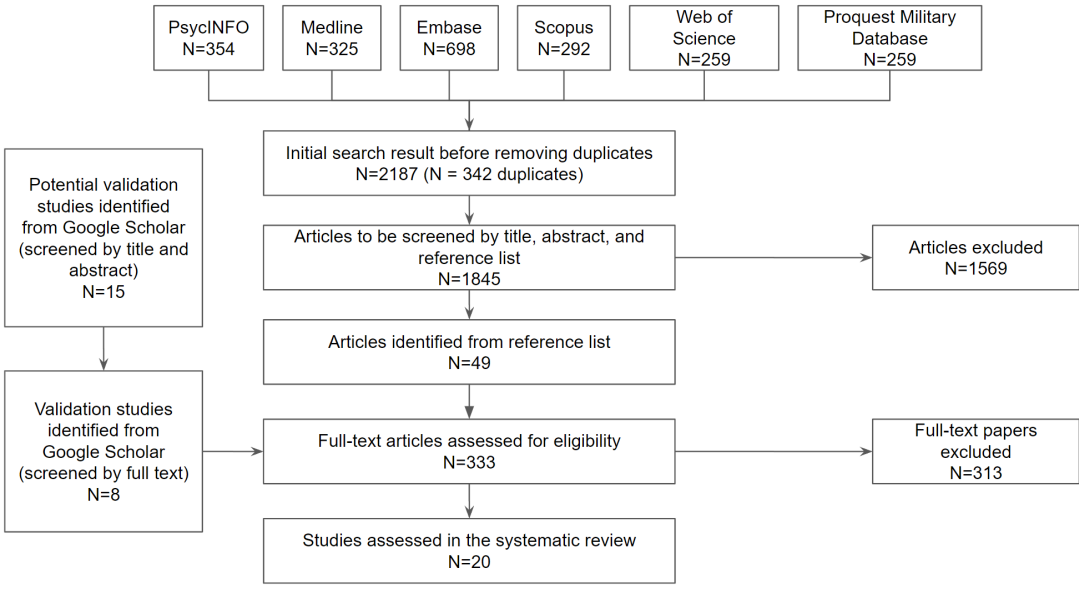
9	Interpretability	The degree to which one can assign qualitative meaning to quantitative scores	+	Mean and SD scores presented of at least four relevant subgroups of patients and MIC defined;	Relevant subgroups = groups that differ in meaningful ways (e.g., demographics, between-subjects experimental manipulation).
			?	Doubtful design or method OR less than four subgroups OR no MIC defined;	Incomplete presentation of means and SD scores
			0	No information found on interpretation.	

Note. Adapted from "Impostor phenomenon measurement scales: a systematic review", by Mak et al., 2019, *Frontiers in psychology, 10*, 671.
[a] These terms are used in Terwee et al., (2007) but were interpreted more broadly here
M = mean; SD = standard deviation.
MIC = minimal important change (smallest difference in score in the domain of interest which patients perceive as beneficial and would agree to, in the absence of side effects and excessive costs).
SDC = smallest detectable change (smallest within person change, above measurement error. A positive is given when SDC or the limits of agreement are smaller than the MIC).
LOA = limits of agreement. ICC = intraclass correlation.
RR = responsiveness ratio. AUC = area under the curve.

2.3 Results

The initial search returned 2187 results, of which 342 were duplicates. These were screened, and most were excluded because the study: 1) was not a validation study, 2) the measure used was qualitative or not life-or-death related, or 3) was not published in the English language. The flow diagram in Figure 2.1 documents the review process.

Figure 2.1
Flow Diagram of the Study Selection Process from Systematic Searches



Overall, we were left with 20 studies to fully evaluate. The identified measures in these studies generally adopted one of two formats: moral dilemmas or self-report scales. Moral dilemma measures were used in 16 included studies. The main moral dilemma measures identified included: 1) the Defining Issues Test (Rest, 1974) and its revised versions, 2) measures using the Process Dissociation (PD) Model (Conway & Gawronski, 2013), and 3) measures using the Consequence, Norm, Inaction (CNI) Model (Gawronski et al., 2017). Three self-report measures were identified in the remaining three studies. Table 2.3 describes the included studies organised by the type of measurement and ascending year of publication within the same group.

It is important to notice that there is substantial variability in what the moral decision-making measures aim to measure and their theoretical basis. This implies that there is a lack of consensus regarding the construct of moral decision-making, and therefore each measure may only capture some of its dimensions. The next section gives a brief description of the identified measures.

2.3.1 Measures based on Moral Dilemmas

2.3.1.1 The Defining Issues Test and Revised Versions

The Defining Issues Test (DIT; Rest, 1974) and its revised versions, the DIT-2 (Rest, Narvaez, Thoma, & Bebeau, 1999), and the behavioural Defining Issues Test (bDIT; Choi et al., 2019), were used in 7 studies. The Defining Issues Test was based on Kohlberg's (1984) Moral Development Theory. The DIT consists of 6 sacrificial dilemma stories. After each story, the participant is given a list of reasons for (e.g., sacrificing a life to save more lives) or against action (e.g., not killing anyone even if it saves others) and asked to rank and rate the importance of each reason. These reasons stem from Kohlberg's stages (2-6) of moral reasoning and can be grouped into three categories: personal interests (Stage 2), maintaining social norms (Stages 3 and 4), or post-conventional perspectives (Stages 5A, 5B, and 6). The DIT quantifies a person's moral development by their likelihood of endorsing post-conventional reasons (i.e., the P score). While the DIT produces several scores representing reliance on each stage of moral development (i.e., stage scores from stages 2-6), the P score is the most widely used index (Rest et al., 1999).

The DIT-2 contains five of the six dilemmas from the original DIT with updated language and generates the N2 instead of P score. The N2 score, like the P score, considers the preference for postconventional reasoning. In addition, the N2 score takes into account the disagreement with less sophisticated schemas (Rest et al., 1999).

The bDIT contains three dilemmas and measures behavioural responses, such as reaction time (Choi et al., 2019). Instead of rating the importance of reasons for action/inaction, participants were given a limited amount of time to select one of the three presented behavioural responses. These three responses represent the three moral schemas: Personal Interest, Maintaining Norms, and Post-Conventional Reasoning.

2.3.1.2 Measures Using the Process Dissociation Model

A set of moral dilemmas that evaluates a person's inclinations for utilitarianism and deontology separately was created by Conway and Gawronski (2013). This set of moral dilemmas was based on the Process Dissociation (PD) Model (Jacoby, 1991). Psychologists typically define utilitarianism as the principle whereby the morality of an action is determined by its consequences (Conway & Gawronski, 2013). On the other hand, deontology is defined as the principle that the morality of an action is determined by its intrinsic nature (e.g., causing harm is wrong regardless of the consequences). While earlier sacrificial dilemmas pit utilitarianism against deontology (e.g., Greene et al., 2001), Conway and Gawronski (2013) argued that the endorsement of one does not necessarily imply a rejection of the other. Therefore, participants' rating of the appropriateness of action in 20 dilemmas were analysed using process dissociation to extract inclinations toward both utilitarianism and deontology. Jang (2020) translated the PD into Korean and conducted a study to validate the measure.

2.3.1.3 Measures Using the CNI Model

The CNI model (Gawronski et al., 2017) further developed the Process Dissociation Model by addressing another problem with the traditional approach. In addition to the two inclinations underlined by the Process Dissociation Model, Gawronski et al. (2017) argued that there is a third component, a general tendency for inaction, that may play a role in moral

decision-making. In a morally ambiguous situation, a person may prefer to not act because they do not want to inject themselves into events, rather than due to a strong inclination toward deontology or utilitarianism. In traditional moral dilemmas, the action always leads to sacrificial killing, which conflates with a preference for inaction. Using the multinomial processing tree method, Gawronski et al. (2017) developed the CNI model, which is a new set of 24 dilemmas that measured participants' sensitivity to **C**onsequences (inclination for utilitarianism in the Process Dissociation Model), sensitivity to **N**orms (inclination for deontology in the Process Dissociation Model), and a general tendency for **I**naction. Körner et al. (2020) expanded the battery from 24 to 48 to improve its suitability in individual difference research.

2.3.1.4 Other Moral Dilemmas

The remaining moral dilemma studies each identified one measure. Bore's (2001) Morality of Justice and Care (MOJAC) scale conceptualised moral dilemmas as the conflict between the rights of the individual (e.g., stealing a drug to save one's sick wife) and the rights of the collective (e.g., stealing is wrong).

Christensen et al. (2014) systematically developed a battery of moral dilemmas based on four conceptually meaningful factors: personal force, benefit recipient, evitability, and intentionality. Additionally, contextual factors such as the word count, framing, situational antecedents, number of individuals involved, types of trade-off (e.g., killing vs stealing, lying), and whether your action will be known to others, were controlled for. Christensen et al. (2014) were interested in whether their conceptual factors influenced participants' decisions, arousal, valence, and reaction times.

Fleischhut et al. (2013) investigated the effect of hindsight in moral decision-making. They were interested in how moral decisions are influenced if participants had information on

their actions' consequences. Fleischhut et al. (2013) generated dilemmas in which actions to avert negative outcomes had probable side effects, and then created three information conditions. In the *foresight* condition, participants were provided with no further information and asked for a decision. In the *hindsight-good* and *hindsight-bad* conditions, participants were given additional information stating that the negative side effects either occurred (*bad* condition) or did not occur (*good* condition). Participants were asked to judge the permissibility of the action and the probability of the negative side effect occurring in the future.

Kimhi (2013) developed moral dilemmas in war-related scenarios (e.g., whether to open fire on the enemy at the risk of harming civilians). Participants' decisions, their perceived appropriateness, confidence, the difficulty of their decisions, and the estimated probability of specific outcomes (e.g., civilians being killed) were measured.

Lotto et al. (2014) investigated the effects of intention and self-involvement in moral decision-making. They constructed 75 moral dilemmas consisting of 30 "instrumental dilemmas", 30 "incidental dilemmas", and 15 fillers. Instrumental dilemmas described killing an individual as means to save others (e.g., killing and taking an innocent person's organs to treat five patients in need of transplants). On the other hand, incidental dilemmas described killing an individual as a foreseen but unintended consequence (e.g., switching the trolley onto another track where there is another worker). Additionally, approximately half of the dilemmas in each condition were self-involved (i.e., killing saves one's own life and others), and half were other-involved (i.e., killing saves others only). Lotto et al. (2014) were interested in the effects of intention and self-involvement on participants' decisions, their rating of action's moral acceptability, and their affective reactions.

Carmona-Perera et al. (2013) translated and adapted the moral dilemmas from Greene et al. (2001). The moral dilemmas were adapted to investigate brain activities when participants were dealing with morally conflicting situations. The battery of dilemmas consists of three groups: non-moral stories, moral-impersonal stories (e.g., flipping a switch to divert the trolley from killing five workers), and moral-personal stories (e.g., pushing a man off the bridge to stop the trolley from killing five workers). More personal moral dilemmas were expected to be more conflicting and associated with both less willingness to take action and heightened brain activity. The personal dilemmas were further divided into high-conflict (dilemmas that had low consensus on the appropriate decision in previous studies) and low-conflict (dilemmas that had high consensus). Carmona-Perera et al. (2013) were interested in the decisions participants would make, the difficulty they felt when making the decision, and the proportion of congruent decisions as an index of rationality (e.g., saying no to risky investment decisions).

2.3.2 Description of Self-Report Scales

2.3.2.1 ABB Scale

The ABB scale, named after the initials of the authors—Abdellaoui, Blatier, and Beauvois (2016)—was created to measure people's judgments on personal, conventional, and moral transgressions. For each type of transgression, four scenarios were given and participants rated how serious and how defensible the action is, and whether the transgressor should be rejected.

2.3.2.2 Oxford Utilitarian Scale

Kahane et al.'s (2018) Oxford Utilitarian Scale aimed to measure two aspects of utilitarianism. The first aspect, instrumental harm, measures whether individuals find causing harm permissible if it leads to more moral good overall. The second aspect, impartial

beneficence, assesses whether individuals maximise overall moral goodness even if it conflicts with self-interest (e.g., donating one's majority of income to charity). Kahane et al (2018) argued that existing moral dilemma measures predominantly focused on *instrumental harm* but overlooked *impartial beneficence*. To address this gap, the Oxford Utilitarian Scale measures both of these factors.

2.3.2.3 Punishment Orientation Questionnaire

The Punishment Orientation Questionnaire (POQ; Yamamoto & Maeder, 2019) aimed to measure what principles people engage with when thinking about punishment. The POQ captures two general principles that underlie the motivations behind punishment—utilitarianism (i.e., deterrence of future transgression) and retributivism (i.e., an eye for an eye). Furthermore, each principle is divided into a Prohibitive dimension and a Permissive dimension, resulting in four subscales: 1) Prohibitive Utilitarianism (limiting punishment based on utility), 2) Prohibitive Retributivism (aversion to punishing if it means hurting innocent people), 3) Permissive Utilitarianism (willingness to give harsh punishment based on the benefits thereof), and 4) Permissive Retributivism (desire for just desserts).

Table 2.3
Included study descriptions

Authors	Study Type	Statistical Analysis	Number of Scenarios / Items	Questions asked	Study Population	Age (Mean)	Sex Ratio[a]
Moral Dilemmas							
DIT							
Martin et al. (1977)	Validation	ANOVA	6 scenarios	Importance on 12 items for each scenario	Sample 1: 60 junior high school, Sample 2: 200 high school students, Sample 3: 105 college students,	Sample 1: 13.9 years, Sample 2: 17.3 years, Sample 3: 20.2 years	Sample 1: 33 males, 27 females, Sample 2: 93 males, 107 females, Sample 4: 34 males, 71 females
Davison & Robbins (1978)	Validation	Cronbach's α, Test-retest reliability, t-test, Correlation	6 scenarios	Importance on 12 items for each scenario	1703 from 6 samples including high school students, undergraduate and graduate students, and adults	Ranged 15-82 years	Most samples reported to have approximately even split between males and females.
DIT-2							
Rest, Narvaez, Thoma, & Bebeau (1999)	Adaptation	ANOVA, Correlation, Cronbach's α, Regression, t-test	5 scenarios	Importance on 12 items for each scenario	Sample 1: 47 ninth-grade students, Sample 2: 35 senior high graduates, new freshmen, Sample 3: 65 college seniors, Sample 4: 53 graduate school and professional school students	Sample 1: 14.64 years, SD = 0.53, Sample 2: 18.51 years, SD = 2.03, Sample 3: 21.55 years, SD = 3.11, Sample 4: 29.06 years, SD = 5.90	Sample 1: 34% female, Sample 2: 77% female, Sample 3: 77% female, Sample 4: 45% female
Mitchell (2000)	Validation	ANOVA, Factor Analysis, Reliability, ANCOVA, Correlation	5 scenarios	Importance on 12 items for each scenario	1534 consisted of 26 samples collected by a third-party research centre from 1998 to 1999.		606 males, 904 females
Mayhew et al. (2015)	Validation	Regression	5 scenarios	Action, 12-item scale	923 (First-year undergraduates in the US)	Not reported	38.4% male, 61.6% female

Choi et al. (2020)	Validation	CFA	5 scenarios	Importance on 12 items for each scenario	39409 (US citizens in university, collected by a third-party research centre between 2000 and 2009)	Ranged 17-26 years	21139 males (47.2%), 23272 females (52%)
bDIT							
Choi et al. (2019)	Adaptation	Reliability (tetrachoric correlation), Differential item functioning analysis, Logistic regression, ANOVA	3 scenarios	Behavioural decision and 8 questions asking the rationale behind decision for each story	353 (Introductory psychology students in the US)	18.64 years, SD = 1.20	81 males, 271 females
Process Dissociation Model							
Conway & Gawronski (2013)	Construction	S1: t-test, Correlation, Regression, S2: t-test, Correlation, ANOVA, S3: t-test, ANOVA	20 scenarios	S1: Appropriateness, S2: Appropriateness, S3: Appropriateness	S1: 112 (Undergraduate students), S2: 57 (Undergraduate students), S3: 275 (MTurk)	S1: 19.23 years, SD = 5.20, S2: 18.37 years, SD = 0.96, S3: 34.08 years, SD = 11.73	S1: 30 males, 82 females, S2: 28 males, 29 females, S3: 118 males, 156 females
Jang (2020)	Validation	Correlation, Mann-Whitney test,	20 scenarios	Appropriateness, probability of taking action, how happy	465 (Korean adults)	31.37 years, SD = 14.20	163 males, 300 females

CNI Model								
Gawronski et al. (2017)	Construction	S1: t-test, g-test, S2: t-test, g-test, S3: t-test, g-test, S4: t-test, g-test	24 scenarios		S1: Acceptability, S2: Acceptability, S3: Acceptability, Action, S4: Acceptability	S1a: 201 (MTurk), S1b: 197 (MTurk), S2a: 194 (MTurk), S2b: 194 (MTurk), S3a: 186 (MTurk), S3b: 189 (MTurk), S4a: 184 (MTurk), S4b: 198 (MTurk)	S1a: 32.20 years, SD = 10.96, S1b: 35.77 years, SD = 11,47, S2a: 34.26 years, SD = 11.90, S2b: 36.36 years, SD = 12.40, S3a: 35.77 years, SD = 12.79, S3b: 34.72 years, SD = 10.69, S4a: Not reported, S4b: Not reported,	S1a: 106 males, 95 females, S1b: 95 males, 102 females, S2a: 96 males, 97 females, S2b: 103 males, 91 females, S3a: 86 males, 100 females, S3b: 91 males, 98 females, S4a: Not reported, S4b: Not reported,
Körner et al. (2020)	Adaptation, Validation	S1: Correlation, S2: Correlation	48 scenarios		S1: Acceptability, S2: Action	S1a: 161 (MTurk), S1b: 177 (MTurk), S2a: 196 (MTurk), S2b: 189 (MTurk)	S1a: 37 years, SD = 11, S1b: 33 years, SD = 9, S2a: 35 years,SD = 10, S2b: 34 years, SD = 9	S1a: 84 males, 72 females, S1b: 105 males, 65 females, S2a: 93 males, 102 females, S2b: 96 males, 90 females
Other Moral Dilemmas								
Bore (2001)	Construction, Adaptation, Validation	S1: Cronbach's α, PCA, Correlation, S2: Cronbach's α, PCA, Correlation, S3: Cronbach's α, PCA, Correlation, S4: Cronbach's α, t-test, Correlation, Second-order Factor Analysis (Varimax rotation), S5: Cronbach's α, t-test, ANOVA, Correlation, Test-retest reliability, PCA, S6: t-test,	S1: 35 items (3 scenarios), S2: 45 items (4 scenarios), S3-6: 24 items (3 scenarios), S7: 24 items, except for the New Zealand samples, which completed	Decision items (e.g., action should be taken/is prohibited/is not important)	S1: 882 (Medical school applicants), S2: 2906 (Medical school applicants), S3: 2862 (Medial school applicants), S4: 84 (First year Psychology students), 82 (Medical school applicants), S5: 232 (Bachelor of Medicine students), S6: 16 (Ethical clinicians), S7: 2862 (Sample from S3), 113 (New Zealand medical students, Sample A), 123 (New Zealand medical students, Sample B), 360 (Israel medical school applicants, Sample A), 626 (Israel medical school applicants, Sample B), 67 (Fiji medical students),	S1: 19.3 years, SD = 3.9, S2: 18.6 years, SD = 3.3, S3: 19.9 years, SD = 4.8, S4: 22.5 years, SD = 8.2, S5: 23.6 years, SD = 5.0, S6: Not reported, S7: 19.9 years, SD = 4.8 (Sample from S3), 20.2 years, SD = 3.0 (New Zealand Sample A),	S1: 368 males, 510 females, S2: 1267 males, 1634 females, S3: 1334 males, 1525 females, S4: 42 males, 121 females, S5: 104 males, 128 females, S6: Not reported, S7: 1334 males, 1525 females (Sample from S3), 50 males, 62 females (New Zealand Sample A), 44 males, 79 females (New Zealand Sample B), 185 males, 174 females (Israel Sample A), 294 males, 323 females (Israel Sample B),

		S7: Cronbach's α, ANOVA, S8a: Cronbach's α, t-test, Regression, ANOVA, S8b: Interview (non-quantitative), S9: Correlation, Regression (stepwise), PCA	the 45-item version, S8a: 45 items, S8b: 45 items,		S8a: 58 (Medical school applicants), S8b: 45 (Sample from S8a), S9: 113 (Medical students, Sample A), 123 (Medical students, Sample B)	19.9 years, SD = 2.4 (New Zealand Sample B), 22.7 years, SD = 3.7 (Israel Sample A), 22.5 years, SD = 2.5 (Israel Sample B), 19.0 years, SD = 2.3 (Fiji Sample), S8a: Not reported, S8b: Not reported, S9: 20.2 years, SD = 3.0 (Sample A), 19.9 years, SD = 2.4 (Sample B)	29 males, 33 females (Fiji Sample), S8a: 31 males, 27 females, S8b: 25 males, 20 females, S9: 50 males, 62 females (Sample A), 44 males, 78 females (Sample B),
Carmona-Perera et al. (2013)	Translation, Adaptation, Validation	ANOVA	60 scenarios	Action, difficulty, congruency.	154 (Spanish undergraduates)	21.51 years, ranged 18-54 years	29 males, 120 females
Christensen et al. (2014)	Adaptation, Validation	S1: ANOVA, t-test, regression, S2: ANOVA, t-test	46 scenarios	Rate level of arousal, rate perceived valence of the dilemma (S1) Additional question re: Action (S2)	S1: 62 (Undergraduate psychology students), S2: 43 (Undergraduate psychology students)	S1: 21.0 years, SD = 5.35 S2: 20.65, SD = 5.52	S1: 19 males, 43 females, S2: 13 males, 30 females

Kimhi (2014)	Construction	Correlation, Path analysis	1 scenario	Reaction (Y/N) to 7 possibilities of action, rate level of confidence on 5pt likert scale to each decision	346 Israeli Defense Force soldiers (202 regular and 144 active reserve)	22.50 years	Not reported
Lotto et al. (2014)	Construction	ANOVA	75 scenarios	Action	120 (University students),	19.96 years, SD = 2.70	55 males, 65 females
Fleischhut et al. (2017)	Construction	ANOVA, correlations	6 scenarios	Appropriateness, moral permissibility, probability of outcomes, probability estimate, rank importance	731 (MTurk)	32.6 years, SD = 12.1	405 males, 326 females
Self-report scales							
Abdellaoui et al. (2016)	Construction	S1: ANOVA, PCA, correlation, S2: ANOVA,	12 item scale		S1: 521, S2: 193 (prison inmates)	S1: 28.1 years, SD = 7.4, S2: 23.72 years	S1: 58.93% male, 41.97 female, S2: 193 males (100%)
Kahane et al. (2018)	Construction, Validation	S1: EFA and CFA, S2: CFA, Correlation, S3: t-test, Correlation	9 item scale		S1: 960 (MTurk), S2: 282 (MTurk), S3: 81 (experts in Moral Philosophy),	S1: 35 years, SD = 12.11, S2: 39 years, SD = 12.66, S3: 32 years, SD = 9.72	S1: 489 females, S2: 178 females, S3: 23 females
Yamamoto & Maeder (2019)	Construction, Validation	S1: EFA, IRT, S2: CFA, S3: Correlations, Regression,	17 item scale		S1: 199 (MTurk), S2: 188 (MTurk), S3: 179 (MTurk)	S1: 33.9 years, SD = 10.7, S2: 32.8 years, SD = 10.6, S3: 36 years, SD = 10.3	S1: 69 males, 120 females, S2: Not reported, S3: 95 males, 84 females,

Note. a. There are missing values of sex/gender in some studies. Therefore, numbers reported in Sex Ratio do not necessarily add up to total sample size.
bDIT = Behavioral Defining Issues Test, DIT = Defining Issues Test, DIT-2 = Defining Issues Test Version 2, MD = Moral Dilemma, MOJAC = Moral Orientation of Justice and Care Scale, PMC = Professional Moral Courage Scale, POQ = Punishment Orientation Questionnaire, OUS = The Oxford Utilitarian Scale, ABB= The scale of social and moral judgments (named after the initials of the authors), URPO = Utilitarian and Retributive Punishment Orientation.
ANOVA = Analysis of Variance, DIF = Differential item functioning analysis, ANCOVA = Analysis of Covariance, CFA = Confirmatory Factor Analysis, EFA = Exploratory Factor Analysis, IRT = Item Response Theory, PAF = Principle Axis Factoring.

2.3.3 Assessment of Psychometric Properties

The assessment of psychometric properties was conducted in accordance with the amended version of the quality appraisal framework defined by Terwee et al. (2007). Two reviewers independently rated each included study against the nine psychometric properties of the appraisal framework (Terwee et al., 2007). Agreement between the two reviewers on the criteria of adequacy was 87.78% and this equates to a Kappa of k = 0.87. Kappa is an inter-rater agreement statistic that controls for the agreement expected based on chance alone and a kappa of 0.87 represents a substantial degree of agreement between raters (Cohen, 1960). Table 2.4 presents detailed information on the measures' factorial structure, reliability estimates, and findings in relation to other variables or group differences.

The ratings of psychometric properties for each study are reported in Table 2.5. None of the studies reported information on floor and ceiling effects. Therefore, all studies were assigned a score of "0" for no information reported on floor and ceiling effects.

Table 2.4

Summary of factorial structure, reliability estimates, and relationships of the measure with other variables/group differences.

Study	Factorial structure and reliability	Relationship with other variables/Group Differences
DIT		
Martin et al. (1977)	Kirstof's Reliability (.70)	College > High School > Junior High
Davison & Robbins (1978)	Cronbach's α (.77-.82), Test-retest (.71-.81; 2-4 years)	Cognitive Ability (r = .43**), Comprehension of Moral Issues (r = .65**), Law and Order Orientation (r = -.50**), Political Tolerance (r = .50**)
DIT-2		
Rest, Narvaez, Thoma, & Bebeau (1999)	Cronbach's α (.81)	DIT P score (r = .71**), Education level (r = .69**), Age (r = .56**), Attitudes toward Human Rights (higher scores indicate greater advocacy for civil liberties, r = .50**),
Mitchell (2000)	Three-factor solution (Personal Interest, Maintaining Norms, Postconventional), Cronbach's α's (.727 for N2 score, .619 for P score),	Higher Education > Lower Education, Liberal > Conservative, Women > Men
Mayhew et al. (2015)		Took DIT-2 three times > Took DIT-2 two times
Choi et al. (2020)	Bi-factor model with a general factor G and 3 lower-order factors (Personal Interest, Maintaining Norms, Postconventional), Cronbach's alpha (.840)	
bDIT		
Choi et al. (2019)	Tetrachoric correlation (.74)	DIT (r = .71)

Process Dissociation Model

Conway & Gawronski (2013)	**Deontological** Inclination:	**Utilitarian** Inclination:
	Utilitarian Inclination (r = .09), Empathic Concern (r = .28**), Perspective-Taking (r = .32**), Religiosity (r = .26**), Moral Identity Internalisation (r = .22*)	Need for Cognition (r = .18), Moral Identity Internalisation (r = .23**), High Cognitive Load < Low Cognitive Load
Jang (2020)	Deontological Inclination Utilitarian Inclination (r = -.23**), Oxford Utilitarian Scale (r = -.27**), Antisocial Personality Disorder (r = -.13**), Antisocial Tendencies (r = -.17**), Older < Younger	**Utilitarian** Inclination Oxford Utilitarian Scale (r = .18**), Women < Men, Higher Education < Lower Education

CNI Model

Gawronski et al. (2017)	Sensitivity to **Consequences**	Sensitivity to **Norms**	Tendency for **Inaction**
	High Psychopathy < Low Psychopathy	Women > Men, High Psychopathy < Low Psychopathy	Women > Men, High Cognitive Load > Low Cognitive Load, Action > Judgment, High Psychopathy < Low Psychopathy

Körner et al. (2020)	Sensitivity to **Consequences**	Sensitivity to **Norms**	Tendency for **Inaction**
Psychopathy	r = -.194** to -.357**	r = -.494** to -.613**	r = -.143 to -.299**
Empathic Concern	r = -.051 to .144	r = .175* to .384**	r = -.023 to .164*
Need for Cognition	r = .022 to .166*	r = .077 to .270**	r = .027 to .112
Impartial Beneficence	r = -.078 to -.202**	r = -.172* to -.348**	r = -.010 to -.287**

		Instrumental Harm	r = -.029 to -.142	r = -.411** to -.561**	r = -.145* to -.239**
		Behavioural Inhibition	r = .032 to .157	r = .053 to .167*	r = -.038 to .098
		Behavioural Activation	r = .004 to -.279**	r = -.050 to -.149*	r = -.040 to -.180*
		Moral Identity Internalisation	r = .107 to .199**	r = .347** to .466**	r = .087 to .238**
		Religiosity	r = -.146* to -.350**	r = .101 to -.235**	r = -.181* to .011

Other Moral Dilemmas

Bore (2001)	One-factor solution from PCA, Cronbach's α: .88 (35-item), .90 (45 item), 0.83 (24-item), Test-retest (.77, 1 year)	Age (r = .2** to .23**) Gender (r = .08* to .14**), DIT P score (-.10*), DIT Decision (.51**) , Narcissism (r = -.15** to -.16**), Aloofness (r = -.04 to -.15**),	Confidence (r = .10* to .19**), Empathy (r = -.01 to .00), Power (r = -.19*), Hedonism (r = -.27**), Benevolence (r = .20*), Conformity (r = .30**)
Carmona-Perera et al. (2013)	Cronbach's α (.705)	Affirmative Decisions: Non-Moral > Moral Impersonal > Moral Personal, High-Conflict > Low-Conflict, Perceived Difficulty: Moral Personal > Moral Impersonal & Non-Moral, High-Conflict > Low-Conflict, Congruent Answers: Non-Moral > Moral Impersonal & Moral Personal	
Christensen et al. (2014)		Arousal: Personal Force > Impersonal Force, Self-Beneficial > Other-Beneficial, Empathy (r = .289*), Valence: Personal Force (more negative), Self-Beneficial (more negative), Personal Force × Intentionality (Accidental Harm was rated more negative than Instrumental Harm in Impersonal Force condition), Benefit Recipient × Intentionality (Accidental Harm was rated as more	Reaction Time: Personal < Impersonal, Self-Beneficial < Other-Beneficial, Arousal (r = -.434**), Empathy (r = -.325*)

		negative than Instrumental Harm in Self-Beneficial condition)
Kimhi (2014)	Cronbach's α's: .70 (Decision) .74 (Confidence) .80 (Difficulty)	Compared to regular soldiers, reserve soldiers are more likely to take action (r = -.141**), feel more confident (r = .107*) and less difficult (r = -.102) about the decision, and more likely to be left-wing oriented (r = -.262**). Left-wing political orientation was associated with less likelihood of action (r = -.264**) and higher perceived difficulty about the decision (r = .211**).
Lotto et al. (2014)		Affirmative Decisions: Incidental Killing > Instrumental Killing, Self-Beneficial > Other-Beneficial, Decision Times: Incidental Killing > Instrumental Killing, Acceptability Ratings: Incidental Killing > Instrumental Killing, Self-Beneficial < Other-Beneficial, Valence Ratings: Self-Beneficial (more unpleasant), Women (more unpleasant), Arousal ratings: Incidental Killing > Instrumental Killing, Self-Beneficial > Other-Beneficial, Women > Men
Fleischhut et al. (2017)		Impermissibility Rating: Foresight (No info on consequence) & Hindsight-Bad (Side effects of action occurred) > Hindsight- Good (Side effects of action did not occur) Estimated likelihood of side effects occurring: Foresight & Hindsight-Bad > Hindsight-Good Participants who judged action as impermissible > Participants who judged action as permissible (r = -.39)
Self-Report Scales		
Abdellaoui et al. (2016)	Three-factor solution, Cronbach's α: .88 (overall), .78 (moral values), .82 (conventional values), .80 (personal values)	Seriousness: Inmates < Control Defensibility/Excusability: Inmates < Control Tolerance (seeing transgression as serious but more defensible and not rejecting

		the transgressor): Inmates < Control			
Kahane et al. (2018)	Two-factor solution, Cronbach's α: .81 (Impartial Beneficence), .79 (Instrumental Harm)	Impartial Beneficence: Instrumental Harm (r = .14*), Explicit Utilitarianism (r = .37*), Classic Sacrificial Dilemmas (r = -.21**), Greater Good Dilemmas (r = .50**), Empathic Concern (r = .33**), Identification with all of humanity (r = .33**), Hypothetical Donation (r = .40**), Environmental Protection (r = .14**), Religiosity (r = .15**)		Instrumental Harm: Explicit Utilitarianism (r = .13*), Classic Sacrificial Dilemmas (r = -.32**), Greater Good Dilemmas (r = .07**), Empathic Concern (r = -.16**), Identification with all of humanity (r = -.19**), Environmental Protection (r = -.21**), Economic Conservatism (r = .18**), Social Conservatism (r = .18**)	
Yamamoto & Maeder (2019)	Four-factor solution, Cronbach's α: .84 (Permissive Retributive), .85 (Permissive Utilitarian), .79 (Prohibitive Retributive), .80 (Prohibitive Utilitarian)	Permissive Retributive: Future-Time Orientation (r = .23*), Positive Affect (r = .36**), Death Penalty for Retribution (r = .55**), Death Penalty for Deterrence (r = .49**)	Permissive Utilitarian: Past-Time Orientation (r = .21**), Positive Affect (r = .30**), Death Penalty for Retribution (r = .57**), Death Penalty for Deterrence (r = .64**), Death Qualification[a] (r = -.39**)	Prohibitive Retributive: Positive Affect (r = -.28**), Negative Affect (r = -.15*), Death Penalty for Retribution (r = -.39**), Death Penalty for Deterrence (r = -.52**)	Prohibitive Utilitarian: Positive Affect (r = -.16**), Death Penalty for Retribution (r = -.27**), Death Penalty for Deterrence (r = -.38**), Death Qualification (r = .30**)

Note. a. Death Qualification is a question asking participants whether their beliefs about the death penalty will impair their performance of their duties as jurors; higher scores indicate a response that prior beliefs about the death penalty do not interfere with performance of duty as a juror.
*p ⩽ .05, **p ⩽ .01

2.3.3.1 DIT and Revised Versions

Seven studies used the Defining Issues Test and its revised versions. For ***content validity***, all seven studies received positive ratings for content validity for providing adequate evidence on measurement aim, target population, and concepts being measured.

For ***internal consistency***, one study received a positive rating for internal consistency. Choi et al. (2020) conducted factor analysis on the DIT-2 (Cronbach's α = .84). Five studies reported Cronbach's α ranging between .70 and .82 but did not perform factor analyses. These studies were assigned intermediate ratings for internal consistency. Mayhew et al. (2015) was assigned "0" for internal consistency as no information on internal consistency was reported.

For ***criterion validity***, two studies developed revised versions of existing measures and used the original version as a benchmark for validation. Rest et al's (1999) DIT-2 (r = .71) and Choi et al's (2019) bDIT (r = .71) was validated against the DIT and were thus assigned positive ratings for criterion validity. The remaining studies did not mention a "gold standard" of moral decision-making measure. Therefore, they were assigned "N/A" for criterion validity.

For ***construct validity***, of the seven studies that investigated various versions of the DIT, two studies were assigned positive ratings for construct validity. Rest et al. (1999) hypothesised positive correlations between DIT-2 scores and age, education level, and attitudes toward human rights. Mitchell (2000) hypothesised positive correlations between DIT-2 scores and age and political liberalism. The remaining five studies were each assigned a score of "0" because they did not propose theoretically-driven hypotheses. Choi et al. (2020) investigated the factorial structure of the DIT-2. While specific hypotheses were proposed, they were neither about relations to other measures nor expected group differences.

Therefore, a "0" was assigned for construct validity for no information on appropriate hypotheses.

Reproducibility (agreement and reliability) and ***responsiveness*** were criteria that applies to repeated measure designs only. Agreement is defined as the extent to which scores on repeated measures are close to each other (absolute measurement error) (Terwee et al., 2007). Reliability (test-retest) is defined as the extent to which participants can be distinguished from each other, despite measurement error (Terwee et al., 2007). Responsiveness is the measure's ability to detect clinically important changes over time, however small the changes are.

Five studies did not examine repeated measures of moral decision-making, therefore this criterion was not applicable for these studies. These studies were assigned an "N/A" rating on Agreement, Reliability, and Responsiveness.

Of the remaining two studies that used repeated measures design, neither referred to the required indices of Agreement (e.g., Minimal Important Change). Therefore, these studies were assigned a "0" score for no information provided on Agreement. For Reliability, neither study referred to the required indices of Reliability (e.g., Intraclass Correlation Coefficient, weighted Cohen's Kappa). Therefore, these studies were assigned a "0" score for no information provided. Nonetheless, these studies reported test-retest reliabilities, which are presented in Table 2.4.

Neither study referred to the required indices of Responsiveness (e.g., Smallest Detectable Change, Minimal Important Change, Guyatt's Responsiveness Ratio). Therefore, these studies were assigned a "0" score for no information provided.

Interpretability is defined as the ability to assign qualitative meaning to quantitative scores (Terwee et al., 2007). Interpretability is important for health measures because it is

crucial that the scores from the instrument reflect meaningful differences between groups (e.g., patient vs control, gender, age). A positive rating for interpretability was given only if the study reported means and standard deviations of the measure for at least four subgroups. An intermediate score was given if there is incomplete reporting of statistics and/or less than four subgroups.

Rest et al. (1999) received a positive rating for interpretability for reporting means and standard deviations of the DIT-2 N2 scores for participants in four education levels (from ninth grade students to graduate and professional school students).

Two studies received intermediate ratings for interpretability. Martin et al. (1977) reported means (but not standard deviation) of DIT P scores among junior high school, senior high school, and college students. Mitchell (2000) reported means (but not standard deviation) of DIT-2 P and N2 scores among five groups of political identities (from very liberal to very conservative).

The remaining four studies were assigned a score of "0" indicating no information on interpretability was reported. This was either due to not having subgroups or not reporting descriptive statistics of the measure across the subgroups.

2.3.3.2 Measures Using the Process Dissociation Model

Two studies used PD measures. For ***content validity***, both studies were positively rated for providing adequate evidence on measurement aim, target population, and concepts being measured. As the construction study of the PD measure, Conway and Gawronski (2013) were theoretically driven in their item selection and thus received a positive rating for content validity.

For ***internal consistency***, both studies received "N/A" due to how the construct scores were calculated. The PD model takes responses from all dilemmas to produce a single score

for each factor (i.e., propensities for utilitarian/deontological principles). This is contrary to self-report scales where multiple items measure the same construct such that analysis of internal consistency can be performed. Therefore, an "N/A" was assigned to these studies as the criteria for internal consistency was not applicable.

For ***criterion validity,*** neither study mentioned a "gold standard" of moral decision-making measure. Therefore, they were assigned "N/A" for criterion validity.

For ***construct validity***, the PD measures received one positive rating and one "0" score. Conway and Gawronski (2013) proposed specific hypotheses and found that deontological inclinations were positively correlated with empathic concern, perspective-taking, religiosity, and moral identity internalisation. Jang (2020) translated and validated the Korean version of the PD measure. A score of "0" was assigned because the analyses were exploratory, and no hypotheses were proposed a priori.

For ***reproducibility (agreement and reliability) and responsiveness***, neither studies used a repeated measures design. Therefore, both studies were assigned an "N/A" rating.

For ***interpretability***, the PD measure received one intermediate rating and one "0" score. Jang (2020) reported means (but not standard deviation) of utilitarian and deontological inclinations of males and females. Conway and Gawronski (2013) did not report descriptive statistics for any subgroups.

2.3.3.3 Measures Using the CNI Model

Two studies used measures adopting the CNI model. For ***content validity***, both studies were positively rated for providing adequate evidence on measurement aim, target population, and concepts being measured. As the construction study of the CNI measure, Gawronski et al. (2018) were theoretically driven in their item selection and thus received a positive rating for content validity.

For ***internal consistency***, similar to the PD measures, both studies received "N/A" ratings. The CNI model takes responses from all dilemmas to produce a single score for each factor (i.e., sensitivity to consequence, sensitivity to norm, general tendency for inaction). Therefore, the criteria for internal consistency was not applicable.

For ***criterion validity,*** neither study mentioned a "gold standard" of moral decision-making measure. Therefore, they were assigned "N/A" for criterion validity.

For ***construct validity***, both studies received positive ratings. Although Gawronski et al. (2017) and Körner et al. (2020) did not propose specific hypotheses regarding the model, each exploratory study (e.g., Studies 1a, 2a, 3a, 4a) was accompanied by a replication study (e.g., Studies 1b, 2b, 3b, 4b) that found supporting evidence for exploratory findings. We deemed this method to be appropriate for minimising the risk of bias from retrospective explanations and evaluated the percentage of hypotheses supported based on the proportion of relations replicated in the second study compared to the first study.

For ***reproducibility (agreement and reliability) and responsiveness***, neither study used a repeated measures design. Therefore, both studies were assigned an "N/A" rating.

For ***interpretability***, the CNI measure received two "0" scores. Neither study reported descriptive statistics for any subgroups.

2.3.3.4 Other Moral Dilemmas

There are six studies that each identified one unique measure of moral decision-making. For ***content validity***, all studies received positive ratings for providing adequate evidence on measurement aim, target population, and concepts being measured. For construction studies, Bore (2001), Kimhi et al. (2014), Lotto et al. (2014), and Fleischhut et al. (2017) were theoretically driven in their item selection and thus received a positive rating for content validity.

For ***internal consistency***, Bore (2001) received a positive rating for conducting factor analyses and reporting internal consistency estimates (Cronbach's α = .83-.90). Carmona-Perera et al. (2013) and Kimhi (2014) were intermediately rated for reporting adequate internal consistency estimates (Cronbach's α > .70). Christensen et al. (2014), Lotto et al. (2014), and Fleischhut et al. (2017) did not report any reliability measures and were thus rated "0" for internal consistency.

For ***criterion validity***, none of the studies mentioned a "gold standard" of moral decision-making measure. Therefore, they were assigned "N/A" for criterion validity.

For ***construct validity***, Kimhi et al. (2014) received a positive rating for formulating theoretically driven hypotheses and obtaining supporting evidence. Bore's (2001) MOJAC scale was intermediately rated for construct validity. This was because a number of hypothesised relationships (e.g., Right Wing Authoritarianism, emotional intelligence) were not supported. Christensen et al. (2014), Lotto et al. (2014), and Abdellaoui et al. (2016) did not propose specific hypotheses and were thus each assigned a score of "0". Fleischhut et al. (2017) proposed specific hypotheses. However, a score of "0" was assigned because the hypothesised relationships were about group differences from experimental manipulations rather than theoretical relationships of the measure with other constructs.

For ***reproducibility (agreement and reliability) and responsiveness,*** only Bore (2001) used a repeated measures design. However, the studies did not refer to indices of agreement, reliability, or responsiveness (e.g., Minimal Important Change). Therefore, these studies were assigned a "0" score for no information provided on these criteria. The remaining 5 studies were rated "N/A" as the criteria are not applicable.

For ***interpretability***, Bore (2001) received a positive rating for reporting means and standard deviations of the MOJAC scale by groups based on the language spoken at home,

years enrolled into medical school and cultural backgrounds. Christensen et al. (2014), Lotto et al. (2014), and Fleischhut et al. (2017) were intermediately rated either for reporting means but not standard deviations of the subgroups' scores, or not systematically reporting descriptive statistics of all subgroups. Carmona-Perera et al. (2013) and Kimhi (2014) were given "0" as there was no information on descriptive statistics of subgroups.

2.3.3.5 Self-Report Scales

Three self-report scales were identified in three construction studies—the ABB Scale (Abdellaoui et al., 2016), the Oxford Utilitarian Scale (Kahane et al., 2018), and the Punishment Orientation Questionnaire (Yamamoto & Maeder, 2019).

All three studies received positive ratings for ***content validity*** for providing adequate evidence on measurement aim, target population, and concepts being measured. Additionally, they were all theoretically driven in the construction and selection of scale items.

For ***internal consistency***, all three studies were positively rated for conducting factor analyses and reporting internal consistency estimates (Cronbach's α = .79-.88).

For ***criterion validity,*** none of the studies mentioned a "gold standard" of moral decision-making measure. Therefore, they were assigned "N/A" for criterion validity.

For ***construct validity***, Kahane et al. (2018) and Yamamoto and Maeder (2019) received positive ratings for formulating theoretically driven hypotheses and obtaining supporting evidence. Abdellaoui et al. (2016) did not propose specific hypotheses and was thus assigned a score of "0".

For ***reproducibility (agreement and reliability) and responsiveness***, none of the studies used repeated measures design. Therefore, all three studies were assigned an "N/A" rating.

For ***interpretability***, two studies were intermediately rated. Abdellaoui et al. (2014) reported means (but not standard deviation) of seriousness and defensibility ratings of violations between prison inmates and the general population, between sex offenders and other offenders, and between recidivists and first-time offenders. Kahane et al. (2018) reported means and standard deviations of Instrumental Harm and Impartial Beneficence between self-identified Republicans and Democrats. Additionally, means and standard deviations of Instrumental Harm (but not Impartial Beneficence) were reported between men and women. Yamamoto was assigned a score of "0" due to not having subgroups.

Table 2.5
Overview of scoring of psychometric properties in the included studies

Measures	Content validity	Internal consistency	Criterion validity	Construct validity	Reproducibility: Agreement	Reproducibility: Reliability	Responsiveness	Floor and ceiling effects	Interpretability
Moral Dilemmas									
DIT									
Martin et al. (1977)	+	?	N/A	0	N/A	N/A	N/A	0	?
Davison & Robbins (1978)	+	?	N/A	0	0	0	0	0	0
DIT-2									
Rest, Narvaez, Thoma, & Bebeau (1999)	+	?	+	+	N/A	N/A	N/A	0	+
Mitchell (2000)	+	?	N/A	+	N/A	N/A	N/A	0	?
Mayhew et al. (2015)	+	0	N/A	0	0	0	0	0	0
Choi et al. (2020)	+	+	N/A	0	N/A	N/A	N/A	0	0
bDIT									
Choi et al. (2019)	+	?	+	0	N/A	N/A	N/A	0	0
Process Dissociation Model									
Conway, & Gawronski, (2013)	+	N/A	N/A	+	N/A	N/A	N/A	0	0
Jang (2020)	+	N/A	N/A	+	N/A	N/A	N/A	0	?
CNI Model									
Gawronski et al. (2017)	+	N/A	N/A	+	N/A	N/A	N/A	0	0
Körner et al. (2020)	+	N/A	N/A	+	N/A	N/A	N/A	0	0
Other Moral Dilemmas									
Bore (2001)	+	+	N/A	?	0	0	0	0	+
Carmona-Perera et al. (2013)	+	?	N/A	0	N/A	N/A	N/A	0	0
Christensen et al. (2014)	+	0	N/A	0	N/A	N/A	N/A	0	?
Kimhi (2014)	+	?	N/A	+	N/A	N/A	N/A	0	0
Lotto et al. (2014)	+	0	N/A	0	N/A	N/A	N/A	0	?
Fleischhut et al. (2017)	+	0	N/A	0	N/A	N/A	N/A	0	?

Self-Report Scales									
Abdellaoui et al. (2016)	+	+	N/A	0	N/A	N/A	N/A	0	?
Kahane et al. (2018)	+	+	N/A	+	N/A	N/A	N/A	0	?
Yamamoto & Maeder (2019)	+	+	N/A	+	N/A	N/A	N/A	0	0

Note. DIT = Defining Issues Test. DIT-2 = Defining Issues Test Version 2. bDIT = Behavioural Defining Issues Test. N/A = Not applicable.

2.4 Discussion

The present systematic review had four aims: 1) identify existing measures of moral decision-making with life/death content, 2) evaluate the psychometric properties of these measures against a quality appraisal tool, 3) discuss the conceptualisation of the construct and assess the usefulness of the identified measures, and 4) ascertain whether a gold standard measure of moral decision-making using the broad definition adopted in this review exists, and if not, whether promising measures exist. Below, we will assess our degree of success in achieving each aim.

2.4.1 Aims 1 and 2: Identifying and Evaluating Measures of Moral Decision-Making.

This review was successful in identifying twelve unique measures of moral decision-making in high-stakes situations. Nine of these were moral dilemma sets, of which only three were reported in more than one study (Defining Issues Test, Process Dissociation Model, and CNI Model), and the other three were self-report scales (ABB Scale, Oxford Utilitarian Scale, Punishment Orientation Questionnaire).

2.4.1.1 Defining Issues Test and revised versions

Consistent with previous findings (Martí-Vilar et al., 2021; Villegas de Posada & Vargas-Trujillo, 2015), the Defining Issues Test (Rest, 1974) and its revised versions were the most commonly used measures in the identified studies. The DIT is one of the earliest measures developed to examine moral decision-making. The results of this systematic review found adequate evidence on factorial structure, internal consistency, and temporal stability. Moreover, the DIT has been validated against theoretically related constructs (e.g., cognitive ability, education, political orientation) and other measures of moral decision-making (e.g., Christensen et al., 2014). Ample evidence of reliability and validity suggests that the DIT and its revised versions (i.e., DIT-2, bDIT) may be a candidate for a gold standard for measuring

moral decision-making. However, a limitation of the DIT is that it is based on Kohlberg's theory of moral reasoning, which is developmental in nature and, thus, the scope of the measure may be theoretically limited. Specifically, the difference in scores on the DIT may be attributed to the levels of moral reasoning development, and thus limit its usefulness for examining differences that may arise among morally mature people (e.g., utilitarian versus deontological inclinations).

2.4.1.2 Process Dissociation Model and CNI Model

The Process Dissociation Model was proposed to challenge the dichotomy between utilitarian and deontological tendencies that underlie earlier measures of moral decision-making (Conway & Gawronski, 2013). Rather than considering them as opposites, utilitarian and deontological tendencies are proposed as separate constructs. Given this theoretical framework, the PD measure was validated against theoretically related constructs (e.g., empathic concern, perspective-taking, religiosity, moral identity internalisation) as well as the Oxford Utilitarian Scale (Kahane et al., 2018). However, there is limited evidence on the reliability, especially internal and temporal, of the measure. Given its different scoring methods, traditional measures of internal consistency (e.g., Cronbach's α) are not applicable. Additionally, a lack of longitudinal studies means that there is no information on the temporal stability of these constructs. Such psychometric properties need to be examined for the measure to be considered a goal standard for measuring moral decision-making.

The CNI Model extended the PD Model by introducing a third factor—a general tendency for inaction. In morally ambiguous situations, people may prefer inaction over any choice of actions. The CNI measure was validated against theoretically related constructs (e.g., psychopathy, empathic concern, need for cognition, behavioural activation/inhibition, moral identity internalisation, and religiosity) and the Oxford Utilitarian Scale (Kahane et al.,

2018). However, the CNI Model shares the same limitation as the PD Model in the lack of evidence on reliability. Future studies will need to examine the internal consistency and temporal stability of the measure.

2.4.1.3 Single Studies using Moral Dilemmas

Six other individual studies using different sets of moral dilemmas involving life and death scenarios were identified in this review. Five of these were intended to measure the effect of experimental manipulations (e.g., amount of information participants had before making a decision). Such measures were not intended for capturing robust individual differences, instead they focus on the state rather than trait aspects. Therefore, the evidence of their psychometric properties will not be discussed.

In the sixth, Bore (2001) developed the MOJAC scale to measure an individual's inclination towards the rights of the individual versus the rights of the collective. The MOJAC scale demonstrated good internal consistency and test-retest reliability. Although some hypotheses were not supported, the MOJAC scale was related to some important theoretically relevant constructs (e.g., Power, Hedonism, Benevolence, and Conformity) and the DIT (Rest, 1974). Overall, the MOJAC scale appears to be a good individual differences measure of certain facets of moral decision-making. Its theoretical scope may need to be extended as moral decision-making in high-stakes situations goes beyond consideration of the rights of the individual versus those of the collective.

2.4.1.4 Self-Report Measures

The ABB scale (Abdellaoui et al., 2016) was intended to measure an individual's judgment of seriousness, defensibility, and tolerability of three types of transgressions—personal, conventional, and moral. While the scale has good internal consistency, it was not

validated against any theoretically related constructs. The incomplete evidence of psychometric properties needs to be addressed for the measure to be used in research.

The Oxford Utilitarian Scale (Kahane et al., 2018) is a self-report measure of utilitarianism in high-resolution by focusing on the two underlying factors—impartial beneficence and instrumental harm. The authors provided adequate evidence on factorial structure, internal consistency, and construct validity on the OUS. Furthermore, it has been evaluated against the Process Dissociation Model (Jang, 2020) and the CNI Model (Körner et al., 2020). However, in return for depth, the OUS has sacrificed its breadth in measurement. By focusing on utilitarianism, it overlooks other important factors such as the intentions of actions, motivations to conform to norms, and tendencies to avoid moral issues. Additionally, there is no information on the temporal stability of the constructs measured by the OUS.

The Punishment Orientation Questionnaire (Yamamoto & Maeder, 2019) looked at moral decision-making in the form of punishments. The scale measures two motivations behind punishment—utilitarianism and retributivism, each of which was further divided into prohibitive motivation and permissive motivation. There is good evidence of the factorial structure, internal consistency, and construct validity of the measure. However, the limited scope of POQ means that it is unlikely to be considered a gold standard measure, as moral decision-making entails more than just punishment. Moreover, the temporal stability of the punishment construct is yet to be examined.

2.4.2 Aim 3: Conceptualisation

The result of the present review indicates that a diverse set of theoretical frameworks has been used to conceptualise moral decision-making. Most notably, the DIT (Rest, 1974) and its revised versions were based on Kohlberg's (1984) Moral Development Theory. Almost all measures involved measuring utilitarianism–the OUS (Impartial Beneficence

versus Instrumental Harm), the POQ (Utilitarianism versus Retributivism), the PD and CNI Models (Utilitarianism/Consequences, Deontology/Norms, and Inaction), and the MOJAC scale (Individual Rights versus Collective Rights). However, none of the conceptualisations are broad enough to be considered moral decision-making. Instead, each conceptualisation focuses on a sub-facet of moral decision-making. This creates a critical obstacle to the integration of the theory of moral decision-making in general, and limits the cross-validation of different measures against each other and other key measures in the nomological network. For instance, only two studies received a positive rating for criterion validity. The DIT-2 (Rest et al., 1999) and the bDIT (Choi et al., 2019) were both strongly correlated to the original DIT (Rest, 1974). All other studies were rated "N/A" indicating that it was impossible to evaluate criterion validity. Therefore, there is a lack of consensus on what models and theories should be the basis of understanding moral decision-making.

The remaining measures were traditional sacrificial dilemmas that pitted utilitarian decisions against deontological decisions (Christensen et al., 2014; Fleischhut et al., 2013; Kimhi et al., 2013; Lotto et al., 2014; Carmona-Perera et al., 2013) and were not intended to measure systematic individual differences in a way people approach and process moral decisions. Moreover, the breadth of the moral decision-making construct has not been captured by traditional sacrificial dilemmas. Although emotion and intuition play important roles in theoretical approaches to moral decision-making, such as Greene et al. (2001) and Haidt (2001), emotions were not measured in the scales we reviewed, and only once did we find a measure that the authors tried to validate against any aspect of emotion. Recent theories and empirical evidence suggest that cognitive processes may not be the only (or even the most important) factor in moral decision-making (Haidt, 2001). Moreover, the literature on how metacognitive processes (thinking about thinking; Flavell, 1979) are involved in moral decision-making is scarce. However, the emerging metacognitive Meta-reasoning

model (Ackerman & Thompson, 2017), outlines processes that monitor the progress of our problem-solving and reasoning that foster an individual to take a particular action, and these constructs and processes are of direct relevance to moral decision-making. Therefore, the present review identifies a need for a more holistic approach that captures *broad and systematic individual differences in terms of both, the breadth of scope and the systematic tendencies (e.g., trait-like factors) underlying moral judgements and their respective nomological network.* Studies that used sacrificial dilemmas were primarily interested in measuring the effects of experimentally manipulating contextual variables (e.g., number of lives saved, whether oneself benefits from sacrificial killing). The considerable influence of this experimental paradigm in the moral decision-making field may partly explain the lack of consensus and systematic conceptualisation of moral decision-making, which affects investigations into this construct, its measurement models, and its relationship with other measures. Striving towards a consensus on models and theories is critical and necessary for advancing research in moral decision-making

2.4.3 Aim 4: Towards a Gold Standard

The final aim of the present review was to identify a gold standard measure of moral decision-making. We do not believe we have identified such a measure, but our review highlights what is needed. Two identified measures—the DIT (and its revised versions) and the OUS—seem promising given their psychometric soundness, however the DIT relies on a particular conceptualisaton of moral decision-making and the OUS only aims to measure one aspect. A gold standard would require agreement as to what a moral decision-making scale should measure, but at the moment there is a scattered conceptualisation of moral decision-making across different measures. Therefore, the DIT and the OUS may serve as gold standards of what they aim to measure, as long as researchers are aware of their theoretically limited scope. If we are to have a gold standard then there is a critical need for a consensus on

the conceptualisation of moral decision-making in high-stakes situations and its nomological network, as well as cross-validation of existing measures and potentially development of new measures that capture the agreed-upon conceptualisation of moral decision-making. This would pave the way for the development of psychometrically valid tools.

A gold standard measure would need evidence of predictive validity (i.e., predicting real-life outcomes). Predicative validity is not a criterion included in the quality appraisal framework because Terwee et al. (2007) developed the framework to assess the quality of health measures, which are themselves the outcome variable of interest. Therefore, an assessment of what the measures predict is not necessary. The application of a quality appraisal framework is beneficial as it allows for systematic evaluation of measures, researchers need to be aware of differences in the contexts between the development and application of the framework. However, ultimately a measure of moral decision-making should predict what people actually do, and although predictive validity was not part of our framework we noted its lack in the studies we reviewed.

Ultimately, the ability to validly capture and train moral decision-making in situations where the consequences can involve the life and death of the civilians and combatants is paramount. Our results (see Table 2.2) show that the included studies either treated moral decision-making as the dependent variable to be predicted (e.g., by age, gender, education level), or validated moral decision-making with measures of other theoretically related constructs (e.g., empathy, cognitive ability, psychopathy). The lack of theoretical and empirical connections between moral decision-making and real-life outcomes invites criticism of how practically meaningful the construct is. Therefore, the predictive validity of moral decision-making measures is an important issue that future studies should address, and it should be a criterion that future reviews consider.

2.4.4 Limitations

2.4.4.1 Search Strategy

The search strategy limited results to only measures of moral decision-making that included life-and-death scenarios and/or items. This decision was based on the goals of our research. We acknowledge that there may be psychometrically sound measures that do not involve life-and-death content. Nevertheless, these measures would contain contexts of great variability such that comparisons between these measures would be difficult. Future studies may conduct systematic reviews of the quality of moral decision-making measures within a specific field (e.g., business, education, sports, engineering).

2.4.4.2 Quality Assessment Framework, Strengths and Limitations

The quality appraisal tool used in the present review was originally developed to evaluate self-report measures of officially diagnosable health conditions (Terwee et al., 2007). Our decision to adopt this framework was based on two reasons. First, previous research has successfully applied the framework to non-diagnosable constructs (e.g., Imposter Phenomenon; Mak et al., 2019). Second, the criteria assessed by this framework served as a good guide to evaluating the psychometric properties of measures aimed to capture systematic responses. However, the adoption of the framework placed limitations on our review, such as the lack of focus on predictive validity.

In addition, despite amendments to the quality assessment framework, specific psychometric properties did not necessarily receive higher scores. In certain instances, it was not possible to evaluate certain psychometric properties. For instance, internal consistency estimates of the Process Dissociation Model (Conway & Gawronski, 2013) and the CNI Model (Gawronski et al., 2017) could not be computed because of these measures' design. Rather than taking each dilemma as an item of the measurement, responses from all

dilemmas are processed to produce a single score for each factor (e.g., utilitarian and deontological tendencies). Therefore, a rating of "N/A" would imply an inability to evaluate it rather than evidence of poor internal reliability. Another example is the criteria that apply to longitudinal studies. These criteria were designed to evaluate the ability of health measures to detect qualitative changes in health status across time. However, the criteria may be too rigorous for moral decision-making measures, as reporting test-retest reliability would not suffice for a positive rating. Therefore, a lack of a positive rating does not necessarily reflect the poor quality of the measure. For readers, the criteria framework may merely serve as a guide to analysing the psychometric quality of the measures, whereas the specific findings and statistics may be more informative. Lastly, the criterion "Interpretability", which refers to the measure's ability to produce qualitative meaning from quantitative scores might make sense in a health/medical setting. However, it may not be applicable in the context of moral decision-making measures. Therefore, ratings on this criterion should bear little weight in evaluating the quality of the measure.

2.4.4.3 Conclusions

Overall, the present review extends previous systematic reviews. The results of our review confirm some findings of previous reviews and meta-analyses on moral reasoning (Villegas de Posada & Vargas-Trujillo, 2015; Martí-Vilar et al., 2021) but also highlight novel key findings that are overlooked by past research. Consistent with previous studies, the DIT remains to be the most used tool to assess moral decision-making. Seven of the twenty included studies used some version of the DIT. However, while measures identified by Martí-Vilar et al. predominantly relied on self-report responses, most measures identified in the present review used moral dilemmas. This suggests that a substantial amount of research in moral decision-making focused on aspects of moral decision-making other than moral reasoning. Still, the scope of the moral decision-making construct captured by these measures

is very limited. These omissions risk an incomplete and biased understanding of processes in moral decision-making that overestimates the role of cognition while ignoring other processes, such as emotion and metacognition. The present review contributes to the understanding of the current state of research by highlighting this omission and providing a critical foundation for future studies in this domain.

Future research that aims for a gold standard measure of moral decision-making needs to look towards unifying different theories and translating them empirically. This may require the development of new research tools that can be validated in real-world situations. A unifying theory is critical as it would provide a comprehensive taxonomy of different aspects of moral decision-making which are currently overlooked, helping us to develop state-of-the-art knowledge in this critically important area of research.

Chapter 3 Study 2: Cooperation, different faces of morality, and their links to risk, fear, and personality during a crisis

This chapter presents Study 2 of this thesis, an original manuscript published in *Personality and Individual Differences*. Minor revisions were made to conform to University of Sydney style requirements. The complete reference is presented below:

Ni, B. K., Burns, B. D., & Kleitman, S. (2025). Cooperation, different faces of morality, and their links to risk, fear, and personality during a crisis. Manuscript submitted for publication in *Personality and Individual Differences, 247,* 113426.

3.1 Introduction

Studying morality is crucial to understanding human behaviour, promoting social cohesion, and informing ethical decision-making across areas like law, policy, and daily life. It bridges theory and practice in addressing societal challenges. The Morality-as-Cooperation Theory adopts a game theory approach to social interactions and argues that morality evolved as the best solutions to resolve problems of cooperation and conflict (Curry, 2016), enabling mutual benefit over zero-sum competition. However, cooperation is not universal, as some exploit others through free-riding or aggression (Duntley & Buss, 2004). This research explores morality through the lens of cooperation.

The dynamics of reward and punishment help explain how morality aligns with self-interest. The Tripartite Model of Morality (Asao & Buss, 2016) identifies three adaptations—moral judgment, moral influence, and moral conscience—that regulate social behaviour to support long-term self-benefit. While selfishness may yield short-term gain, it often incurs social costs, such as exclusion or punishment. Thus, moral decision-making involves a cost-benefit analysis of personal outcomes.

3.1.1 Cooperation: Different Types of Morality

This research proposes a framework of cooperative morality that includes both its positive and darker aspects, similar to how positive (e.g., resilience) and negative (e.g., anxiety) well-being are viewed as distinct (Karademas, 2007). Importantly, the absence of one does not imply the presence of the other, making their relationship critical to examine. Positive morality entails prosocial cooperation, balancing self-interest with concern for others. In contrast, dark morality encompasses selfish motives that undermine others, aligning with traits like amorality, psychological reactance, and need for chaos. There is a growing need for research on dark traits associated with morally and socially questionable behaviours (e.g., Moshagen, Hilbig, & Zettler, 2018; Paulhus, 2014), as these traits can erode social cohesion and societal stability, particularly in times of crisis and uncertainty.

Positive morality encompasses constructs that promote cooperation, such as moral foundations and social conservatism. Moral Foundations Theory (Graham et al., 2008; Graham et al., 2011) outlines five psychological foundations—Harm, Fairness, Ingroup Loyalty, Authority, and Purity—that support reciprocal cooperation and group stability (Curry et al., 2019). Similarly, social conservatism emphasises preserving moral traditions and institutional order (Everett, 2013), reinforcing cooperative norms.

In contrast*, dark morality* encompasses constructs that undermine cooperation. In this research, we propose three such constructs. Amorality reflects a willingness to defy rules, embrace violence, and pursue self-interest (Stankov & Knezevic, 2005), which entails rejecting cooperation. Psychological Reactance refers to the drive to reclaim autonomy when it feels threatened, often undermining cooperative norms (Hong & Page, 1989). Cooperation inevitably imposes certain restrictions on one's freedom to pursue self-interest to the fullest extent. As a result of reactance, one would find self-interested goals more desirable and be

more likely to engage in such behaviours (Rosenberg & Siegel, 2018). Need for Chaos denotes a desire to destabilise systems in pursuit of radical change (Petersen et al., 2023), highlighting a hostility to social structures.

Integrating these key theoretical constructs, we expect three higher-order factors to emerge. Positive morality is expected to be divided into Binding Morality, entailing group order and cohesion (Ingroup Loyalty, Authority, Purity) and Individualising Morality, pertaining to respect for individuals (Harm, Fairness) (Franks & Scherr, 2015; Malka et al., 2016), with social conservatism aligning with Binding Morality. Additionally, we expect a third factor of Dark Morality encompassing Amorality, Psychological Reactance, and Need for Chaos. Together, these constructs reflect a distinct moral disposition characterised by self-interest, resistance to normative constraints, and a disposition toward social disruption. These never before put together constructs align with the Morality-as-Cooperation Theory (Curry, 2016) extending it by collectively capturing essential aspects of both (un)cooperative and dark morality. In doing so, if emerges, this hypothesised Dark Morality factor would expand the theoretical landscape of the Morality-as-Cooperation Theory by capturing antisocial or counter-cooperative tendencies that are increasingly relevant in contemporary societal and crisis contexts.

3.1.2 The Role of Risk-Taking Propensity in Morality

While cooperation is the best strategy to produce win-win situations (Curry, 2016), another important feature is that it involves lower risks. Immoral actions may yield short-term rewards but are risky due to potential punishment (Asao & Buss, 2016). Thus, there is a trade-off between short-term potential benefits and the long-run risks, consistent with the game theory approach to cooperative morality (Curry, 2016). General Risk Propensity (GRiPS; Zhang, Highhouse, & Nye, 2019) conceptualises a domain-general construct of risk-

taking tendencies, defined as a "general willingness to enter or avoid risk situations" (p.153). Similarly, impulsivity is an important construct to measure risk-taking propensities. Given their conceptual similarity, we expect them to converge into a single Risk-Taking factor (see Appendix B6 for more details). To our knowledge, the present study is the first to explicitly adopt a domain-general approach to risk-taking propensity and examine its relationships with *positive* and *dark* aspects of morality.

Risk-seeking individuals may prioritise short-term rewards from exploitation while disregarding long-term costs, reducing the appeal of prosocial behaviours and moral reputation. Impulsivity is positively associated with amorality (Gojković et al., 2019), and experimentally increasing risk propensity led to greater moral transgressions, suggesting a possible causal role (Cameron, 2009; Prescott, 2012). Overall, existing evidence suggests that higher general risk propensity and impulsivity are associated with more selfish and exploitative behaviours perceived as immoral. The present study seeks to replicate this relationship and extend the findings by employing the theoretical framework of cooperative morality. Additionally, it aims to obtain ecologically valid evidence through the examination of COVID-19-Safe behaviours in a real-world context. Investigating this relationship could yield critical insights into the role of risk propensity in moral scenarios involving self-interest, which could inform future policy and interventions designed to promote moral behaviours.

3.1.3 Personality and Cognitive Ability

We also investigated the role of theory-driven individual differences constructs.

3.1.3.1 Big Five Personality Measures

Individual differences in the Big Five personality traits can also inform moral decision-making. Conscientiousness is associated with norm- and rule-following, self-

discipline, and the ability to delay gratification (John & Srivastava, 1999). Similarly, agreeable people tend to be more cooperative and concerned for others (John & Srivastava, 1999). These attributes are conducive to more willingness to cooperate and less short-term selfish behaviours. Conscientiousness and agreeableness predict cooperative and rule-abiding behaviours and are negatively correlated with psychological reactance (Waris et al., 2020). Conscientiousness and extraversion are linked to Binding Morality (Lewis & Bates, 2011), contributing to social stability. The orderliness from conscientiousness and sociability from extraversion are essential in creating stable social cohesion. However, extraverts' higher need for social interaction and lower risk aversion were shown to lead to reduced adherence to restrictions such as lockdowns and social distancing (Kleitman et al., 2021). It is unclear how neuroticism and openness to experience are related to morality. However, evidence suggests that Openness is positively correlated to Individualising Morality (Lewis & Bates, 2011).

For risk propensity, risk-taking individuals are more energetic and willing to explore new ideas and activities. In contrast, individuals who are aversive to risks can be more cooperative and compassionate, anxious about uncertainty, and/or organised and self-disciplined. A recent meta-analysis has shown that general risk propensity indeed was positively correlated with extraversion and openness to experience, and negatively correlated with agreeableness, neuroticism and conscientiousness (Highhouse et al., 2022).

3.1.3.2 Cognitive Ability

Cognitive ability has a mixed relationship with morality. Some findings suggest it is positively associated with Individualising Morality and negatively with Binding Morality, although political and cultural factors may moderate these links (Van Leeuwen et al., 2014; Kemmelmeier, 2008). For Dark Morality, higher cognitive ability is generally associated with lower amorality (Stankov, 2009) and weakly linked to lower norm-violating tendencies

(Michels, 2022). It is also negatively related to health and social risk-taking (Boyer, 2006; Frisell et al., 2012) and positively associated with risk aversion in loss-based decisions (Rustichini et al., 2016). As such, higher cognitive ability is expected to correlate negatively with *dark morality* and risk propensity.

3.1.4 Fear and COVID-Related Concerns

3.1.4.1 Fear and Moral Decision-Making

Fear is another factor influencing behaviour, particularly under threat (Gullone, 2000). It can override moral predispositions, shifting focus toward self-preservation. In the context of COVID-19, fear may promote adherence to safety behaviours regardless of moral orientation.

3.1.4.2 Fear, Risk-Taking, and COVID-19-Safe Behaviours

Fear is closely linked to lower risk aversion (Wake et al., 2020). During the pandemic, three main fear domains were identified: 1) the healthcare system and getting infected; 2) the economy, political stability, and social liberty as a result of the pandemic and government lockdown measures, and 3) financial security (Kleitman et al., 2023). Fear and perceived COVID-19 threat predicted compliance with safety measures during early pandemic stages (Jørgensen et al., 2021; Harper et al., 2021; Kleitman et al., 2021). Aligning with prior findings, COVID-related fears are expected to correlate positively with safety behaviours and negatively with risk-taking.

3.1.5 Protective Behaviours in Different Stages of the COVID-19 Pandemic

The global response to the COVID-19 pandemic was marked by unprecedented challenges, prompting nations to adopt various measures to curb the spread of the virus (Alwan et al., 2020). Central to these efforts is the concept of COVID-19 compliance behaviours. To stop the virus from spreading, protective behaviours such as avoiding crowded areas, keeping a safe distance from others, wearing a face mask in public, and avoiding touching others (Chu et al., 2020) were recommended responsible behaviours, which were enforced in Australia during the zero-COVID-19 suppression approach. Containing the virus carries a moral implication, as transmitting it—particularly to vulnerable

individuals—can result in significant harm. Non-compliance with COVID protective behaviours was morally condemned (Bor et al., 2023; Rosenfeld & Tomiyama, 2022).

In mid-December 2021, Australia abandoned its zero-COVID-19 suppression approach and lifted most public health protections given over 90% of the population aged 16+ were double-dose vaccinated (Australian Government Department of Health, 2021). Around the same time, the highly transmissible Omicron variance resulted in all-time-high national case rates with an average of 67,663 new cases over the week before 10 January 2022 (Australian Government Department of Health, 2022). The Federal Government decided that Australia would move "forward to live with this virus with common sense and responsibility", leaving the primary responsibility to individuals (Talbot, 2021). Self-regulated choices during this stage of the pandemic become ever so critical to contain the spread of still dangerous variants of the virus. More importantly, looking at self-regulated behaviours provides a crucial insight into the role of individual differences in compliance decisions when the situational pressure is removed (i.e., the lifting of COVID-19 rules and regulations).

We conducted a longitudinal study to examine compliance with protective behaviours across three key stages of the COVID-19 response: the mandated compliance phase, the immediate self-regulation phase, and a later stage of sustained personal responsibility. The first study was carried out between January and March 2022, a period marked by a sudden shift from government-imposed restrictions to individual decision-making. To assess behaviours during the mandated phase, participants retrospectively reported their actions prior to December 31, 2021. Their responses during the study period captured behaviours immediately following this transition. A follow-up assessment in June 2022 (Time 2) gauged longer-term patterns of self-regulated compliance. These time points trace the shift from strict containment measures—such as mandatory isolation and furloughs—to a model centred on

voluntary adherence and targeted protections for at-risk groups. By exploring whether individuals continued to follow protective guidelines once enforcement ended, the study offers valuable insight into how morality, risk perception, and fear influence real-world decisions and their consistency over time.

3.1.6 The Current Study: Aims and Hypotheses

The current study builds upon and extends past research on morality, compliance, and risk-taking during COVID-19 (e.g., Bor et al., 2023; Harper et al., 2021; Kleitman et al., 2023), by offering a novel theoretical integration of cooperation and dark morality with a focus on real-world decision-making. Within the framework of cooperative morality, our study seeks to seeks to determine why some individuals behave morally while others do not. To our knowledge, this is the first study to examine cooperative moral decision-making alongside risk propensity, fear, and personality traits within an ecologically valid context, which required cooperation. To capture this unique context, we employed a longitudinal approach and sampled the population twice: when rules were imposed and then lifted while the threat of infection remained. We also used a novel analytical approach using Latent Profile Analysis (LPA). In recent years, LPA has gained notable popularity in psychological research due to its capacity to uncover meaningful subgroups within heterogeneous populations based on patterns of individual responses (Spurk et al., 2020). Unlike traditional variable-centred approaches, LPA enables researchers to adopt a person-centred perspective, allowing for a more nuanced understanding of psychological constructs. Identifying distinct moral and psychological profiles within ecologically valid settings offers practical implications for targeted interventions, public policy, and regulatory measures.

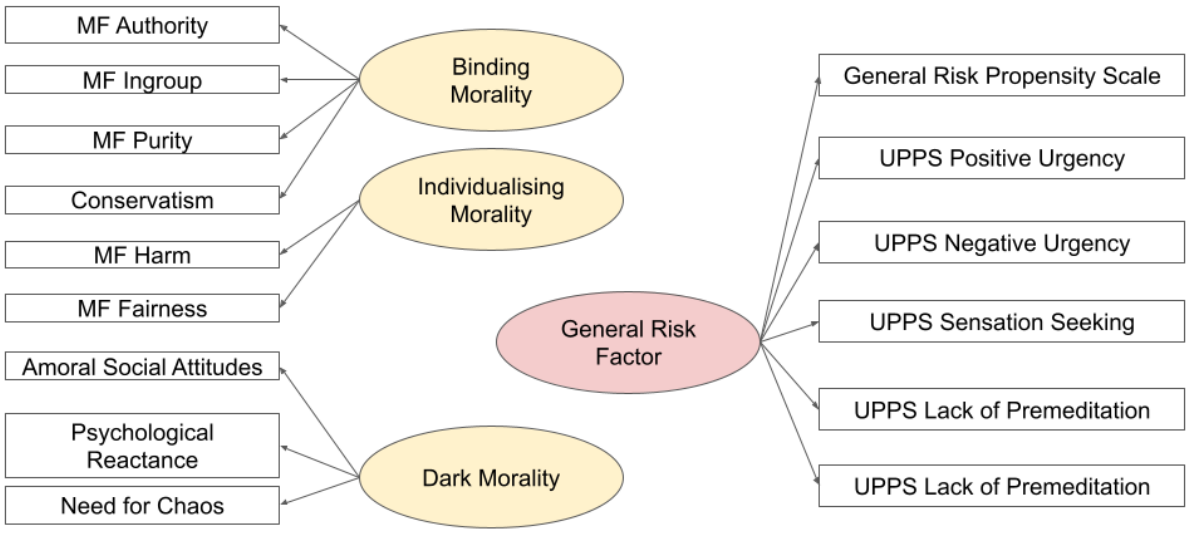
The COVID-19 context offered a unique opportunity to examine moral decision-making beyond traditional laboratory settings. We employed Factor Analytic and Latent

Profile Analysis (LPA) methods, as used in previous research on COVID-19 behaviours (Kleitman et al., 2021; Kleitman et al., 2023; Yalçın et al., 2022). LPA allows us to identify subgroups based on shared patterns of morality, risk propensity, fear, and self-regulated compliance. Prior studies have identified two main clusters—empathic vs. antisocial—characterised by traits such as callousness, deceitfulness, and risk-taking (Miguel et al., 2021), while others found more nuanced groupings related to compliance, mental health, and resilience (Yalçın et al., 2022; Fernández et al., 2020; Wright et al., 2022). Our analysis includes morality, risk, COVID-related fears, and compliance, and we expect a parsimonious two-cluster solution, though more complex structures may emerge. We distinguish our hypotheses between higher-order factors (examined using CFA) and individual profiles (identified via LPA), as the former represent underlying dimensions while the latter refer to meaningful person-level groupings based on those dimensions.

The present study has three aims. First, we aim to replicate previous findings and extend our knowledge on the higher-order factors in morality and risk-taking propensity. As discussed earlier, we expect morality and risk/impulsivity measures to converge into theoretically meaningful factors. Using Confirmatory Factor Analysis (CFA), we hypothesise:

> **H1**. The morality measures will converge into three factors: 1) Binding Morality (Ingroup Loyalty, Authority, Purity, and Social Conservatism), 2) Individualising Morality (Harm, Fairness), and 3) Dark Morality (Amorality, Psychological Reactance, Need for Chaos).
>
> **H2**. The risk/impulsivity measures will converge into one general risk-taking factor.
>
> Figure 3.1 depicts the theoretically driven factors we expect to emerge.

Figure 3.1
Theoretical factors expected from confirmatory factor analyses.



Second, we aim to replicate the LPA results from Kleitman et al. (2021) and Miguel et al. (2021). Specifically, we hypothesise that:

> **H3**. In line with the hypothesised relationship between morality and risk-propensity, LPA will reveal two clusters—one moral risk-averse group and one amoral risk-seeking group.

Third, we aim to examine if the clusters differ in morality, risk propensity, fear, personality, and cognitive abilities. Although Binding and Individualising Morality are separate factors focusing on different aspects of cooperation (i.e., individual vs collective), they should both promote compliance. Therefore, we do not make separate hypotheses but examine how they, together as *positive morality,* contrast with *dark morality*. Therefore, assuming that we find two clusters, we hypothesise that:

H3a. Compared to the amoral risk-seeking group, the moral risk-averse group will have higher levels of *positive morality* (Binding and Individualising) and lower levels of *dark morality*.

H3b. Compared to the amoral risk-seeking group, the moral risk-averse group will have lower levels of risk propensity.

H3c. Compared to the amoral risk-seeking group, the moral risk-averse group will have:

i) higher levels of COVID-related fears;

ii) will be more agreeable, conscientious, and less extraverted;

iii) have higher cognitive ability;

iv) higher levels of compliance attitudes;

v) higher levels of self-imposed cooperative COVID-19 safe behaviours at all time points.

3.2 Methods

3.2.1 Participants

This study adheres to the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines (Von Elm et al., 2007) for cross-sectional reporting, which includes a structured framework for reporting key aspects of the study design, data sources, participant selection, analytics, along with transparency regarding biases, missing data, and generalisability. This study was a longitudinal observational study comprising two time points during the COVID-19 pandemic. A convenience sample of 598 adults in Australia was recruited through an online paid research platform, Prolific (https://www.prolific.com/; Prolific, 2022). [1] Participants were eligible to participate if they were aged 18 years or older and residing in Australia, had internet access and were proficient in English. We applied Prolific's filtering criteria and quotas to ensure a spread of ages, SES, educational levels and gender balance. The sample size was determined based on previous studies employing similar designs, measures and analytics, adjusted to account for sampling in a single-country context (e.g., Fullerton, et al., 2025; Kleitman et al., 2021). Participants were compensated £7 (approximately $13 AUD) for completing the one-hour survey, which is a standard rate on this platform. Figure 3.2 shows the flow diagram of data collection, response rate, and exclusions. Time 1 data collection occurred from Jan 27th to March 10th, 2022. In June 2022 (Time 2), participants were invited to complete a 20-minute follow-up survey and were compensated £3 (approximately $ 5.25 AUD) for their time. Participants received information about each survey, including details on different withdrawal options (available

[1] Prolific paid research platform employs pre-screening tools, identity verification and IP restrictions to minimise duplicate entries and prevent fraudulent responses. It also offers transparent demographic filtering to balance the recruitment process and reduce response biases associated with convenience sampling.

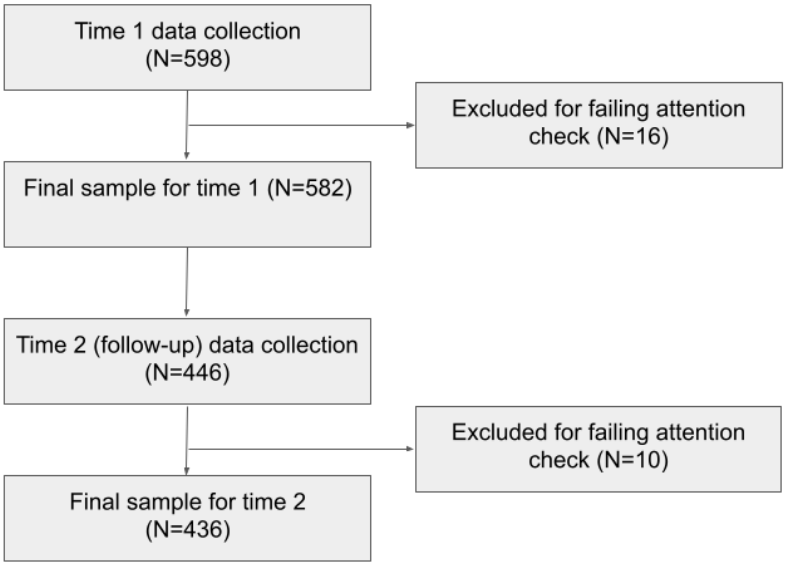
before, during, or after completing the survey), as well as data storage and usage policies. Participants provided an informed digital consent before starting each survey.

3.2.2 Data Quality

Data quality was screened using bogus items and consistency checks validated in previous research (Huang, Bowling, Liu, & Li, 2015; Meade & Craig, 2012; Wardropper, Dayer, Goebel, & Martin, 2021, see Appendix B3). This led to the removal of data from sixteen participants at Time 1 and ten participants at Time 2. The final sample comprised 582 participants at Time 1 and 436 participants at Time 2 (follow-up).

The attrition rate between surveys was 25.1%, which aligns with typical rates observed in longitudinal research (Gustavson et al., 2012; Kristman et al., 2004) with simulation studies demonstrating that relationships between variables remain valid under the missing at random (MAR) condition at this level of attrition. The 146 people who did not respond to the follow-up survey did not notably differ in terms of demographic characteristics considered (see Appendix B4). Importantly, the demographic composition of respondents in both Time 1 and Time 2 was very similar, with differences of less than 3% or points (see Appendix B4). Appendix B4 summarise relevant statistics. Several other response biases (e.g., common method bias, early-late bias), were also considered and ruled out (see Appendix B5).

Figure 3.2
Respondent flow diagram.



The University of Sydney Human Research Ethics Committee (2021/971) granted ethics approval[2].

3.2.3 Measures

Details of the measures are reported in Table 3.1. People were asked to participate on two separate occasions: Time 1 (January to March 2022) and Time 2 follow-up (June 2022). At Time 1, participants were asked to report how each measure, as well as demographic characteristics, applied to them at the time of assessment, including compliance. Additionally, they were also asked to indicate their compliance retrospectively (prior to December 31, 2021). At Time 2, they again responded as to how compliance behaviours applied to them 3-4 months since Time 1 assessment. These three time points for compliance behaviours were intended to capture whether the differences between groups remain stable before and after the

[2] Data collection was part of a larger research project. Therefore, we only report aspects relevant to the present study's aims.

ease of strict lockdowns and ease of strict public health restrictions (Talbot, 2021), amid the first Omicron wave in Australia in early January 2022 (Australian Government Department of Health, 2022), and then at the 3-4 months follow-up when people were able to make their own compliance decisions for a sustained period of time.

3.2.4 Planned Statistical Analysis

Two separate CFAs were conducted to extract factors from the moral and risk measures. These factors, along with COVID-related fears and compliance attitudes, were included in an LPA to identify groups with similar characteristics. One-way ANOVAs with Scheffe-corrected post-hoc comparisons examined profile differences in psychological variables, demographics (Time 1), and compliance behaviours (Times 1 and 2). Analyses were performed using SPSS 28.0, AMOS 26.0, and R with tidyLPA. CFA was used to validate the measurement model based on theoretical expectations. LPA was applied to identify individual-level psychological profiles. ANOVA and post-hoc comparisons were used to test profile differences. These methods are appropriate for uncovering both latent constructs and individual subgroups in large cross-sectional data.

Table 3.1

Measures Employed in This Study.

Measure (Authors)	Number of items and response scale	Dimensions and example items	Internal consistency (previous studies)
Moral Measures			
Moral Foundations Questionnaire (Graham et al., 2008)	20 items (1) *not at all relevant* to (6) *highly relevant*	When you decide whether something is right or wrong, to what extent are the following considerations relevant to your thinking? 1. Harm e.g., "Whether or not someone suffered emotionally." 2. Fairness e.g., "Whether or not some people were treated differently than others." 3. Loyalty e.g., "Whether or not someone's action showed love for his or her country." 4. Authority e.g., "Whether or not someone showed a lack of respect for authority." 5. Purity e.g., "Whether or not someone violated standards of purity and decency."	α =.57-.67 (Tamul et al., 2020)
	(1) *strongly disagree* to (6) *strongly agree*	When you decide whether something is right or wrong, to what extent are the following considerations relevant to your thinking? 1. Harm e.g., "Whether or not someone cared for someone weak or vulnerable." 2. Fairness e.g., "Whether or not someone acted unfairly." 3. Loyalty e.g., "Whether or not someone did something to betray his or her group." 4. Authority e.g.., "Whether or not someone conformed to the traditions of society." 5. Purity e.g., "Whether or not someone did something disgusting."	
Social Conservatism (Everett, 2013)	3 items (1) *fully disagree* to (5) *fully agree*	"We have to respect our history and tradition."	α = .55 (Kleitman et al., 2021)
Amoral Social Attitudes Scale (Stankov & Knezevic, 2005)	6 items (1) *strongly disagree* to (5) *strongly agree*	"I hate obligations and responsibility of any kind."	α = .64 (Kleitman et al., 2021)
Need for Chaos (Petersen et al., 2023)	11 items [a] (1) *strongly disagree* to (7) *strongly agree*	“Sometimes I just feel like destroying beautiful things”	α = .90 (Petersen et al., 2023)
Hong Psychological Reactance Scale (Hong & Page, 1989)	14 items (1) *strongly disagree* to (6) *strongly agree*	"Regulations trigger a sense of resistance in me."	α = .75-.80 (Shen & Dillard, 2005)

Risk Propensity/Impulsivity Measures

General Risk Propensity Scale (Zhang et al., 2019)	8 items (1) *strongly disagree* to (5) *strongly agree*	"My friends would say that I'm a risk taker."	α = .92 (Zhang et al., 2019)
Short UPPS-P Impulsive Behaviour Scale (Cyders et al., 2014)	20 items (1) *strongly disagree* to (4) *strongly agree*	1. Negative Urgency e.g., "When I'm upset I often act without thinking." 2. Positive Urgency e.g., "I tend to lose control when I am in a great mood." 3. Sensation Seeking e.g., "I quite enjoy taking risks. 4. Lack of Premeditation e.g., "My thinking is usually careful and purposeful." (reverse coded). 5. Lack of Perseverance e.g., "I finish what I start." (reverse coded).	α = .74-.88 (Cyders et al., 2014)

Outcome Measures

Multidimensional COVID-19 Worry Index (Original measure, see Appendix B1)	19 items (1) *never* to (4) *always*	1. Infection and Infrastructure Concerns e.g. "I am concerned about the health of my family members due to COVID-19." 2. Political, Liberties, and Economy Concerns e.g., "I am worried about political unrest in Australia." 3. Personal Financial Concerns e.g., "I am anxious about losing money due to COVID-19."	α = .74-.90, (Kleitman et al., 2023)
Compliance Attitudes [b] (Original measure, see Appendix B1)	5 items (0) *does not apply at all* to (100) *applies very much*	"I adhere to the current COVID-19 rules or recommendations."	α = .81-.85 (Kleitman et al., 2023)
COVID Compliance Behaviours[c] (Original measure, see Appendix B1)	10 items (1) *Never* to (4) *Always*, *N/A* if item does not apply	1. Social Distancing e.g., "I avoid large gatherings." 2. Mask Wearing e.g., "I made sure my mask covers my nose and mouth."	

Control Variables

Mini-International Personality Item Pool (Donnellan et al., 2006)	20 items (1) *very inaccurate* to (5) *very accurate*	1. Extraversion: "I am the life of the party." 2. Agreeableness: "I sympathize with others' feelings." 3. Conscientiousness: "I get chores done right away." 4. Neuroticism: "I have frequent mood swings." 5. Intellect/Openness: "I have a vivid imagination."	α = .65-.82 (Donnellan et al., 2006)
Esoteric Analogies Test (Stankov, 1997)	20 items	FLAME is to HEAT as ROSE is to: a) LEAVES; b) SCENT; c) THORN or d) PETAL	α = .76 (Kleitman et al., 2021)

[a] The original pool of 11 items for the scale was used instead of the final 7-item version. The 11-item scale exhibited better psychometric properties and factor loadings in factor analyses.
[b] Measured at Time 1, (January-March 2022), including retrospective recollection (prior to December 2021).
[c] Measured at Time 1, (January-March 2022), including retrospective recollection (prior to December 2021) and at Time 2 (June 2022).

3.3 Results

Descriptive statistics and reliabilities estimate (Cronbach's Alpha), and correlations for risk, impulsivity, morality, and COVID-related fear measures and with other measures are presented in Appendix B2. The reliability estimates ranged from acceptable to good for all measures except for MFQ Fairness (α=.57), possibly because the subscale consists of only four items. The absolute values of skewness statistics and kurtosis for all measures fall within the acceptable range of < 2 and < 7 (Hair et al., 2010). A description of the sample is provided in Appendix B4.

3.3.1 Confirmatory Factor Analyses

3.3.1.1 Morality measures

Three models were fitted: one-factor, two-factor, and three-factor (description and fit indices of all models can be found in Table 3.2). Using fit indices cut-off conventions from the literature, a model fit is deemed acceptable if Standardized Root Mean Squared Residual (SRMR) $\leq .08$, Root Mean Square Error of Approximation (RMSEA) $\leq .06$, Comparative Fit Index (CFI) $\geq .95$, and Tucker—Lewis Index (TLI) $\geq .95$ (Brown, 2015; Hu & Bentler, 1999).

Table 3.2
Model description and fit statistics for CFA with morality measures.

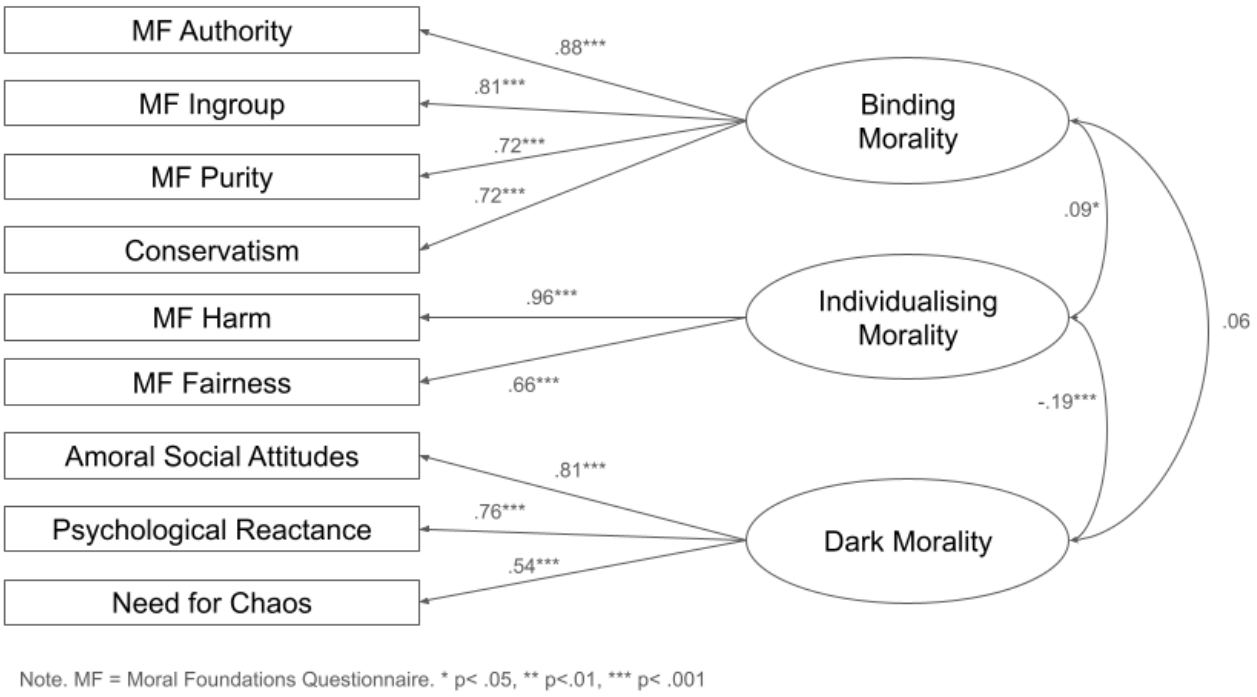
	χ^2	df	χ^2/df	TLI	CFI	RMSEA (90% CI)	AIC	SRMR
One-factor model	803.327	27	29.753	.446	.584	.222 (.209-.236)	857.327	.167
Two-factor model	390.203	26	15.008	.730	.805	.155 (.142-.169)	446.203	.112
Three-factor model	84.635	24	3.526	.951	.968	.066 (.051-.081)	144.635	.048

Note. χ^2—chi-squared, df—degrees of freedom, TLI—Tucker-Lewis Index, CFI—Comparative Fit Index, RMSEA—Root Mean Square Error of Approximation, CI—Confidence Interval, AIC—Akaike Information Criterion, SRMR—Standardized Root Mean Squared Residual.

Firstly, an initial one-factor model was conducted with all variables loading onto a single factor, which had a poor model fit. Subsequently, a two-factor model (*positive* and *dark morality*) and a three-factor model (Individualising, Binding, and Dark Morality) were used to determine the factorial structure of morality. For the two-factor model, the moral foundations and Social Conservatism defined *positive morality,* whilst Amorality, Psychological Reactance, and Need for Chaos defined Dark Morality, with both factors allowed to covary. The three-factor model had 1) *Individualising* Morality (Harm and Fairness facets of Moral Foundations); 2) *Binding Morality* (Ingroup Loyalty, Authority, Purity facets of Moral Foundations and Social Conservatism), and 3) Dark Morality, (Amorality, Psychological Reactance, and Need for Chaos), with all factors covarying freely. Differences in χ^2statistics indicated that the two-factor solution was an improvement compared to the one-factor solution ($\chi^2\text{diff} = 413.12, p < .001$); however, fit indices remained poor (Brown, 2015; Hu & Bentler, 1999). However, as predicted, the three-factor model solution demonstrated a significant improvement over the two-factor solution ($\chi^2\text{diff} = 305.57, p < .001$). Despite that, Individualising Morality factor was defined by only two markers—Harm and Fairness—the three-factor model exhibited acceptable fit indices according to conventional cut-offs, although RMSEA is slightly above the cut-off

(.066) (Brown, 2015; Hu & Bentler, 1999). Figure 3.3 presents the CFA results for morality measures based on the final 3-factor model.

Figure 3.3
Model of the three-factor CFA model with standardised regression and correlations coefficients for moral variables (N=582).



3.3.1.2 Risk/Impulsivity Measures

CFA identified a modified one-factor model defined by General Risk Propensity, Positive Urgency, Negative Urgency, Sensation Seeking, and Lack of Premeditation that demonstrated excellent fit ($\mathrm{TFI} = .989, \mathrm{CFI} = .996, \mathrm{RMSEA} = .040, \chi^2(4) = 7.711,$ $\chi^2/\mathrm{df} = 1.928$; see Appendix B6 for more details).

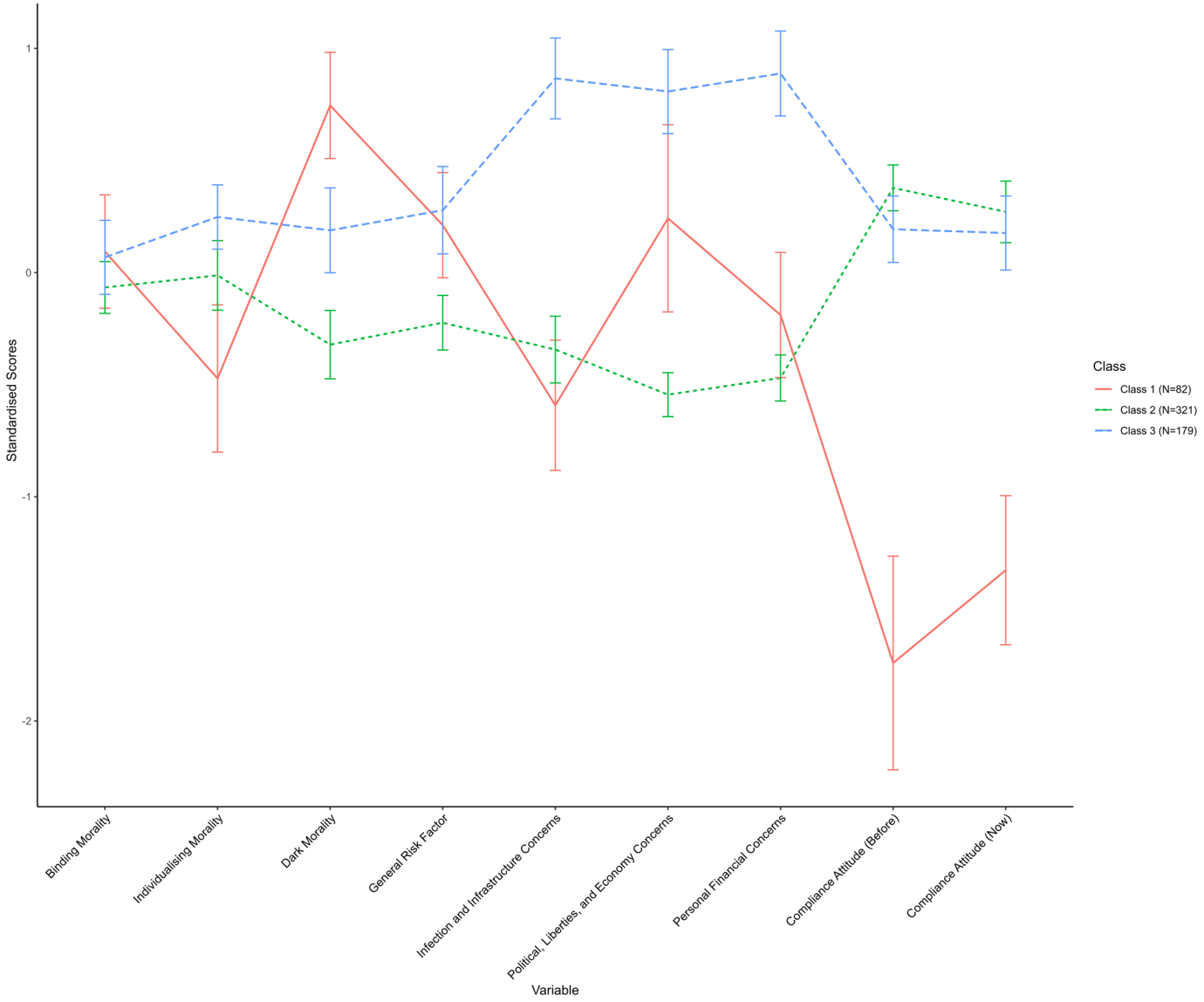
3.3.2 Latent Profile Analysis

Next, Latent Profile Analysis (LPA) was performed based on nine variables, which are key to this research and based on previous studies (Kleitman et al., 2021; Miguel et al., 2021). First, we included moral and risk factors from the CFA analyses. Second, we included three factors based on COVID-related fears/concerns: Infection-Infrastructure (healthcare infrastructure and COVID infection), Political-Liberties-Economy (economic/political stability and personal freedom), and Personal Finance (financial capability for daily life). Lastly, we included the Time 1 and retrospective compliance attitudes to compare attitudes during different stages of the pandemic—when it was mandated compared to self-regulated.

We examined 2 to 6 class solutions, with 1-Class as the default. To determine the final solution, we looked at a range of fit statistics and the interpretability and meaningfulness of the profiles for each solution (Spurk et al., 2020 ; see Appendix B7 for details). We retained the 3-Class solution because of its superior fit statistics and the meaningful addition of the third class. All further analyses were conducted based on the 3-Class solution (Figure 3.4).

Class 1—the *amoral risk-seeking class*—was smaller (14.1%, n=82), showed high Dark Morality and General Risk, and much lower Individualising Morality and Compliance Attitudes. Class 2 (55.2%, n = 321)—the *moral risk-averse class*—showed the lowest levels of Dark Morality and General Risk and higher levels of Compliance Attitudes. Class 3 (30.8%, n = 179)—the *anxious compliant class*—was characterised by elevated levels in all three aspects of COVID-related Concerns. Compared to the moral risk-averse class, it did not differ in Compliance Attitudes but had higher levels of Dark Morality and General Risk. Interestingly, it also had the highest score for Individualising Morality. The number of people in the *Amoral Risk-Seeking* group, although relatively small, was similar to the results from Kleitman et al. (2021) (see Table 3.3).

Figure 3.4
Standardised scores of the 3-Class LPA solution (Error bars represent 95% CI).



A series of One-Way ANOVA and post-hoc tests with Scheffe corrections were conducted to examine the differences between the profile characteristics of the classes. Table 3.4 presents the descriptive statistics and results of the analyses.

While there were no differences in Binding Morality between the three classes, the most potent differences in the classes were in Dark Morality, with a large effect size ($\eta^2 = .14$), where the *amoral risk-seeking* class was highest, followed by the *anxious*

compliant class, and the *moral risk-averse* class was lowest. Individualising Morality levels differed, with the *anxious compliant* class having the highest, followed by the *moral risk-averse* class, and the *amoral risk-seeking* class having the lowest levels. Risk propensity was the lowest for the *moral risk-averse* class *and* similar for the two other classes. Differences in COVID-19-related Concerns between different classes showed large effect sizes, ranging from .37 to .42. Concerns over infection and personal finances were the highest for the *anxious compliant class*. However, the compliance attitude reports were remarkably lower only for the *amoral risk-seeking class,* with two other classes showing similar levels. Compliance attitudes differences between the classes also showed large differences ($\eta^2 = .56$ and .33), with the amoral risk-seeking class reporting lowest compliance attitudes at both retrospective and Time 1. In comparison, the other two classes showed higher compliance attitudes, but they did not differ from each other.

Table 3.3

Descriptive Statistics, ANOVA, and post-hoc tests of profile characteristics by Class.

	Mean (SD)			One-Way ANOVA			Scheffe Post-hoc		
	Amoral Risk-Seeking (1)	**Moral Risk-Averse (2)**	**Anxious Compliant (3)**	F	p	η^2	1-2	2-3	3-1
Binding Morality	0.04 (0.71)	-0.04 (0.72)	0.05 (0.71)	1.19	.31	.00	.63	.37	.99
Individualising Morality	-0.37 (0.90)	-0.01 (0.69)	0.19 (0.62)	18.14	<.01	.06	**<.01**	**.01**	**<.01**
Dark Morality	0.33 (0.41)	-0.14 (0.39)	0.10 (0.42)	52.90	<.01	.15	**<.01**	**<.01**	**<.01**
General Risk Factor	0.10 (0.62)	-0.13 (0.56)	0.19 (0.63)	17.58	<.01	.06	**.01**	**<.01**	.54
Infection and Infrastructure Concerns	1.84 (0.53)	2.06 (0.52)	2.87 (0.53)	169.34	<.01	.37	**<.01**	**<.01**	**<.01**
Political, Liberties, and Economy Concerns	2.13 (0.66)	1.67 (0.38)	2.53 (0.51)	197.94	<.01	.41	**<.01**	**<.01**	**<.01**
Personal Financial Concerns	1.96 (0.81)	1.72 (0.59)	2.96 (0.69)	208.28	<.01	.42	**.01**	**<.01**	**<.01**
Compliance Attitudes Before	53.73 (15.08)	89.91 (8.93)	86.43 (11.67)	371.06	<.01	.56	**<.01**	**<.01**	**<.01**
Compliance Attitudes Now	47.98 (14.34)	77.72 (14.31)	75.90 (14.87)	142.90	<.01	.33	**<.01**	.41	**<.01**

Note. $p < .05$ for Scheffe post-hoc comparisons are bolded. η^2 = effect size

3.3.3 Differences between the Classes: Personality, Cognitive Ability, Demographics, and Behaviours

3.3.3.1 Personality, Cognitive Ability, and Demographics

One-way ANOVA and post-hoc pairwise comparisons with Scheffe corrections were conducted to examine how the classes differ regarding psychological variables and demographics. The results on demographics and psychological variables are presented in Table 3.4.

The *Moral Risk-Averse* class had the highest mean age but was only significantly higher than the *Anxious Compliant* class. For gender, 10 participants reported non-binary or preferred not to say. For the remaining 572 participants, a number of males and females are reported in Table 3.4, with a chi-squared test of independence revealed that gender distributions differed among the classes, $\chi^2(2, 572) = 25.01, p < .001, \omega = .21$. Using pairwise comparisons, the *Amoral Risk-Seeking* class had significantly more males and fewer females compared to the *Moral Risk-Averse* class ($\chi^2(1, 399) = 18.40, p < .001$) and the *Anxious Compliant* class ($\chi^2(1, 254) = 21.50, p < .001$), while the other two classes did not differ from each other ($\chi^2(1, 491) = 0.83, p = .31$) after Bonferroni correction.

For personality, the three classes did not differ in Extraversion and Openness. Not surprisingly, the *Amoral Risk-Seeking* was lowest on agreeableness and the *Moral Risk-Averse* class was highest on conscientiousness. The *Anxious Compliant* class was highest on neuroticism. For cognitive ability, the Moral Risk-Averse class had the highest mean levels in the Esoteric Analogies Test. Still, it was only significantly higher than the *Anxious Compliant* class.

Table 3.4

Descriptives, One-Way ANOVA, and post-hoc comparisons of personality, demographics, and cognitive ability between classes at Retrospective, Time 1, and Time 2.

		Mean (SD)			One-Way ANOVA			Scheffe Post-hoc		
	α	**Amoral Risk-Seeking (1)**	**Moral Risk-Averse (2)**	**Anxious Compliant (3)**	F	p	η^2	1-2	2-3	3-1
Age	-	33.40 (12.20)	36.30 (13.20)	32.30 (11.90)	6.14	<.01	.02	.18	**<.01**	.82
Sex (n's for M/F)	-	54/27	125/193	60/113	-	-	-	-	-	-
Agreeableness	.81	13.80 (3.06)	15.40 (3.18)	15.30 (3.24)	8.74	<.01	.03	**<.01**	.83	**<.01**
Conscientiousness	.68	13.50 (3.13)	14.40 (3.08)	13.40 (3.30)	7.48	<.01	.03	**.05**	**<.01**	.99
Neuroticism	.77	11.90 (3.23)	11.50 (3.58)	13.50 (3.38)	18.37	<.01	**.06**	.73	**<.01**	**<.01**
Extraversion	.80	10.20 (3.64)	10.00 (3.69)	10.50 (3.76)	1.08	.34	<.01	.85	.35	.89
Openness	.74	14.60 (3.37)	15.00 (3.26)	15.20 (3.22)	.77	.46	<.01	.65	.86	.46
EAT Accuracy	.72	65.40 (19.26)	69.20 (19.17)	62.40 (19.95)	7.33	<.01	.03	.29	**<.01**	.50

Note. α = Cronbach's alpha. EAT = Esoteric Analogies Test; $p < .05$ for Scheffe post-hoc comparisons are bolded. η^2 = effect size

3.3.3.2 Validating Classes: COVID Protective Behaviours

As a measure of real-life outcomes and to cross-validate classes, we examined whether the three groups differed in a range of key COVID protective behaviours—infection risk disclosure, illness-related (voluntary) isolation, social distancing, protective social behaviour — and whether the differences were stable across time[3]. Two-way mixed ANOVAs were conducted to analyse the effect of time and class on COVID protective behaviours. Post hoc comparisons of behaviours between classes were performed. In these analyses, non-significant interaction effects indicate that the pattern of differences between classes remained unchanged across different times. Table 3.5 summarises these results and presents the two-way mixed ANOVAs in four key behaviours (a larger selection of behaviours is presented in Appendix B8). Given that participant attrition in follow-up and NA

[3] A chi-square goodness-of-fit test was conducted to show that the size proportions of the three classes did not change at Time 2 (follow-up), $\chi^2(2, N=436) = .408$, $p=.817$.

responses when the item did not apply, group sizes are reported for each item. Two behaviours had significant time effects, indicating levels of behaviours changed across time (potentially due to the transition from the mandated stage to the self-regulation stage). Given this research scope, we will focus on the differences between classes only and whether the differences are consistent across different times.

The differences in behaviours between classes were significant for all items with large effect sizes (η_p^2's > .11), suggesting substantial differences between moral and risk-taking classes. As expected, the *Amoral Risk-Seeking* class reported the lowest behaviours in all these behaviours. The *Moral Risk-Averse* and the *Anxious Compliant* classes generally did not differ. This pattern was remarkably consistent for all three time points, with the *Amoral Risk-Seeking* displaying the lowest levels of Covid-safe cooperative behaviours compared to the other two classes. None of the interaction terms were significant, suggesting that the pattern of differences between classes remained stable across time.

Table 3.5

Descriptives, Two-Way Mixed ANOVA, and post-hoc comparisons of protective behaviours between classes at Retrospective, Time 1, and Time 2.

	Time	Classes Mean (SD)			N	Two-Way Mixed ANOVA						Scheffe Post-hoc Comparison between Classes		
						Time		Class		Time × Class				
		Amoral Risk-Seeking (1)	Moral Risk Averse (2)	Anxious Compliant (3)		F	η_p^2	F	η_p^2	F	η_p^2	1-2	1-3	2-3
Infection Risk Disclosure														
If I experience(d) flu/COVID-like symptoms, I inform(ed) people before/after meeting them.	Retrospective	2.24 (1.23)	3.07 (1.16)	3.27 (1.02)	260	3.49	.01	15.52**	.11	.54	<.01	**<.01**	**<.01**	.22
	Time 1	2.29 (1.27)	3.16 (1.13)	3.36 (0.97)										
	Time 2	2.56 (1.02)	3.18 (0.92)	3.39 (0.77)										
Illness-related (voluntary) Isolation														
I stayed at home if I felt unwell with flu/COVID-like symptoms.	Retrospective	2.52 (1.20)	3.56 (0.82)	3.44 (0.87)	299	3.51	.01	26.44**	.15	.71	.01	**<.01**	**<.01**	.82
	Time 1	2.70 (1.19)	3.61 (0.72)	3.56 (0.82)										
	Time 2	2.58 (1.00)	3.42 (0.76)	3.44 (0.78)										
Social Distancing														
If I go(went) out, I stay(ed) 1.5m away from people.	Retrospective	2.27 (0.94)	3.06 (0.88)	3.14 (0.84)	429	51.15**	.11	26.27**	.11	.75	.00	**<.01**	**<.01**	.34
	Time 1	2.30 (0.93)	2.92 (0.86)	3.05 (0.81)										
	Time 2	1.91 (0.77)	2.49 (0.86)	2.62 (0.90)										
Protective Social Behaviour														
I avoid(ed) meeting face-to-face with at-risk people (e.g., elderly and those with underlying health conditions).	Retrospective	2.23 (1.10)	3.13 (0.97)	3.17 (0.96)	386	57.23**	.13	25.28**	.12	2.20	.01	**<.01**	**<.01**	.12
	Time 1	2.15 (1.11)	2.95 (1.01)	3.19 (0.89)										
	Time 2	1.79 (0.85)	2.31 (0.94)	2.57 (0.96)										

Note. N = valid sample size for each item. Significance levels are indicated next to the F values: ** p <.01. Non-significant F values for interaction terms are underlined.
p < .05 for Scheffe post-hoc comparisons are bolded.
Retrospective: prior to Dec 31 2021. Time 1: Jan-March, 2022. Time 2: June, 2022.

3.4 Discussion

The current study is the first to study how morality, risk propensity, and fear relate to moral decision-making. We did this using the real-life, ecologically valid situation presented by the COVID-19 pandemic. The unique context of the pandemic has provided insights into decisions that require collective moral effort for the common good (i.e., COVID-safe cooperative behaviours to contain the spread of COVID).

3.4.1 Aim 1: Higher Order Morality and Risk/Impulsivity Factors

The first aim of the present study was to examine the higher-order factors in moral foundations (Franks & Scherr, 2015; Malka et al., 2016) and general risk propensity (Zhang et al., 2019; Frey et al., 2017), respectively. In doing this, we extended research to a positive and dark morality framework.

Aligning with previous findings, the morality measures converged into Individualising, and Binding Morality (Franks & Scherr, 2015; Malka et al., 2016). As expected, a separate Dark Morality factor also emerged. The factors were uncorrelated or weakly correlated, consistent with previous findings (Efferson et al., 2017; Glenn et al., 2009). By incorporating Dark Morality—characterised by selfishness, uncooperativeness, and disruptiveness—our results extend Curry's (2016) Morality-as-Cooperation framework to include motivations for refusing cooperation. Notably, Dark Morality was the strongest differentiator of the three classes among the moral and risk factors, highlighting its critical role in moral decision-making and emphasising the need for future research to consider this dimension for a deeper understanding of cooperation during crises.

3.4.2 Aim 2: Identification of the Compliant and Non-Compliant subgroups

Our second aim was to use LPA to identify subgroups based on morality, risk propensity, fear, and compliance attitudes toward COVID-19-safe behaviours. Instead of the hypothesised two-class solution, our results revealed three distinct profiles. The Amoral Risk-Seeking (~14%) and Moral Risk-Averse (~55%) groups aligned with prior research on non-compliant and compliant individuals (Kleitman et al., 2021). However, we identified a novel third group—Anxious Compliant (~31%)—which, despite higher Dark Morality and risk propensity, exhibited strong compliance similar to the Moral Risk-Averse group. This extends Miguel et al.'s (2021) findings, which identified only two classes (empathy and antisocial patterns) based on antisocial traits. Our findings reveal heterogeneity among high Dark Morality individuals, suggesting an overlooked compliance pathway driven by fear and concern, with implications for behavioural predictions.

Importantly, the pattern of characteristics among the three classes suggests that classes with higher Dark Morality are also higher on the General Risk Factor. The relationship is consistent with previous findings on the relationship between risk propensity and morality (Gojković et al., 2019). This finding is not surprising as higher risk propensity implies greater tolerance and/or insensitivity towards the potential negative consequences of moral transgressions and fixates more on the immediate rewards and satisfactions.

3.4.3 Aim 3: Hypothesised Differences between LPA classes

Our third aim was to examine whether the clusters differ in morality, risk propensity, fear, personality, cognitive ability, as well as compliance attitudes and self-imposed cooperative behaviours. Most hypotheses were supported for the *Amoral Risk-Seeking* and *Moral Risk-Averse* classes. The third *Anxious Compliant* class presented a more complex picture.

3.4.3.1 Morality and Risk Propensity

Among the three Morality factors, Dark Morality showed the greatest distinction between classes, as predicted for the Amoral Risk-Seeking and Moral Risk-Averse groups, but also for the Anxious Compliant group, which exhibited moderate levels. Risk propensities were higher in the Amoral Risk-Seeking and Moral Risk-Averse groups, though the Anxious Compliant group reported similar levels to the former. Contrary to expectations, *positive morality* was not linked to risk propensity. Surprisingly, Binding Morality did not differ across groups, suggesting that values like group cohesion, social order, and loyalty did not influence cooperative attitudes or COVID-19-Safe behaviours. While the Moral Risk-Averse group scored higher in Individualising Morality than the Amoral Risk-Seeking group, the Anxious Compliant group ranked highest. This suggests different possible pathways to cooperation: Individualising Morality, based on principles of harm reduction and fairness, and fear-driven concerns may both foster cooperation, whereas Dark Morality aligns with risk-taking and rejection of cooperation.

3.4.3.2 Personality and Cognitive Ability

Our results support the expected roles of agreeableness and conscientiousness in distinguishing between moral and risk-related profiles. The *Moral Risk-Averse* and *Anxious Compliant* groups were more agreeable, reinforcing the link between prosocial traits and cooperative behaviour. The lower conscientiousness in the *Anxious Compliant* group, despite high self-imposed compliance, suggests a complex interplay with *Dark Morality* as it shares negative relations with conscientiousness (Waris et al., 2020), potentially driven by risk/impulsivity or emotional instability. Surprisingly, extraversion did not differentiate between groups, indicating that sociability was not a key factor in self-imposed compliance and moral decision-making during the self-regulated stage of the pandemic.

Neuroticism was highest among the *Anxious Compliant* class, aligning with their COVID-related concerns/fears. However, their combination of high-risk propensity and neuroticism contradicts findings that link neuroticism to lower risk-taking (Highhouse et al., 2022). Nevertheless, when looking at COVID-19 safe behaviours that mitigate personal health risks and the danger of infecting others, the Anxious Compliant class reported the lowest levels. Therefore, future studies could further explore the discrepancy between self-reported risk propensity and actual risk behaviours and the role of neuroticism in them.

Surprisingly, the classes did not differ in openness to experience. One possible explanation is that in Highhouse et al.'s (2022) meta-analysis, openness to experience was correlated with adaptive risk-taking behaviours (e.g., investing, entrepreneurship, social assertiveness) but not with maladaptive risk-taking behaviours (e.g., gambling, speeding, aggression). The latter was more strongly associated with the constructs (e.g., impulsivity) used to measure risk propensity in this study. Our results imply that the links between these personality traits and risk propensity may be domain-specific. Future studies may further explore this relationship by including constructs that measure different aspects of risk propensity that are not solely connected to maladaptive risk-taking (e.g., behavioural activation and inhibition systems).

Contrary to expectations, cognitive ability was not associated with Dark Morality or risk propensity. The only significant difference was where the *Moral Risk-Averse* scored higher than the *Anxious Compliant* classes. The lower cognitive ability may be associated with higher levels of fear, which can negatively affect executive functions such as inhibitory control and working memory (Lindström & Bohlin, 2012; Storbeck & Wylie, 2024).

3.4.3.3 Morality, Risk Propensity, Fear, and Compliance

Fear played a crucial role in how morality and risk propensity influenced cooperative COVID-safe behaviours. Most viewed non-cooperation as harmful and immoral (Bor et al., 2023; Rosenfeld & Tomiyama, 2022). The Amoral Risk-Seeking and Moral Risk-Averse groups followed a clear pattern: higher Dark Morality and risk propensity reduced compliance, while lower selfishness and greater delayed gratification increased cooperation, both during and after compliance mandates. These findings replicate the association between risk propensity and moral decision-making (Cameron, 2009; Prescott, 2012). However, the Anxious Compliant group defied this trend. Despite high Dark Morality and General Risk, they maintained strong compliance, likely driven by COVID-related fear. The role of fear presents a theoretically significant case with important implications for future research. While COVID-related fear reinforced compliance in this group, fear may also exert polarising effects contingent on contextual factors. Notably, prolonged exposure to fear-inducing stimuli could heighten susceptibility to propaganda and extreme rhetoric, particularly when such narratives strategically exploit underlying anxieties or moral convictions. Future research should further examine these dynamics, specifically investigating the relationship between fear, moral disengagement, and vulnerability to extremist messaging. Such inquiry holds practical relevance, as it could inform interventions aimed at mitigating radicalisation among at-risk populations.

Our longitudinal design demonstrates the temporal stability of morality, risk propensity, and fear in shaping compliance. The persistence of these differences—during the mandated and self-regulation stages and four months later—is striking. Even after restrictions were lifted, protective behaviours by the *Moral Risk-Averse* and *Anxious Compliant* groups remained distinct from the *Amoral Risk-Seeking* group, suggesting that the non-cooperative behaviours of the latter were driven by *Dark Morality* and the absence of *COVID-related*

fears. These findings highlight a key contribution: positive and dark aspects of morality may function independently, influencing risk-taking and fear in distinct ways. Future research should further explore their unique roles in prosocial and moral decision-making. Our findings have important practical implications. The identification of the three LPA classes and their persistent compliance behaviours suggests that there may be two stable moral and amoral clusters of individuals. Their moral decision-making appears consistent across situations and is associated with their risk propensity. The moral decision-making by the third Anxious Compliant class, however, seems to be more situational and influenced by external factors (e.g., threat of COVID). For practical applications, these insights suggest that the first two groups can potentially be identified using psychological markers of morality and risk propensity, while targeted interventions—such as risk framing or value priming—can be developed to encourage moral behaviours in the third group.

3.4.4 Limitations and Future Directions

Our study benefits from a diverse and relatively representative Australian sample, examined under the unique conditions of the COVID-19 pandemic. This enhanced ecological validity, allowing us to capture real-world interactions between morality, risk propensity, and fear in compliance attitudes and cooperative behaviour using a longitudinal design. By reflecting population diversity, our findings offer robust insights, yet future research should replicate and extend these results with larger, more diverse samples, including non-WEIRD populations (White, Educated, Industrialised, Rich, and Democratic; Henrich, Heine, & Norenzayan, 2010). Demographic factors such as cultural values (e.g., collectivism vs individualism), economic conditions (e.g., unemployment, crime rate) and health/safety welfare (life expectancy, crime rate) may moderate the relationship between moral decision-making and risk propensity. Furthermore, exploration across different contexts (e.g., no threat specified, climate change, public health crises that similarly rely on voluntary cooperation) is

needed to assess the broader generalisability of these results. Global crises such as climate change may not have immediate negative outcomes but are likely to result in more severe and irreversible damages in the long run. Threats that unfold over a longer time frame may be perceived differently at the cognitive level—often as abstract, distant, or uncertain—which can reduce their motivational impact and hinder proactive moral action.

Another limitation of this study is that the *Individualising Morality* factor included only two subscales from the Moral Foundations (Harm and Fairness). While this aligns with previous factor analytic studies using CFA, models with fewer than three indicators are vulnerable to under-identification (Brown, 2015). Future research should incorporate additional constructs (e.g., empathy, moral identity) that theoretically align with *Individualising Morality* to enhance the reliability of this factor. Moreover, future studies could investigate a broader range of dark personality traits (e.g., the Dark Triad, callousness, greed; Moshagen, Hilbig, & Zettler, 2018; Paulhus, 2014) are related to risk propensity, moral decision-making, and well-being.

We collected a convenience sample given the nature and timing of the study. Nevertheless, analyses were conducted to ensure that our results would not suffer from methodological biases, including common method bias, early-late response bias, and non-response bias (see Appendix B5). The attrition rate between Time 1 and Time 2 was 25.1%, consistent with typical rates reported in longitudinal research (Gustavson et al., 2012; Kristman et al., 2004). Importantly, respondents who did not participate in the Time 2 follow-up did not differ systematically from completers on key demographic variables. Additionally, the characteristics and relative proportions of LPA class memberships remained stable across both time points, suggesting that differences in sample composition or profile characteristics did not drive attrition.

Lastly, while the context of the COVID-19 pandemic provides a unique opportunity to investigate the role of risk propensity in cooperative morality, it by no means captures all kinds of situations where moral considerations are crucial and consequential. There may be situations for "moral risk-takers"—individuals who accept personal risk to uphold moral principles. It is also feasible that, in the context of material or business rewards, in addition to moral risk-aversive and amoral risk-taking, a different profile emerges of those people who engage in calculated legal risk. How stable the relationship between risk-taking and morality in different situations is requires further research.

3.4.5 Conclusions

This research is important for personality research because it advances our understanding of how fundamental personality traits—particularly risk propensity and impulsivity, interact with morality and fear to shape real-life decision-making. This highlights risk propensity as a critical but overlooked factor. Our analyses also identified heterogeneous subgroups of individuals with differing susceptibility to external factors in moral decision-making, which have significant practical implications for monitoring and managing moral behaviours in various contexts. The results offer novel and ecologically valid evidence on the complex relationship between these constructs, providing an essential foundation for future research on moral psychology in crisis contexts.

Chapter 4 Study 3: The role of risk propensity in moral decision-making using the CNI model

This chapter presents Study 3 of this thesis, an original manuscript prepared for publication.

4.1 Introduction

The concept of self-interest occupies a central role in the study of morality, framing how individuals navigate social contexts, balance personal and communal needs, and make choices that influence themselves and others. Traditionally viewed as a catalyst for selfish behaviour, self-interest is increasingly recognised in psychological research as a foundational element of moral decision-making (Asao & Buss, 2016; Curry, 2016; Tomasello et al., 2012). Recognising this interplay, the Morality-as-Cooperation theory suggests that morality itself evolved as an adaptive response to social dilemmas rooted in humanity's need to balance conflict and cooperation around self-interested motives (Curry et al., 2019). According to this view, morality functions as a framework to guide cooperative behaviour, mitigate conflicts, and promote social bonds, effectively channelling self-interest toward win-win situations.

Given the complex interplay between self-interest and moral behaviour, psychological processes that underlie cognition, personality, and self-regulation are key for individuals to survive and thrive in this cooperative social environment (Tomasello, 2016). It is crucial to investigate the role of self-regulatory psychological constructs. Constructs such as general risk propensity (Zhang et al., 2019), impulsivity (Lynam et al., 2006), and behavioural inhibition and activation systems (Carver & White, 1994) may influence how individuals approach moral dilemmas, regulate self-interested impulses, and conform to or deviate from moral norms. By examining the relationships between morality and self-regulatory constructs, this study aims to contribute to a more comprehensive understanding of moral

psychology, emphasising the nuanced ways in which self-interest and self-regulation shape moral decision-making and behaviour.

4.1.1 The Consequences, Norms, and Inaction (CNI) Model

The Consequences, Norms, and Inaction (*CNI)* model of morality (Gawronski et al., 2017) is a framework designed to parse the distinct factors that influence individuals' moral decision-making processes: Consequences (C), Norms (N), and Inaction (I). The CNI model employs sacrificial moral dilemmas in a 2 × 2 design by systematically varying consequences and normative framing. Consequences are manipulated so that either benefits outweigh costs (greater condition) or costs outweigh benefits (smaller condition). Norms are framed as either prescriptive (requiring action) or proscriptive (prohibiting action). Individuals' response patterns across these conditions allow for estimating their sensitivity to consequences, norms, and general inaction tendencies.

The CNI model distinguishes three dimensions of moral decision-making. The Consequence (C) parameter captures individuals' sensitivity to outcomes, with higher scores indicating a greater likelihood of acting when benefits outweigh harms, irrespective of normative context. The Norm (N) parameter reflects adherence to moral rules, with higher values associated with increased action when norms prescribe rather than prohibit behaviour, regardless of outcomes. The Inaction (I) parameter measures a general tendency to refrain from action in moral dilemmas, potentially to avoid responsibility or discomfort. These dimensions enable a nuanced assessment of whether moral choices are primarily guided by outcomes, norms, or aversion to action. Körner et al. (2020) expanded the battery of CNI dilemmas, thereby allowing the measurement of the CNI parameters as individual differences constructs. Thus, the CNI model allows for an individual differences approach to

investigating specific mechanisms of moral decision-making and their relationships with self-regulation constructs.

4.1.2 Moral Identity

Moral identity refers to the degree to which being a moral person is central to an individual's self-concept (Aquino & Reed, 2002). It reflects how important morality is to someone's sense of who they are. People with a strong moral identity see moral traits, such as being honest, caring, fair, and compassionate, as key parts of their self-definition, and they strive to act in ways that align with these values. Moral identity has two dimensions—internalisation and symbolisation. Internalisation is related to the self-importance of moral characteristics. The examples include choosing not to cheat on a test, returning a wallet, or speaking up against unethical practices even when it is against self-interest because fairness and integrity are central to one's self-view. Symbolisation relates to a more general sensitivity to the moral self as a social object whose behaviours can demonstrate that one has these characteristics (Aquino & Reed, 2002). The examples include wearing clothing and symbols that signal one’s commitment to some causes, publicly posting about one's virtual behaviours (e.g., donations), especially when there is a reputational benefit, and volunteering in a visible role to demonstrate one’s commitment to some cause. The inclusion of moral identity is an important aspect of the Morality-as-Cooperation Theory. The extent to which moral principles are integrated into the self-concept through internalisation should reflect how consciously and actively moral considerations factor into decision-making regarding conflicts and cooperation. This also complements the CNI model, which captures individual differences in behavioural patterns, but makes no underlying assumptions about mental processes that account for these patterns (Gawronski et al., 2018).

4.1.3 Dark Personality Traits

Moral decision-making, like all forms of decision-making, requires individuals to navigate uncertainty. However, unlike many other decision-making contexts, the uncertainty in moral domains is not primarily probabilistic but rather normative, concerning judgments about what is right and what should be valued. From a cooperation-based perspective, morality functions to promote prosocial behaviour by encouraging individuals to internalise the principle that actions serving collective interests are inherently "right," even when such actions entail delayed personal benefits. Nevertheless, alternative normative frameworks may arise in which individuals construe "what is right" as that which maximises immediate self-interest. This form of "dark morality" similarly provides a principled answer to the question of rightness, but in a way that privileges self-serving outcomes. Importantly, these two orientations—positive and dark morality—are not necessarily mutually exclusive. Rather, they may coexist within individuals, reflecting distinct but overlapping systems of moral valuation.

Understanding constructs with dark moral connotations is essential for capturing the full spectrum of self-interested behaviour. Dark personality constructs generally reflect a stable disposition to prioritise personal gain with minimal regard for others, encompassing traits such as Machiavellianism and psychopathy, and to a lesser extent, narcissism (Moshagen et al., 2018). Callousness and lack of empathy emerge as central features across these traits, underpinning a disregard for ethical norms and the well-being of others (Paulhus & Jones, 2015). Nevertheless, dark personality traits are not the complete opposite of positive morality constructs (e.g., moral foundations; Ni et al., in press) and are therefore crucial to measure in the context of our investigation into morality and self-regulation.

The two-factor model of psychopathy (Hare, 1991; Levenson et al., 1995; Miller et al., 2008) also has important implications for morality. The model distinguishes between

primary and secondary psychopathy. Primary psychopathy is characterised by interpersonal and affective deficits, such as a lack of empathy, remorse, or guilt, alongside manipulativeness and emotional detachment (Miller et al., 2008). These traits strongly reflect the essence of dark personality traits (Moshagen et al., 2018), as they facilitate the pursuit of self-serving goals without regard for ethical considerations or others. Secondary psychopathy, in contrast, is marked by impulsivity, emotional instability, and a tendency toward reactive aggression (Hare, 1991), which represents a style of being less calculated and more driven by immediate self-interest. Both types highlight distinct pathways through which individuals may prioritise personal gain at the expense of others, albeit with varying degrees of strategic premeditation and emotional regulation. Therefore, the two-factor model of psychopathy allows us to explore potential mechanisms of non-cooperative amorality (e.g., callous vs impulsive) and their associations with self-regulation.

Additional constructs such as amorality and psychological reactance further expand the conceptualisation of dark personality. Amorality involves a readiness to violate norms, accept violence, and pursue self-interest through rule-breaking (Stankov & Knezevic, 2005), while psychological reactance reflects a defensive resistance to perceived restrictions on personal autonomy (Hong & Page, A psychological reactance scale: Development, factor structure and reliability., 1989). Including these traits in research about the role of dark personality in moral decision-making and self-regulation provides a broader understanding of the interplay between self-interest and cooperative morality, highlighting both proactive norm violation and reactive defiance.

Overall, the inclusion of dark personality traits allows us to examine the relationship between self-regulation and the full spectrum of factors that drive moral cooperation (i.e., CNI parameters, moral identity) and those that undermine cooperation in favour of self-interest (dark triad, primary/secondary psychopathy, amorality, and psychological reactance).

4.1.4 Self-regulation Constructs

Self-regulation constructs refer to the psychological mechanisms that enable individuals to control and adapt their thoughts, emotions, and behaviours in pursuit of personal goals and social expectations (Vohs & Baumeister, 2016). While early models emphasised time discounting as a central feature of self-regulation deficits (van Baal et al., 2022), more recent accounts highlight the role of affective conflict and goal competition (Loewenstein & Carbone, 2024). Key constructs in this domain—risk propensity, impulsivity, and behavioural inhibition/activation—offer valuable insight into how individuals navigate moral decisions.

General risk propensity, defined as a "general willingness to enter or avoid risk situations", has been proposed as a domain-general construct for risk-taking tendencies (Zhang et al., 2019). Supporting this definition, studies identified a general risk-taking factor (R) emerging from multiple self-report measures of risk-taking (Frey et al., Risk preference shares the psychometric structure of major psychological traits., 2017). Similarly, impulsivity has been modelled as a general *I* factor with multiple subcomponents, including time estimation, delay discounting, information sampling, sensation seeking, sensitivity to reward, and sensitivity to punishment (Huang et al., 2024). Among the measures employed, the UPPS-P impulsivity behaviour scale (Whiteside et al., 2005; Cyders et al., Examination of a short English version of the UPPS-P Impulsive Behavior Scale, 2014), loaded highly on the general *I* factor. Given the conceptual similarity between general risk propensity and impulsivity, Ni et al (2025) found that the two constructs converged into one factor using confirmatory factor analysis; however, a two-factor solution was also feasible but could not be properly tested due to a limited number of relevant markers utilised. Therefore, including another measure of self-regulation/risk-taking would be beneficial, as it could help

differentiate between nuanced aspects of impulsivity and risk propensity, ultimately leading to a more comprehensive model of self-regulatory and risk-seeking behaviours.

The behavioural inhibition and activation systems (BISBAS) are theorised to regulate aversive and appetitive motivations, respectively (Carver & White, 1994). The behavioural inhibition system (BIS) responds to signals of punishment, non-reward, and novelty, suppressing behaviours that may lead to adverse outcomes (Gray, 1990). In contrast, the behavioural activation system (BAS) is attuned to cues of reward, non-punishment, and relief from punishment, facilitating goal-directed behaviour. The BISBAS Scale assesses one BIS factor and three BAS dimensions: drive, reward responsiveness, and fun-seeking. In addition to risk propensity and impulsivity, BISBAS captures motivational sensitivities to outcomes, offering a distinct perspective on self-regulatory processes.

Regarding the CNI dilemmas, behavioural activation was associated with lower sensitivities to both consequences and norms (Körner et al., 2020). However, these correlations do not differentiate between different aspects of behavioural activation. The present study seeks to clarify further the relationships between various facets of BISBAS and moral decision-making.

4.1.5 Personality and Cognitive Ability

We also look at two theoretically driven constructs—HEXACO personality and cognitive ability. Conscientiousness and agreeableness—traits linked to rule-following, self-discipline, and concern for others—are consistently associated with cooperative and norm-abiding behaviour, and negatively correlated with psychological reactance (John & Srivastava, The Big-Five trait taxonomy: History, measurement, and theoretical perspectives., 1999; Waris et al., 2020). Honesty-humility was also negatively correlated with the core of the Dark Triad (Lee & Ashton, 2014). In terms of risk propensity, extraversion and openness

are positively associated with risk-taking, while agreeableness, neuroticism, and conscientiousness predict greater risk aversion (Highhouse et al., 2022). Cognitive ability is modestly linked to lower amorality and norm violations (Stankov L. , 2009; Michels, 2022), and tends to predict lower health and social risk-taking and greater aversion to losses (Boyer, The development of risk-taking: A multi-perspective review, 2006; Frisell et al., Is the association between general cognitive ability and violent crime caused by family-level confounders?, 2012; Rustichini et al., 2016). Incorporating personality traits and cognitive ability into the analysis allows for a more comprehensive understanding of how the interplay between morality and self-regulation is situated within a broader nomological network of individual differences.

4.1.6 Latent Profile Analysis: A Person-Centred Approach

In recent years, Latent Profile Analysis (LPA) has gained notable popularity in psychological research due to its capacity to uncover meaningful subgroups within heterogeneous populations based on patterns of individual responses. Unlike traditional variable-centred approaches (e.g., correlation, regression, factor analysis), LPA enables researchers to adopt a person-centred perspective, allowing for a more nuanced understanding of psychological constructs.

Previous LPA studies examining clusters of individuals based on (a)morality and risk propensity revealed two or three classes (Miguel et al., 2021; Ni et al., 2025). In both studies, the first two classes consist of a *Moral Risk-Averse* class (high on morality and empathy, low on antisocial traits and risk propensity) and an *Amoral Risk-Seeking* class (high on antisocial traits and risk propensity, low on morality and empathy). Ni et al. (in press) identified a third class whose prosocial behaviours were moderated by fear despite reporting amoral risk-seeking tendencies. Importantly, this group maintained relatively high levels of positive

morality alongside elevated dark morality and risk propensity. Their moral decision-making patterns suggest a heightened sensitivity to situational cues, implying that their moral behaviours are more context-dependent compared to the more stable orientations of the other two classes. The present study seeks to replicate this three-class solution, with particular attention to the context-dependent third class, to evaluate the robustness and generalisability of these moral–risk profiles across samples. We label this group "Opportunistic Risk-Seeking" because, despite their elevated risk propensity and dark morality, their prosocial behaviour emerges selectively when situational factors such as fear make cooperation advantageous.

Importantly, both Miguel et al. (2021) and Ni et al. (2025) were conducted within the unique context of the COVID-19 pandemic. During this period, widespread viral transmission and stringent governmental restrictions imposed salient threats to individuals' self-interest, including risks to health, personal freedom, and financial security. Although such threat-laden contexts illuminate the role of self-interest within the cooperative morality framework, they are less representative of typical daily life. Accordingly, the present study seeks to replicate prior findings while extending their generalisability by examining the relationship between morality and self-interest in a context largely free of acute external threats.

4.1.7 The Present Study

The primary aim of the present study is to employ Latent Profile Analysis (LPA) to uncover distinct clusters of individuals characterised by unique patterns across several key variables: the CNI parameters (sensitivity to consequences, sensitivity to norms, and general tendency for inaction), moral identity (internalisation and symbolisation), self-regulatory deficits (risk propensity, impulsivity, and behavioural inhibition/activation), and dark

personality traits (the Dark Triad, primary and secondary psychopathy, amorality, and psychological reactance). Specifically, we hypothesise that:

H1a: LPA will reveal three clusters: a *Moral Risk-Averse* group, an *Amoral Risk-Seeking* group, and an *Opportunistic Risk-Seeking* group.

H1b: Compared to the *Amoral Risk-Seeking* group, the *Moral Risk-Averse* and *Opportunistic Risk-Seeking* groups will be:

a. Higher in the C and N parameters of the CNI model and moral identity (internalisation and symbolisation);

H1c: Compared to the Moral Risk-Averse group, the Amoral Risk-Seeking and Opportunistic Risk-Seeking groups will be:

a. Higher in Dark Triad, primary and secondary psychopathy, amorality, psychological reactance;
b. Higher in general risk propensity, impulsivity, and behavioural activation;
c. Lower in behaviour inhibition.

We also make secondary hypotheses about differences in personality and cognitive ability between the classes:

H2: Compared to the *Amoral Risk-Seeking* and *Opportunistic Risk-Seeking* group, the *Moral Risk-Averse* group will be:

a. Higher honesty-humility, conscientiousness, and agreeableness;
b. Lower extraversion and openness to experience;
c. Higher cognitive ability.

4.2 Methods

4.2.1 Participants

The participants were 418 undergraduate psychology students from the University of Sydney. Participants were recruited through the SONA system in exchange for partial course credit. Data cleaning was conducted by examining the number of non-serious answers (unreasonably fast response times, see Appendix C1). This resulted in the removal of 39 participants. The final sample included 369 participants (266 females, mean age = 20.27, SD = 2.91, age range = 18-46). A detailed description of the sample was reported in Appendix C1.

4.2.2 Measures and procedures

Table 4.1 reports details of the measures. The order of the measures was counterbalanced (see Appendix C2). Participants completed the study online, which took approximately one hour. The University of Sydney Human Research Ethics Committee (2021/720) granted ethics approval.

4.2.3 Planned analyses

Latent Profile Analysis (LPA) was conducted to determine clusters of individuals that share similar patterns in the characteristics. One-way ANOVAs and post-hoc comparisons (with Scheffe corrections) were conducted next to examine differences between identified profiles. SPSS Version 28.0 (IBM Corp., 2021), and R (R Core Team, 2021) with tidyLPA (Rosenberg et al., 2019) were used for all analyses.

Table 4.1

Measures employed in this study.

Measure (Authors)	Number of Items and response scale	Dimensions and example items	Internal consistency (previous studies)
Morality Measures			
CNI Moral Dilemmas (Körner et al., 2020)	40[a] dilemmas, "Is it acceptable to act/let action happen?"		N/A
Moral Identity Scale (Aquino & Reed, 2002)	10 items, Not True of Me (1) to Completely True of Me (7)	1. Internalisation e.g., "It would make me feel good to be a person who has these characteristics." 2. Symbolisation e.g., "I am actively involved in activities that communicate to others that I have these characteristics."	α = .74-.90, (Aquino & Reed, 2002)
Amoral Social Attitudes (Stankov & Knezevic, 2005)	20 items, Disagree (1) to Agree (5)	"You would be a fool to obey laws, which are thought up by old codgers and crooked politicians."	
Short Dark Triad (Jones & Paulhus, 2014)	27 items, Disagree Strongly (1) to Agree Strongly (5)	1. Machiavellianism e.g., "Most people can be manipulated." 2. Narcissism e.g., "People see me as a natural leader." 3. Psychopathy e.g., "People who mess with me always regret it."	α = .68-.74, (Jones & Paulhus, 2014)
Levenson Self-Report Psychopathy Scale (Levenson et al., 1995)	26 items, Disagree Strongly (1) to Agree Strongly (4)	1. Primary Psychopathy e.g., "Success is based on survival of the fittest; I am not concerned about the losers." 2. Secondary Psychopathy e.g., "I find myself in the same kind of trouble, time after time."	α = .61-.84, (Miller, Gaughan, & Pryor, 2008)
Hong Psychology Reactance Scale-Refined (Hong & Faedda, 1996)	11 items, Strongly Disagree (1) to Strongly Agree (5)	"Regulations trigger a sense of resistance in me."	α = .75-.80 (Shen & Dillard, 2005)

Self-Regulation Measures

General Risk Propensity Scale (Zhang et al., 2019)	8 items, Strongly Disagree (1) to Strongly Agree (5)	"Taking risks is an important part of my life."	α = .92 (Zhang, Highhouse, & Nye, 2019)
Short UPPS Impulsivity Scale (Cyders et al., Examination of a short English version of the UPPS-P Impulsive Behavior Scale, 2014)	20 items, Agree Strongly (1) to Disagree Strongly (4)	1. Negative Urgency e.g., “When I’m upset I often act without thinking.” 2. Positive Urgency e.g., “I tend to lose control when I am in a great mood.” 3. Sensation Seeking e.g., “I quite enjoy taking risks. 4. Lack of Premeditation e.g., “My thinking is usually careful and purposeful." (reverse coded). 5. Lack of Perseverance e.g., “I finish what I start.” (reverse coded).	α = .74-.88 (Cyders, Littlefield, Coffey, & Karyadi, 2014)
BIS/BAS Scale (Carver & White, 1994)	24 items, Very True for Me (1) to Very False for Me (4)	1. BAS Drive e.g., "I go out of my way to get things I want." 2. BAS Reward Responsiveness e.g., "When I see an opportunity for something I like, I get excited right away." 3. BAS Fun Seeking e.g., "I often act on the spur of the moment." 4. BIS Behaviour Inhibition e.g., "13 If I think something unpleasant is going to happen, I usually get pretty 'worked up'."	α = .71-.77 (Voight et al., 2009)

Other Psychological Variables

Brief HEXACO	24 items	1. Honesty-Humility e.g., “I find it difficult to lie.” 2. Emotionality e.g., “I can easily overcome difficulties on my own.” 3. Extraversion e.g., “I easily approach strangers.” 4. Agreeableness e.g., “I tend to quickly agree with others.” 5. Conscientiousness e.g., “I work very precisely.” 6. Openness to Experience e.g., “I have a lot of imagination.”	
Esoteric Analogies Test (Stankov , 1997)	20 items	FLAME is to HEAT as ROSE is to: a) LEAVES; b) SCENT; c) THORN or d) PETAL	α = .76 (Kleitman et al., To comply or not comply? A latent profile analysis of behaviours and attitudes during the COVID-19 pandemic., 2021)

Note. [a] The original dilemmas contained 12 scenarios subject to 4 conditions (i.e., 48 items). The present study removed two scenarios, 4) assisted suicide and 11) mother, resulting in a total of 40 items.

4.3 Results

The order of the measures was counterbalanced, which generally did not influence the measures (see Appendix C2). Descriptive statistics and reliability estimates of the individual differences measures are presented in Appendix C2.

4.3.1 CNI Model Parameters

The CNI parameters were computed using the CAN algorithm proposed by Liu and Liao (2021) to address several statistical issues presented in the data (see Appendix C3). The CAN algorithm estimates three parameters similar to the original CNI model, namely, C (Consequences), A (Action), and N (Norms). The only difference lies in the A parameter, which captures the tendency to take action irrespective of consequences and norms (i.e., the inverse of the I parameter). The correlations between the CAN parameters and the individual differences measures are presented in Appendix C4.

4.3.2 Latent Profile Analysis

We conducted Latent Profile Analysis based on the moral and self-regulation variables. 2- to 6-class solutions were examined, with 1-Class as the default. Determining the number of profiles is not straightforward because it relies not only on fit statistics but also on theoretical and content-related considerations (Spurk et al., 2020). To determine the final solution, we looked at both the fit statistics and the interpretability and meaningfulness of the profiles for each solution. Table 4.2 presents the fit statistics for the 2- to 6-class LPA solutions.

We compared model fit statistics in accordance with Spurk et al.'s (2020) guidelines by comparing a range of model fit statistics (AIC, BIC, sample adjusted BIS, log likelihood, entropy, and Bootstrap Likelihood Ratio Test). The general trend suggested that models with higher numbers of profiles showed a better fit. All criteria suggested a 6-class model (see

Table 4.2). All models except the 6-Class model showed great posterior classification probabilities (i.e., greater than .90; see Appendix C5).

Table 4.2
Fit Statistics, Class Distribution, and Posterior Probabilities of LPA models.

Classes	LogLik	AIC	BIC	SABIC	Entropy	BLRT(p)
1	-11226.98	22541.96	22712.94	22573.35	1.00	NA
2	-10757.64	21649.28	21909.65	21697.09	.86	.01
3	-10592.03	21364.05	21713.80	21428.27	.84	.01
4	-10476.66	21179.31	21618.44	21259.95	.85	.01
5	-10348.97	20969.93	21498.44	21066.98	.88	.01
6	-10252.52	20823.03	21440.92	20936.49	.88	.01

	Class Sizes and Proportions		**Latent class probabilities for most likely membership (row) by latent class (column)**		
3 Class Solution					
	p	**n**	**Class 1**	**Class 2**	**Class 3**
Class 1	.22	81	**.94**	.00	.06
Class 2	.36	131	.00	**.94**	.06
Class 3	.41	148	.03	.06	**.91**

Note. AIC = Akaike Information Criterion. BIC = Bayesian Information Criterion. SABIC = Sample-adjusted BIC. BLRT(p) = p-value of Bootstrapped Likelihood Ratio Test. Correct classification probabilities (values on the diagonal) are **bolded**.

We then turn our attention to the interpretability and meaningfulness of profiles for each model. To aid interpretation, we grouped measures into three meaningful clusters: morality (CNI parameters and moral identity dimensions), dark personality traits (Short Dark Triad, Levenson Psychopathy, Amorality, and Reactance), and self-regulatory deficits constructs (impulsivity, risk propensity, and BISBAS). The 2-class solution reveals two distinct profiles: Amoral Risk-Seeking (42%, n = 153) and Moral Risk-Averse (58%, n = 207) (see Figure 4.1). Compared to the Amoral Risk-Seeking group, the Moral Risk-Averse group is higher on the C and N parameters, moral identity internalisation (but not symbolisation),

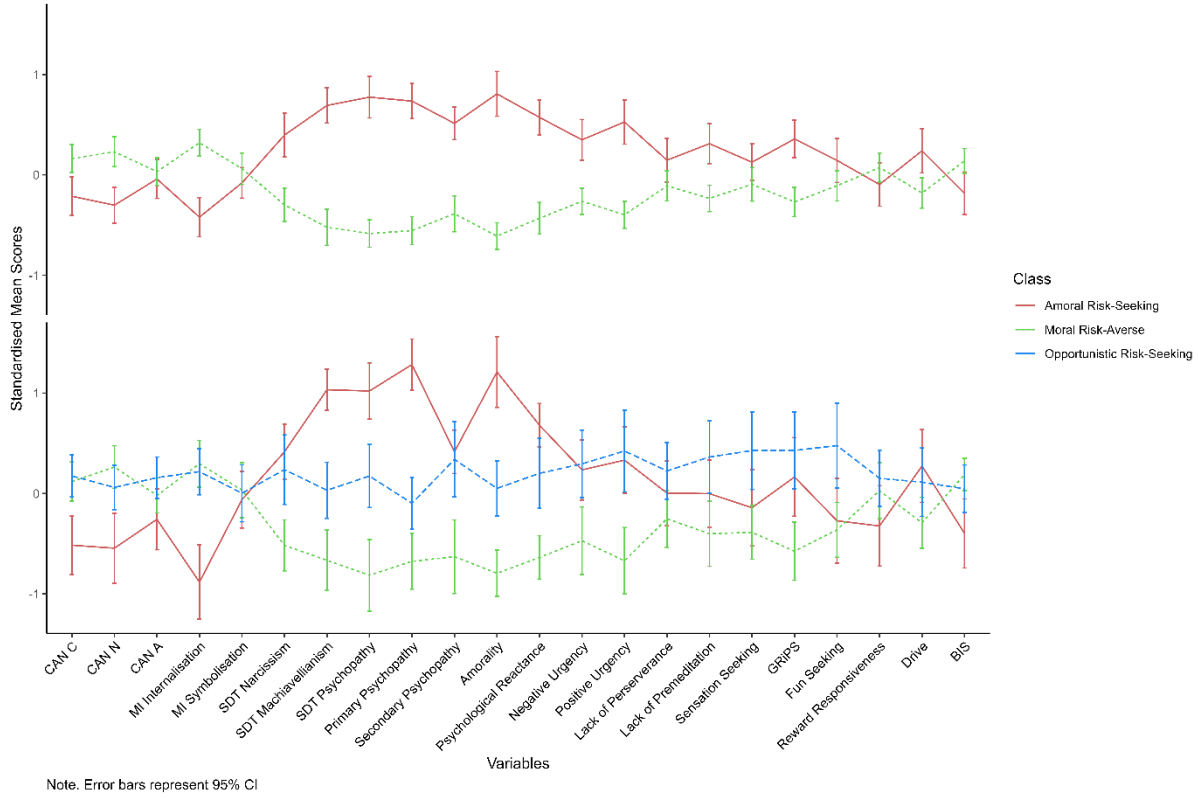
and lower on the dark traits and self-regulatory deficits (also higher on BIS) except for reward responsiveness.

The 3-class solution identified a new Opportunistic Risk-Seeking (41%, n=148) group in addition to the Amoral Risk-Seeking (22%, n=81) and the Moral Risk-Averse (36%, n=131) group. This group showed higher levels of moral traits and lower levels of dark traits, similar to those in the Moral Risk-Averse group. However, this group also exhibited higher levels of self-regulatory deficits, some of which were even more pronounced than those of the Amoral Risk-Seeking group. The pattern of characteristics for the Adaptive Risk-Seeking group seems to break the covariation of lower morality and higher self-regulation deficits exhibited by the previous two groups. The dissociation from the trend suggests potential non-linear relationships between morality and self-regulatory capabilities, providing incremental meaningfulness compared to the 2-class solution.

For the 4-, 5-, and 6-class solutions, despite having adequate class sizes and fit statistics, the solutions offered little beyond the 3-class solution (see Appendix C5). Therefore, we deemed the 3-class solution to be the most meaningful, and all further analyses were conducted based on the 3-class model.

Figure 4.1

Comparison of 2- vs 3-Class LPA Solutions.



4.3.3 ANOVA and Post-Hoc Comparisons

Table 4.3 presents the descriptive statistics, ANOVA, and pairwise comparisons between the three LPA classes for all variables included in the LPA. The HEXACO personality factors showed poor reliability and were presented in Appendix C6.

4.3.3.1 Moral Measures

CNI/CAN parameters: Significant differences were found across all three CNI components (CAN C, N, and A). The Moral Risk-Averse and Opportunistic Risk-Seeking groups demonstrated higher sensitivity to consequences (C) and normative considerations (N) compared to the Amoral group. In contrast, the two groups did not differ significantly from each other. For the tendency to act (A), the Amoral Risk-Seeking group scored lower than the other two groups.

Moral Identity: Internalisation showed large group differences ($\eta^2 = .24$), with both the Moral Risk-Averse and Opportunistic Risk-Seeking groups scoring significantly higher than the Amoral Risk-Seeking group. Symbolisation, however, did not differ significantly across groups, suggesting that while private moral self-concept varied, its public expression remained relatively similar.

4.3.3.2 Dark Personality Traits

Dark Triad: The three LPA groups differed significantly on all Dark Triad traits, with large effect sizes indicating substantial between-group variance ($\eta^{2}'s = .17 - 50$). The Amoral Risk-Seeking group exhibited the highest levels of Narcissism, Machiavellianism, and Psychopathy, consistent with a profile characterised by manipulativeness, self-interest, and moral disengagement. In contrast, the Moral Risk-Averse group scored lowest across all traits, reflecting a prosocial and ethically restrained personality. The Opportunistic Risk-Seeking group showed high narcissism but reported intermediate levels between the other two groups for the other dark traits.

Levenson Psychopathy: The Amoral Risk-Seeking group scored highest on both dimensions, reflecting a profile marked by interpersonal callousness (Primary Psychopathy) and impulsive, emotionally reactive tendencies (Secondary Psychopathy). The Moral Risk-Averse group had the lowest scores, consistent with their high moral internalisation and behavioural inhibition. The Opportunistic Risk-Seeking group exhibited intermediate scores compared to the other two groups. However, it did not differ significantly from the Amoral Risk-Seeking group on Secondary Psychopathy. This suggests that, despite greater moral internalisation and cognitive functioning, the Opportunistic group shares a similar level of emotional dysregulation and impulsivity with the Amoral group.

Amorality and Psychological Reactance: The effect sizes were particularly large for amorality ($\eta^2 = .58$) and substantial for psychological reactance ($\eta^2 = .27$), underscoring these traits as key differentiators among the profiles. The Amoral Risk-Seeking group scored highest on amorality and psychological reactance, with significant differences observed across all pairwise comparisons. The Opportunistic Risk-Seeking group exhibited moderate levels of both traits. In contrast, the Moral Risk-Averse group scored the lowest, reflecting a more substantial moral alignment and less resistance to external influence.

4.3.3.3 Self-Regulation Measures

Impulsivity (UPPS): Across all impulsivity facets, the Amoral Opportunistic Risk-Seeking and groups showed higher impulsivity than the Moral Risk-Averse group, particularly on urgency and lack of premeditation. Notably, the Opportunistic group's impulsivity was similar to the Amoral Risk-Seeking group, with significant differences mostly emerging in comparison to the Moral Risk-Averse group.

Risk Propensity (GRiPS): The Opportunistic Risk-Seeking group reported the highest risk propensity, followed closely by the Amoral Risk-Seeking group, both significantly higher than the Moral Risk-Averse group. The higher risk propensity by the Adaptive Risk-Seeking group indicates a willingness to engage in risk despite maintaining a higher moral identity.

Behavioural Activation and Inhibition (BAS/BIS): The Opportunistic Risk-Seeking group demonstrated stronger behavioural activation (higher fun seeking, reward responsiveness, and drive) than the Moral Risk-Averse group, with the Amoral Risk-Seeking group showing similar levels. In contrast, BIS scores were highest in the Moral group, indicating greater behavioural inhibition and sensitivity to potential negative outcomes.

Cognitive Ability and Demographics: The Opportunistic Risk-Seeking and Moral Risk-Averse groups performed significantly better than the Amoral group, suggesting that higher cognitive ability may be associated with more adaptive or prosocial profiles. No significant group differences were found for age or sex, indicating that the observed psychological distinctions were not attributable to demographic variance.

Table 4.3

ANOVA and pairwise comparisons between LPA Classes.

	Amoral Risk-Seeking (1)	Moral Risk Averse (2)	Opportunistic Risk-Seeking (3)	F	p	η^2	1 vs 2	1 vs 3	2 vs 3
CNI Parameters									
CAN C	.12 (.17)	.23 (.18)	.25 (.17)	16.18	<.01	.08	**<.01**	**<.01**	.66
CAN N	.27 (.27)	.48 (.23)	.42 (.24)	18.40	<.01	.09	**<.01**	**<.01**	.13
CAN A	.46 (.10)	.48 (.07)	.50 (.08)	5.42	.01	.03	.17	**<.01**	.30
Moral Identity									
MI Internalisation	5.18 (1.05)	6.32 (.83)	6.25 (.66)	56.73	<.01	.24	**<.01**	**<.01**	.76
MI Symbolisation	3.32 (1.22)	3.47 (1.39)	3.47 (1.41)	.39	.68	.00	.73	.73	1.00
Short Dark Triad									
SDT Narcissism	3.06 (.48)	2.53 (.47)	2.96 (.55)	36.29	<.01	.17	**<.01**	.37	**<.01**
SDT Machiavellianism	3.67 (.53)	2.44 (.58)	2.94 (.51)	126.40	<.01	.41	**<.01**	**<.01**	**<.01**
SDT Psychopathy	2.80 (.44)	1.78 (.39)	2.32 (.37)	175.14	<.01	.50	**<.01**	**<.01**	**<.01**
Levenson Psychopathy									
Primary Psychopathy	2.50 (.27)	1.55 (.35)	1.84 (.32)	219.26	<.01	.55	**<.01**	**<.01**	**<.01**
Secondary Psychopathy	2.54 (.36)	2.02 (.44)	2.50 (.46)	56.04	<.01	.24	**<.01**	.84	**<.01**
Amorality	2.91 (.48)	1.79 (.30)	2.28 (.33)	246.41	<.01	.58	**<.01**	**<.01**	**<.01**
Psychological Reactance	3.24 (.43)	2.51 (.48)	2.96 (.48)	65.15	<.01	.27	**<.01**	**<.01**	**<.01**
UPPS Impulsivity									
Negative Urgency	2.62 (.65)	2.14 (.57)	2.66 (.61)	29.06	<.01	.14	**<.01**	.87	**<.01**
Positive Urgency	2.34 (.55)	1.70 (.44)	2.40 (.55)	72.41	<.01	.29	**<.01**	.67	**<.01**
Lack of Perseverance	1.98 (.54)	1.84 (.47)	2.10 (.56)	8.68	<.01	.05	.16	.26	**<.01**
Lack of Premeditation	1.89 (.60)	1.68 (.49)	2.12 (.57)	23.31	<.01	.12	**.02**	**<.01**	**<.01**
Sensation Seeking	2.56 (.60)	2.39 (.63)	2.92 (.59)	27.90	<.01	.14	.12	**<.01**	**<.01**
GRiPS	2.92 (.85)	2.33 (.65)	3.15 (.62)	50.51	<.01	.22	**<.01**	.05	**<.01**
Fun Seeking	2.92 (.57)	2.88 (.49)	3.31 (.42)	32.03	<.01	.15	.83	**<.01**	**<.01**
Reward Responsiveness	3.24 (.57)	3.41 (.45)	3.47 (.39)	6.43	<.01	.03	**.03**	**<.01**	.60

Drive	2.77 (.57)	2.47 (.52)	2.69 (.55)	9.10	<.01	.05	**<.01**	.55	**<.01**
BIS	2.95 (.58)	3.24 (.45)	3.17 (.50)	8.43	<.01	.05	**<.01**	**<.01**	.53
Esoteric Analogies Test	.59 (.16)	.65 (.16)	.66 (.14)	6.78	<.01	.04	**.02**	**<.01**	.72
Demographics									
Age	20.04 (1.59)	20.21 (2.37)	20.41 (3.82)	.45	.64	.00	.91	.65	.85
Sex (M/F)	28/53	29/102	45/103	2.18	.12	.01	.15	.80	.31

Note. Means (SD) are presented for each class. Post-hoc pairwise comparisons were conducted with Scheffe correction. P-values for significant pair-wise comparisons are in **bold.** GRiPS = General Risk Propensity Scale.

4.4 Discussion

4.4.1 Aims 1 & 2: Theoretical Implications of Profile Differentiation

The primary aim of this study was to uncover distinct subgroups of individuals based on patterns in moral decision-making, moral identity, dark personality traits, and self-regulation using Latent Profile Analysis (LPA). In addition to replicating previous findings (Ni et al., 2025), the present study also aims to generalise the relationships to a no-threat context.

A parsimonious two-class solution, comprising Moral Risk-Averse and Amoral Risk-Seeking groups, was consistent with the hypothesised positive association between morality and self-regulatory capacities. However, closer inspection of the fit indices and the substantive characteristics of the profiles indicated that a three-class solution provided a superior and more theoretically meaningful account of the data. This pattern aligns with the three-class solution identified in prior work (Ni et al., 2025), thereby supporting the replicability of these moral–risk profiles across samples.

The three-class solution—comprising Amoral Risk-Seeking, Moral Risk-Averse, and Opportunistic Risk-Seeking—provides robust support for the utility of a person-centred approach to understand the interaction between these psychological constructs. Within both two-class and three-class models, the Moral Risk-Averse group displayed heightened sensitivity to consequences and norms (C and N parameters), elevated internalisation of

moral identity, and low levels of dark traits and self-regulation deficits. In contrast, the Amoral Risk-Seeking group exhibited the opposite pattern, reflecting the established connection between psychopathy, reduced norm adherence, and elevated risk-taking. (Levenson et al., 1995; Paulhus & Jones, 2015).

Overall, the observed associations—higher C and N parameters and moral identity internalisation, and lower dark traits correspond with greater self-regulation (i.e., lower risk propensity, impulsivity, and BAS, and higher BIS)—align with theories emphasising self-interest in moral behaviours and offer empirical support for the cooperative morality framework (Curry, 2016).

4.4.2 Complexity in the Opportunistic Risk-Seeking Profile

A central contribution of this study is the replication of an *Opportunistic Risk-Seeking* profile, which complements the Moral Risk-Seeking and Amoral Risk-Averse groups previously reported by Miguel et al. (2021). This three-class solution aligns with Ni et al.'s (2025) findings in several important respects.

First, the moral characteristics that both promote and undermine cooperative morality (i.e., prosocial moral traits versus dark traits) appear to operate largely independently. Despite elevated impulsivity and risk propensity, individuals in the Opportunistic Risk-Seeking group retained heightened sensitivity to consequences and norms, alongside only intermediate levels of dark traits. This pattern underscores the necessity of considering a broader spectrum of moral and amoral factors in future research on moral decision-making.

Second, the third group identified in both studies was characterised by high risk propensity and moderate levels of dark traits, situating them between the Amoral Risk-Seeking and Moral Risk-Averse groups. Furthermore, the replication of this group was obtained under different study contexts: Ni et al. (2025) conducted their research during the

COVID-19 pandemic, where threats to self-interest—including health, autonomy, and financial security—were pronounced. In that setting, fear appeared to motivate cooperative behaviours among members of this class. By contrast, the present study was conducted in a laboratory environment absent from such acute threats. Under these conditions, Opportunistic Risk-Seeking individuals appeared to acknowledge moral principles but adhered to them less rigidly than the Moral Risk-Averse group. Instead, they seemed to adopt a more situational strategy, acting in line with moral norms when doing so was advantageous (e.g., complying with pandemic restrictions to minimise personal health risks).

Consistent with this interpretation of the Opportunistic Risk-Seeking group being more situationally driven is that the only scales on which they were significantly higher or lower than both other groups were fun seeking, Lack of Premeditation, and Sensation Seeking. Essentially these are all indictors of spontaneity which by its nature is situation responsive.

Importantly, this opportunistic pattern should not be interpreted as inherently adaptive. Members of this group also displayed elevated narcissism and secondary psychopathy, traits associated with manipulative, callous, impulsive, and emotionally unstable tendencies (Jones & Paulhus, 2014; Levenson et al., 1995). Such characteristics may predispose individuals toward maladaptive outcomes, including delinquent behaviour or reputational damage, that ultimately undermine long-term self-interest. Nonetheless, as the present study did not assess behavioural outcomes directly, this interpretation remains speculative and warrants further empirical investigation.

Taken together, these findings replicate and extend those of Ni et al. (2025), demonstrating that the interplay between self-regulation and moral decision-making generalises across both threat-laden and non-threat contexts.

4.4.3 Implications for Intervention and Policy

The findings of this study offer concrete implications for developing psychological and organisational interventions. The effectiveness of strategies may depend on target profiles. For instance, interventions promoting emotional regulation and impulse control and construct more adaptive incentive structures could be more beneficial for promoting moral behaviours for the Opportunistic Risk-Seeking group. In contrast, the Amoral Risk-Seeking and Moral Risk-Averse groups may act more consistently in accordance with their levels of self-regulation capabilities and morality. Identifying and selecting the appropriate individuals may prove to be a more efficient strategy for institutions and organisations. On a broader scale, these insights can inform institutional policies that aim to foster ethical cultures by accounting for the diversity of psychological dispositions influencing moral behaviour.

4.4.4 Limitations and Directions for Future Research

Despite the promising insights offered by this research, several limitations must be acknowledged. First, the cross-sectional nature of the study precludes any inference about causality or developmental trajectories. Longitudinal designs are needed to explore how moral and self-regulatory traits co-evolve. Second, the reliance on self-report measures may introduce bias due to social desirability or self-perception inaccuracies. Future research could incorporate behavioural or neurophysiological assessments to enhance ecological validity. Third, although the sample size was adequate, it consisted solely of undergraduate psychology students, with an uneven representation of sexes in the sample (~72% female), which limits the generalisability of the findings. Such a limitation might also be reflected in the differences in class proportions when compared to Ni et al.'s (2025) study, which consists of the general adult population in Australia. Nevertheless, the identification of three distinct LPA groups across markedly different samples provides evidence for the robustness and

replicability of these profiles within the broader population. Lastly, the HEXACO factors displayed low reliability. Future studies may benefit from more robust personality assessments.

4.4.5 Conclusion

This study advances our understanding of the interplay between moral decision-making, dark personality traits, and self-regulatory capacities by identifying psychologically meaningful subgroups through LPA. The differentiation between profiles, particularly the identification of the Adaptive Risk-Seeking group, underscores the complex, multifaceted nature of moral psychology. These findings contribute to a richer theoretical framework and support the development of tailored interventions that consider the moral and self-regulatory heterogeneity within individuals.

Chapter 5 Discussion

5.1 General Discussion

This thesis comprises a systematic literature review and two empirical investigations designed to advance understanding of individual differences in moral decision-making. The literature review (Chapter 2) critically evaluated existing measures and underlying theories, identifying a notable absence of a unified conceptual framework and limited psychometric development in the study of moral decision-making as an individual differences construct. Building on this foundation, the two subsequent empirical studies examined the relationship between moral decision-making and risk aversion across contexts characterised by the presence or absence of threat. Findings from these studies highlighted complex associations between morality and risk aversion that are difficult to summarise by traditional multivariate analytics. This research also demonstrated that fear functions as a key moderating variable when self-interest is perceived to be under threat. Collectively, these contributions represent novel insights into the interplay between morality, risk propensity, and situational influences, providing a foundation for both theoretical refinement and applied approaches to understanding moral behaviour.

This chapter synthesises the central contributions of the thesis in relation to the three aims outlined in Chapter 1. It also considers the broader strengths and limitations of the research and discusses the theoretical and practical implications of the findings for future psychological research and applications beyond the academic context.

5.2 Contribution to Existing Literature

Within the cooperative morality framework (Curry, 2016), morality serves as an adaptive solution to balance the conflict between personal gains and collective interests. Yet, few studies have investigated *the role of risk propensity* that could drive individuals into self-

interested, amoral behaviours. To address this gap, the research described in this thesis aimed to examine the relationship between risk aversion and moral decision-making, starting with a systematic literature review examining the quality of current psychometric tools and theories of moral decision-making, followed by two empirical studies. The following sections outline the major novel contributions and findings surrounding each aim.

5.2.1 Aim 1: Systematically investigate and appraise current measures of high-stakes moral decision-making

The first major contribution of this thesis was the systematic review and critical appraisal of available measures of high-stakes moral decision-making (Chapter 2). To our knowledge, this review is the first to systematically identify, evaluate, and compare instruments designed to capture individual differences in life-and-death moral decisions, using the PRISMA framework and a structured quality appraisal tool (Terwee et al., 2007). Across 20 studies, we found that most measures fell into two broad categories: moral dilemma paradigms and self-report questionnaires. While certain instruments, such as the Defining Issues Test and the Oxford Utilitarian Scale, demonstrated stronger psychometric properties than others, no measure could be considered a "gold standard" due to their narrow theoretical scope, limited construct validity, and inconsistent evidence for temporal stability. A key finding was the considerable heterogeneity across measures in terms of theoretical grounding, operationalisation of moral decision-making, and quality of psychometric evidence. This fragmentation highlights a persistent gap between theoretical frameworks and empirical measurements in the field of moral decision-making. The absence of robust and validated instruments impedes the ability to reliably identify individual differences in moral decision-making and undermines both theoretical progress and applied practices in high-stakes domains such as medicine, military, and law. The review therefore makes an important contribution by consolidating a scattered literature, exposing significant shortcomings in

content validity, construct clarity, and cross-validation, and establishing the urgent need for a unified conceptual framework to guide future measure development.

Aim 2: Within the cooperative morality framework, examine the relationship between morality and risk propensity.

The second major contribution of this thesis was the empirical examination of the relationship between morality and risk propensity within the cooperative morality framework under real-world conditions of threat and uncertainty (Chapter 3). By situating the research during the self-regulated stage of the COVID-19 pandemic, Study 2 offered ecologically valid insights into how morality and risk interact when individuals must balance self-interest with collective welfare. A novel finding is that Confirmatory Factor Analyses revealed two positive morality factors (Binding and Individualising) and one negative Dark Morality factor, alongside a general risk factor, providing evidence for theoretically coherent latent structures that unify the theory of these complex constructs. While Study 3 (Chapter 4) did not employ factor analyses, the patterns of associations between clusters of moral and risk variables are consistent with those observed in Study 2.

Crucially, while positive and negative moral factors theoretically pose seemingly opposing forces onto moral decision-making (i.e., promoting vs undermining cooperation), our results revealed that these factors were independent. Furthermore, risk propensity appeared to have a stronger association with negative morality than positive morality. Previous studies that investigated the relationship between moral decision-making and risk propensity often relied on moral transgressions in the form of actual behaviours or lab tasks (Cameron, 2009; Hsu et al., 2009; Prescott, 2012). The findings presented in this thesis provide empirical support and theoretical grounding for this relationship, highlighting the

stronger effect of negative morality on moral transgressions and underscoring the need to capture both positive and negative aspects of morality in future studies.

5.2.2 Aim 3: Identify distinct subgroups of individuals based on morality, risk propensity, and study-specific variables under different contexts (threat vs no threat) and the role of fear under threat.

The third major novel contribution of this thesis was the identification of distinct psychological subgroups based on morality, risk propensity, and study-specific variables across two contexts. In Study 2 (Chapter 3), conducted under the COVID-19 threat, Latent Profile Analysis revealed three classes: an Amoral Risk-Seeking group (high Dark Morality and risk, low compliance), a Moral Risk-Averse group (low Dark Morality and risk, high compliance), and an Anxious Compliant group (elevated Dark Morality and risk, but high Individualising Morality and COVID-related fears). These findings suggest that fear can override moral predispositions by motivating compliance regardless of underlying moral or risk orientations. This integration of morality, risk propensity, and fear highlights the role of self-interests in moral decision-making as posited by the Morality-as-Cooperation theory (Curry, 2016).

In Study 3, situated in a no-threat environment, replicating the results of Study 2, a broadly consistent two-group distinction emerged again between Moral Risk-Averse and Amoral Risk-Seeking individuals, reaffirming the robustness of the theoretical link between morality and risk propensity. However, without the presence of the explicit threat, Study 3 further uncovered an Opportunistic Risk-Seeking group who combined elevated impulsivity and risk-taking with higher levels of moral sensitivity. The replication of the Moral Risk-Averse and Amoral Risk-Seeking groups across both studies underscores the stability of these profiles. In contrast, the emergence of the Anxious Compliant group in a threat context and

the Opportunistic Risk-Seeking group in a no-threat context highlights the role of situational pressures in shaping moral profiles. Together, these findings advance the cooperative morality framework by demonstrating both the consistency of core moral–risk orientations and the situational contingencies that give rise to more context-specific profiles.

5.3 General Strengths

5.3.1 Systematic Investigation of Moral Decision-Making Measurement

A key strength of this thesis is the systematic investigation of existing measures of high-stakes moral decision-making against a quality appraisal tool (Terwee et al., 2007). Through a comprehensive first systematic literature review, this research critically appraised the conceptual clarity, psychometric properties, and methodological rigour of available instruments. Study 1 is novel within the moral decision-making literature because it adopts an individual differences approach, which advances knowledge and identifies the direction for future research in both theoretical (e.g., how and why people differ morally) and practical (e.g., predicting and intervening moral behaviours) aspects.

5.3.2 Adoption and Expansion of the Cooperative Morality Framework

Another notable strength lies in the theoretical advancement of the cooperative morality framework. The Morality-as-Cooperation theory posits morality as an adaptive strategy within the framework of evolutionary morality and game theory (Curry, 2016). Therefore, the cooperative morality framework allows morality to interact with fundamental self-regulatory processes, such as risk-taking, impulsivity, and fear, as well as with broader personality traits that influence how individuals balance self-interest against collective welfare. This framework goes beyond defining morality as a matter of right versus wrong based on a code, judgment, or norm (Gert & Gert, 2025), positioning it instead as a dynamic system of strategies that weigh personal costs and social benefits. In doing so, it incorporates

reasoning about utility and trade-offs, thereby enabling the generation of testable hypotheses that can be evaluated against related constructs of self-interest, decision-making, and real-world behaviour.

This thesis also extended the scope of cooperative morality by integrating both prosocial and counter-cooperative dispositions, thereby capturing a broader spectrum of individual differences in moral orientation. Specifically, the identification of Binding, Individualising, and Dark Morality factors, alongside risk propensity and fear, allowed for a more comprehensive account of the psychological dimensions that shape moral decision-making. By expanding the conceptual boundaries of cooperative morality, the thesis not only refined the issues with the measurement of moral dispositions but also generated insights into how these constructs interact with risk-taking and situational influences.

5.3.3 Replication of findings under Threat and No-Threat Contexts across diverse samples

A further strength of this thesis is the replication and extension of findings across contexts characterised by varying levels of threat. Study 2, conducted during the COVID-19 pandemic, provided ecologically valid evidence of how morality, risk, and fear jointly shaped compliance behaviours in a high-stakes environment. Study 3, conducted in the absence of imminent threat, replicated core findings regarding the distinction between Moral Risk-Averse and Amoral Risk-Seeking groups. The two studies also revealed context-specific subgroups such as the Anxious Compliant (under threat) and Opportunistic Risk-Seeking (under no threat). Furthermore, the two studies were conducted with diverse samples: Study 2 drew on a sample broadly representative of the Australian adult population, whereas Study 3 was based on first- and second-year undergraduate psychology students. These consistencies and differences demonstrate both the robustness of core moral–risk orientations and inter-

individual differences in the flexibility of cooperative morality in response to situational conditions. Replicating results across distinct contexts and populations strengthens the generalisability of the findings and underscores the importance of studying moral decision-making not only in laboratory paradigms but also within real-world ecological settings.

5.4 General Limitations

5.4.1 Lack of Validating Behaviours Under No-Threat Context

Study 3 did not include measures of actual moral behaviours. Although the latent profiles it identified mirrored those observed in Study 2, the absence of behavioural validation constrains interpretation, particularly with respect to the Opportunistic Risk-Seeking group. It remains unclear whether members of this group are proactively adaptive—strategically balancing risk-taking with moral considerations—or whether they are passive and reactive, displaying moral sensitivity only when situational cues make it salient. Without behavioural data, inferences about the real-world implications of this subgroup remain tentative. This research, however, paves the way to future research which should incorporate ecologically valid behavioural measures in no-threat contexts to more accurately assess the consistency and practical significance of these profiles.

5.4.2 Sample Characteristics and Generalisability

A further limitation of this thesis concerns the sample composition of Study 3, which consisted solely of undergraduate students and was predominantly female. This demographic homogeneity contrasts with the more diverse adult sample recruited for Study 2 and raises questions about the comparability of findings across studies. In particular, differences in age, education, and gender balance may confound interpretation of the third groups identified in each study—Anxious Compliant under threat and Opportunistic Risk-Seeking under no threat—as well as the differences in LPA class proportions between studies. It is therefore

unclear to what extent these differences reflect genuine situational influences (threat vs. no threat) or artefacts of sample composition. Future research should seek to replicate these profiles across more diverse and representative populations to determine whether the observed group structures and proportions hold consistently across demographic contexts.

5.5 Implications and Future Directions

The results, strengths and limitations described in this thesis highlight several key implications and suggestions for future research. These are outlined below.

5.5.1.1 Selection and Intervention

A critical implication of the present findings concerns the potential use of moral–risk profiles in contexts where decision-making under uncertainty carries significant social consequences, such as healthcare, the military, law enforcement, and high-stakes organisational leadership. Identifying individuals with stable Amoral Risk-Seeking or Moral Risk-Averse orientations could assist in selection processes, ensuring that those in positions of responsibility are more likely to prioritise cooperative and prosocial outcomes and to mitigate a potential internal threat of hiring bad actors. At the same time, the existence of situationally sensitive groups, such as the Anxious Compliant or Opportunistic Risk-Seeking profiles, suggests that interventions could be tailored to strengthen *adaptive* decision-making. For example, training that fosters self-regulation, perspective-taking, or fear management may help redirect tendencies that undermine cooperation. These findings, therefore, highlight not only the importance of identifying enduring moral-risk dispositions but also the promise of targeted interventions to shape behaviour in individuals whose moral decision-making is more situationally malleable.

5.5.2 The Role of Incentive Structure in Moral Decision-Making

The cooperative morality framework underscores that moral decision-making often involves weighing short-term self-interest against longer-term cooperative benefits. The findings from this thesis suggest that the structure of incentives and situational pressures plays a critical role in shaping whether individuals act in moral or self-serving ways. Under threat (e.g., COVID-19), fear aligned self-interest with prosocial compliance, reducing differences between groups. Future research should therefore examine how variations in incentive structures—such as punishment, reputational concerns, or reward systems—can reinforce cooperative behaviours or exacerbate self-serving tendencies. Understanding these dynamics has direct implications for designing policies and environments that foster moral behaviour, from public health campaigns to workplace ethics programs.

5.5.3 Personality States and Morl-Risk Profiles

The findings of this thesis highlight the need to consider personality states in addition to traits when examining moral–risk profiles. While the replication of Moral Risk-Averse and Amoral Risk-Seeking groups across Studies 2 and 3 suggests that stable, trait-like dispositions underpin core moral orientations, the emergence of the Anxious Compliant group under threat and the Opportunistic Risk-Seeking group under no threat indicates that situational states also play a critical role. Contemporary theories such as Whole Trait Theory conceptualise traits as density distributions of states over time (Fleeson & Jayawickreme, 2015; Jayawickreme et al., 2019; Bader et al., 2025). Applying these insights, it is plausible that the third groups identified in Studies 2 and 3 represent larger state-dependent deviations from broader trait orientations, arising from context-specific influences such as fear, incentives, or environmental affordances. Future research should therefore employ longitudinal and experience-sampling designs to disentangle the relative contributions of

traits and states in moral decision-making. Clarifying the interplay of personality states and traits in moral–risk orientations will be critical for refining cooperative morality theory, enabling more precise predictions of when individuals act in line with stable moral tendencies versus when they shift flexibly in response to situational pressures.

5.6 Conclusion

This thesis advanced understanding of individual differences in high-stakes moral decision-making by systematically appraising existing measures, situating morality within the cooperative morality framework, and empirically examining its relationship with risk propensity, fear, and situational context. The systematic review offered the first comprehensive psychometric evaluation of high-stakes moral decision-making measures, revealing conceptual fragmentation and psychometric limitations that impede theoretical progress and practical application. Building on this foundation, Studies 2 and 3 expanded cooperative morality to encompass both prosocial and darker dispositions alongside risk and self-regulatory factors, demonstrating that moral decision-making reflects not only judgments of right and wrong but also consideration of utility and self-interest. Across contexts, the replication of Moral Risk-Averse and Amoral Risk-Seeking groups underscored robust underlying orientations, while the emergence of the Anxious Compliant profile under threat and the Opportunistic Risk-Seeking profile under no threat highlighted the situational flexibility of moral decision-making. These findings contribute theoretically by extending cooperative morality to account for counter-cooperative traits, methodologically by applying systematic measurement appraisal and person-centred analyses, and practically by informing selection, intervention, and policy design in high-stakes contexts. Taken together, this work highlights morality as a dynamic and adaptive strategy that balances self-interest with collective welfare, laying the groundwork for future research to clarify the stability and variability of moral orientations over time.

References

Abdellaoui, S., Lourel, M., Blatier, C., & Beauvois, J. L. (2016). Development and validation of a scale of social and moral judgments (ABB scale) and its use in prison settings. *European Review of Applied Psychology*, *66*(4), 171-180.

Ackerman, R., & Thompson, V. A. (2017). Meta-reasoning: Monitoring and control of thinking and reasoning. *Trends in cognitive sciences, 21*(8), 607-617.

Alwan, N. A., Burgess, R. A., Ashworth, S., Beale, R., Bhadelia, N., Bogaert, D., Dowd, J., Eckerle, I., Goldman, L. R., Deepti, G., Greenhalgh, T., Gurdasani, D., Hamdy, A., Hanage, W. P., Hodcroft, E. B., Hyde, Z., Kellam, P., Kelly-Irving, M., Krammer, F., Lipsitch, M., . . . Ziauddeen, H. (2020). Scientific consensus on the COVID-19 pandemic: we need to act now. *The Lancet, 396*(10260), e71-e72.

Aquino, K., & Reed, A. (2002). The Self-Importance of Moral Identity. *Journal of Personality and Social Psychology, 83*(6), 1423-1440.

Asao, K., & Buss, D. M. (2016). The tripartite theory of machiavellian morality: Judgment, influence, and conscience as distinct moral adaptations. *The Evolution of Morality*, 3-25.

Australian Government Department of Health. (2021, December 17). COVID-19 vaccination doses by age and sex. https://www.health.gov.au/resources/publications/covid-19-vaccine-rollout-update-17-december-2021

Australian Government Department of Health. (2022). *Coronavirus (COVID-19) at a glance - 10 January 2022*. Australian Government Department of Health. https://www.health.gov.au/resources/publications/coronavirus-covid-19-at-a-glance-10-january-2022?language=en.

Bader, M., Columbus, S., Zettler, I., & Mayer, A. (2025). Developing, evaluating, and interpreting personality state measures: A framework based on the revised latent state-trait theory. *European Journal of Personality, 39*(3), 408-427.

Blasi, A. (1990). Kohlberg's theory and moral motivation. New Directions for Child Development, 47, 51-57. https://doi.org/10.1002/cd.23219904706

Bor, A., Jørgensen, F., Lindholt, M. F., & Petersen, M. B. (2023). Moralizing the COVID-19 Pandemic: Self-Interest Predicts. *Political Psychology, 44*(2), 257-259.

Bore, M. R. (2001). *The psychology of morality: A Libertarian-Communitarian dimension and a dissonance model of moral decision making* (Doctoral dissertation, University of Newcastle).

Boyer, T. W. (2006). The development of risk-taking: A multi-perspective review. *Developmental Review, 26*(3), 291-345.

Brown, T. A. (2015). *Confirmatory factor analysis for applied research* (Second Edition ed.). New York: Guilford Publications.

Bucciarelli, M., Khemlani, S. & Johnson-Laird, P. N. (2008). The psychology of moral reasoning. Judgment and Decision Making, 3(2), 121-139.

Cameron, J. S. (2009). *Flexible ethics: Loss frames and unethical behavior.* Stanford University.

Carmona-Perera, M., Vilar-Lopez, R., Perez-Garcia, M. & Verdejo-Garcia, A. (2013). Using moral dilemmas to characterize social decision-making. Clinical Neuropsychiatry: Journal of Treatment Evaluation, 10(2), 95-101.

Carver, C. S., & White, T. L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: the BIS/BAS scales. *Journal of Personality and Social Psychology, 67*(2), 319.

Choi, Y. J., Han, H., Bankhead, M., & Thoma, S. J. (2020). Validity study using factor analyses on the Defining Issues Test-2 in undergraduate populations. *PloS one*, *15*(8), e0238110.

Choi, Y. J., Han, H., Dawson, K. J., Thoma, S. J., & Glenn, A. L. (2019). Measuring moral reasoning using moral dilemmas: evaluating reliability, validity, and differential item functioning of the behavioural defining issues test (bDIT). *European Journal of Developmental Psychology*, *16*(5), 622-631.

Christensen, J. F., & Gomila, A. (2012). Moral dilemmas in cognitive neuroscience of moral decision-making: A principled review. *Neuroscience & Biobehavioral Reviews*, *36*(4), 1249-1264.

Christensen, J. F., Flexas, A., Calabrese, M., Gut, N. K. & Gomila, A. (2014). Moral judgment reloaded: A moral dilemma validation study. *Frontiers in Psychology, 5*, https://doi.org/10.3389/fpsyg.2014.00607

Chu, D. K., Akl, E. A., Duda, S. S., Yaacoub, S., Schünemann, H. J., & COVID-19 Systematic Urgent Review Group. (2020). Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-CoV-2 and COVID-19: a systematic review and meta-analysis. *The Lancet, 395*(10242), 1973-1987.

Cohen, J. (1960). A coefficient of agreement for nominal scales. Educational and Psychological Measurement, 20, 37-46. https://doi.org/10.1177/001316446002000104

Conway, P., & Gawronski, B. (2013). Deontological and utilitarian inclinations in moral decision making: a process dissociation approach. *Journal of personality and social psychology, 104(2),* 216.

Curry, O. S. (2016). Morality as cooperation: A problem-centred approach. In T. K. Shackelford, & V. A. Weekes-Shackelford (Eds.), *The Evolution of Morality* (pp. 27-51).

Curry, O. S., Chesters, M. J., & Van Lissa, C. J. (2019). Mapping morality with a compass: Testing the theory of 'morality-as-cooperation'with a new questionnaire. *Journal of Research in Personality, 78*, 106-124.

Curry, O. S., Mullins, D. A., & Whitehouse, H. (2019). Is it good to cooperate? Testing the theory of morality-as-cooperation in 60 societies. *Current Anthropology, 60*(1), 47-69.

Cyders, M. A., Littlefield, A. K., Coffey, S., & Karyadi, K. A. (2014). Examination of a short English version of the UPPS-P Impulsive Behavior Scale. *Addictive Behaviors, 39*(9), 1372-1376.

Davison, M. L., & Robbins, S. (1978). The reliability and validity of objective indices of moral development. *Applied Psychological Measurement*, *2*(3), 391-403.

Donnellan, M. B., Oswald, F. L., Baird, B. M., & Lucas, R. E. (2006). The mini-IPIP scales: tiny-yet-effective measures of the Big Five factors of personality. *Psychological Assessment, 18*(2), 192.

Duntley, J., & Buss, D. M. (2004). The evolution of evil. In A. G. Miller, *The Social Psychology of Good and Evil* (pp. 102-123). New York: Guilford.

Efferson, L., Glenn, A., Remmel, R., & Iyer, R. (2017). The influence of gender on the relationship between psychopathy and five moral foundations. *Personality and Mental Health, 11*(4), 335-343.

Everett, J. (2013). The 12 item social and economic conservatism scale (SECS). *PloS One, 8*(12), e82131.

Fernández, R. S., Crivelli, L., Guimet, N. M., Allegri, R. F., & Pedreira, M. E. (2020). Psychological distress associated with COVID-19 quarantine: Latent profile analysis, outcome prediction and mediation analysis. *Journal of Affective Disorders, 277*, 75-84.

Fiske, A. P. (1991). *Structures of social life: The four elementary forms of human relations: Communal sharing, authority ranking, equality matching, market pricing*. Free Press.

Fiske, A. P. (1992). The four elementary forms of sociality: framework for a unified theory of social relations. *Psychological Review*, *99*(4), 689.

Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new area of cognitive–developmental inquiry. *American Psychologist*, *34*(10), 906.

Fleeson, W., & Jayawickreme, E. (2015). Whole trait theory. *Journal of Research in Personality, 56*, 82-92.

Fleischhut, N., Meder, B. & Gigerenzer, G. (2017). Moral hindsight. *Experimental Psychology, 64*, 110-123. https://doi.org/10.1027/1618-3169/a000353

Foot, P. (1967). The problem of abortion and the doctrine of the double effect. *Oxford review*, *5*.

Franks, A. S., & Scherr, K. C. (2015). Using moral foundations to predict voting behavior: Regression models from the 2012 US presidential election. *Analyses of Social Issues and Public Policy, 15*(1), 213-232.

Frey, R., Pedroni, A., Mata, R., Rieskamp, J., & Hertwig, R. (2017). Risk preference shares the psychometric structure of major psychological traits. *Science Advances, 3*(10), e1701381.

Frisell, T., Pawitan, Y., & Långström, N. (2012). Is the association between general cognitive ability and violent crime caused by family-level confounders? *PloS One, 7*(7), e41783.

Garrigan, B., Adlam, A. L., & Langdon, P. E. (2018). Moral decision-making and moral development: Toward an integrative framework. *Developmental review, 49*, 80-100.

Gawronski, B., Armstrong, J., Conway, P., Friesdorf, R. & Hutter, M. (2017). Consequences, norms, and generalized inaction in moral dilemmas: The CNI model of moral decision-making. *Journal of Personality and Social Psychology, 113*, 343-376. https://doi.org/10.1037/pspa0000086

Gawronski, B., Conway, P., Armstrong, J., Friesdorf, R., & Hütter, M. (2018). Effects of incidental emotions on moral dilemma judgments: An analysis using the CNI model. *Emotion, 18*(7), 989.

Gert, J., & Gert, B. (2025). The Definition of Morality. In E. N. Zalta, & U. Nodelman (Eds.), *The Stanford Encyclopedia of Philosophy* (Spring 2025 ed.). Metaphysics Research Lab, Stanford University. https://plato.stanford.edu/archives/spr2025/entries/morality-definition

Glenn, A. L., Iyer, R., Graham, J., Koleva, S., & Haidt, J. (2009). Are all types of morality compromised in psychopathy? *Journal of Personality Disorders, 23*(4), 384-398.

Gojković, V., Dostanić, J., & Đurić, V. (2019). The dark triad, amorality, and impulsivity. *Psihologija, 52*(1), 53-73.

Goodwin, G. P., Piazza, J. & Rozin, P. (2014). Moral character predominates in person perception and evaluation. *Journal of Personality and Social Psychology, 106*, 148-168. https://doi.org/10.1037/a0034726

Graham, J., Haidt, J., & Nosek, B. (2008). The Moral Foundation Questionnaire (Short Version). http://www.MoralFoundations.org

Graham, J., Nosek, B. A., Haidt, J., Iyer, R., Koleva, S., & Ditto, P. H. (2011). Mapping the moral domain. *Journal of Personality and Social Psychology, 101*(2), 366.

Gray, J. A. (1990). Brain systems that mediate both emotion and cognition. *Cognition & Emotion, 4*(3), 269-288.

Greene, J. D., Morelli, S. A., Lowenberg, K., Nystrom, L. E., & Cohen, J. D. (2008). Cognitive load selectively interferes with utilitarian moral judgment. *Cognition, 107*(3), 1144-1154.

Greene, J. D., Nystrom, L. E., Engell, A. D., Darley, J. M., & Cohen, J. D. (2004). The neural bases of cognitive conflict and control in moral judgment. *Neuron, 44*(2), 389-400.

Greene, J. D., Sommerville, R. B., Nystrom, L. E., Darley, J. M., & Cohen, J. D. (2001). An fMRI investigation of emotional engagement in moral judgment. *Science*, *293*(5537), 2105-2108.

Gullone, E. (2000). The development of normal fear: A century of research. *Clinical Psychology Review, 20*(4), 429-451.

Gustavson, K., Von Soest, T., Karevold, E., & Røysamb, E. (2012). Attrition and generalizability in longitudinal studies: findings from a 15-year population-based study and a Monte Carlo simulation study. . *BMC Public Health, 12*(1), 918.

Haidt, J. (2001). The emotional dog and its rational tail: a social intuitionist approach to moral judgment. *Psychological Review, 108*(4), 814.

Haidt, J. (2003). The moral emotions. In R. J. Davidson, K. R. Scherer, & H. H. Goldsmith (Eds.), *Handbook of affective sciences* (pp. 852–870). Oxford University Press.

Haidt, J., Bjorklund, F., & Murphy, S. (2000). Moral dumbfounding: When intuition finds no reason. *Unpublished manuscript, University of Virginia*.

Haidt, J. (2001). The emotional dog and its rational tail: A social intuitionist approach to moral judgment. *Psychological Review, 108*, 814-834. https://doi.org/10.1037/0033-295X.108.4.814

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate Data Analysis: A Global Perspective* (7th ed.). Upper Saddle River, New Jersey: Pearson Educational International.

Hare, R. D. (1991). *Manual for the Psychopathy Checklist Revised.* Toronto, Canada: Multi-Health Systems.

Harper, C. A., Satchell, L. P., Fido, D., & Latzman, R. D. (2021). Functional fear predicts public health compliance in the COVID-19 pandemic. *International Journal of Mental Health and Addiction, 19*(5), 1875-1888.

Harris, J. R. (1995). Where is the child's environment? A group socialization theory of development. *Psychological Review, 102,* 458-489. https://doi.org/10.1037/0033-295X.102.3.458

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). Most people are not WEIRD. *Nature*, *466*(7302), 29-29.

Highhouse, S., Wang, Y., & Zhang, D. C. (2022). Is risk propensity unique from the big five factors of personality? A meta-analytic investigation. *Journal of Research in Personality, 98*, 104206.

Hong, S. M., & Faedda, S. (1996). Refinement of the Hong psychological reactance scale. *Educational and Psychological Measurement, 56*(1), 173-182.

Hong, S. M., & Page, S. (1989). A psychological reactance scale: Development, factor structure and reliability. *Psychological Reports, 64*(3), 1323-1326.

Hsu, Y. H., Fang, W., & Lee, Y. (2009). Ethically questionable behavior in sales representatives–An example from the Taiwanese pharmaceutical industry. *Journal of Business Ethics, 88*, 155-166.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1-55.

Huang, Y., Luan, S., Wu, B., Li, Y., Wu, J., Chen, W., & Hertwig, R. (2024). Impulsivity is a stable, measurable, and predictive psychological trait. *Proceedings of the National Academy of Sciences, 121*(24), e2321758121.

IBM Corp. (2021). IBM SPSS Statistics for Windows, Version 28.0. Armonk, NY: IBM Corp.

Ísaksson, A. (1979). Kohlberg's theory of moral development and its relevance to education. *Scandinavian Journal of Educational Research*, *23*(2), 47-63.

Jacoby, L. L. (1991). A process dissociation framework: Separating automatic from intentional uses of memory. *Journal of memory and language*, *30*(5), 513-541.

Jang, E. (2020). Validation of the Korean version of the Moral Judgment Scale: A process dissociation approach to moral dilemmas. *Heliyon*, *6*(11), e05518.

Jayawickreme, E., Zachry, C. E., & Fleeson, W. (2019). Whole trait theory: An integrative approach to examining personality structure and process. *Personality and Individual Differences, 136*, 2-11.

John, O. P., & Srivastava, S. (1999). The Big-Five trait taxonomy: History, measurement, and theoretical perspectives. In J. OP, S. S, & J. OP (Ed.), *Handbook of Personality: Theory and Research* (pp. 102-138). Pervin , LA: Guildford Press.

Jones, D. N., & Paulhus, D. L. (2014). Introducing the short dark triad (SD3) a brief measure of dark personality traits. *Assessment, 21*(1), 28-41.

Jørgensen, F., Bor, A., & Petersen, M. B. (2021). Compliance without fear: Individual-level protective behaviour during the first wave of the COVID-19 pandemic. *British Journal of Health Psychology, 26*(2), 679-696.

Kahane, G. (2015). Side-tracked by trolleys: Why sacrificial moral dilemmas tell us little (or nothing) about utilitarian judgment. *Social neuroscience*, *10*(5), 551-560.

Kahane, G., Everett, J. A., Earp, B. D., Caviola, L., Faber, N. S., Crockett, M. J., & Savulescu, J. (2018). Beyond sacrificial harm: A two-dimensional model of utilitarian psychology. *Psychological Review*, *125*(2), 131-164.

Karademas, E. C. (2007). Positive and negative aspects of well-being: Common and specific predictors. *Personality and Individual Differences, 43*(2), 277-287.

Kemmelmeier, M. (2008). Is there a relationship between political orientation and cognitive ability? A test of three hypotheses in two studies. *Personality and Individual Differences, 45*(8), 767-772.

Kimhi, S. (2014). Moral dilemma in the war against terror: Political attitudes and regular versus reserve military service. *Ethics & Behavior*, *24*(1), 1-15.

Kleitman, S., Fullerton, D. J., Law, M. K., Blanchard, M. B., Campbell, R., Tait, M., Schulz, J., Lee, J., Stankov, L., & King, M. T. (2023). The Psychology of COVID-19 Booster Hesitancy, Acceptance and Resistance in Australia. *Vaccines, 11*(5), 907.

Kleitman, S., Fullerton, D. J., Zhang, L. M., Blanchard, M. D., Lee, J., Stankov, L., & Thompson, V. (2021). To comply or not comply? A latent profile analysis of behaviours and attitudes during the COVID-19 pandemic. *PloS One, 16*(7). https://doi.org/e0255268

Kohlberg L. (1984). *The Psychology of Moral Development*. San Francisco, CA: Harper & Row.

Körner, A., Deutsch, R., & Gawronski, B. (2020). Using the CNI model to investigate individual differences in moral dilemma judgments. *Personality and Social Psychology Bulletin, 46*(9), 1392-1407.

Kristman, V., Manno, M., & Côté, P. (2004). Loss to follow-up in cohort studies: how much is too much? *European Journal of Epidemiology, 19*(8), 751-760.

Kuylen, M. N., Kim, S. Y., Keene, A. R., & Owen, G. S. (2021). Should age matter in COVID-19 triage? A deliberative study. *Journal of Medical Ethics*, *47*(5), 291-295.

Lapsley, D. K. (1992). *Moral psychology after Kohlberg*. In Invited address given at the meeting of the Midwestern psychological association, Chicago, IL.

Lee, K., & Ashton, M. C. (2014). The dark triad, the big five, and the HEXACO model. *Personality and Individual Differences, 67*, 2-5.

Levenson, M. R., Kiehl, K. A., & Fitzpatrick, C. M. (1995). Assessing psychopathic attributes in a noninstitutionalized population. *Journal of Personality and Social Psychology, 68*(1), 151.

Lewis, G. J., & Bates, T. C. (2011). From left to right: How the personality system allows basic traits to influence politics via characteristic moral adaptations. *British Journal of Psychology, 102*(3), 546-558.

Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P. A., et al. (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. *PLoS Med.* 6:e1000100. doi: 10.1371/journal.pmed.1000100

Lindström, B. R., & Bohlin, G. (2012). Threat-relevance impairs executive functions: negative impact on working memory and response inhibition. *Emotion, 12*(2), 384.

Loewenstein, G., & Carbone, E. (2024). Self-control≠ temporal discounting. *Current Opinion in Psychology*, 101924.

Lotto, L., Manfrinati, A., & Sarlo, M. (2014). A new set of moral dilemmas: Norms for moral acceptability, decision times, and emotional salience. *Journal of Behavioral Decision Making*, *27*(1), 57-65.

Lynam, D. R., Smith, G. T., Whiteside, S. P., & Cyders, M. A. (2006). *The UPPS-P: Assessing five personality pathways to impulsive behavior* (Vol. 10). West Lafayette: Purdue University.

Mak, K. K. L., Kleitman, S. & Abbott, M. J. (2019). Impostor phenomenon measurement scales: A systematic review. Frontiers in Psychology, 10, https://doi.org/10.3389/fpsyg.2019.00671

Malka, A., Osborne, D., Soto, C. J., Greaves, L. M., Sibley, C. G., & Lelkes, Y. (2016). Binding moral foundations and the narrowing of ideological conflict to the traditional morality domain. *Personality and Social Psychology Bulletin, 42*(9), 1243-1257.

Malti, T., & Krettenauer, T. (2013). The relation of moral emotion attributions to prosocial and antisocial behavior: A meta-analysis. *Child development*, *84*(2), 397-412.

Martin, R. M, Shafto, M. & Vandeinse, W. (1977). The reliability, validity, and design of the Defining Issues Test. Developmental Psychology, 13, 460-468. https://doi.org/10.1037/0012-1649.13.5.460

Marti-Vilar, M., Escrig-Espuig, J. M. & Merino-Soto, C. (2021). A systematic review of moral reasoning measures. *Current Psychology: A Journal for Diverse Perspectives on Diverse Psychological Issues*, No Pagination Specified. https://doi.org/10.1007/s12144-021-01519-8

Mathes, E. W. (2021). An evolutionary perspective on Kohlberg's theory of moral development. *Current Psychology*, *40*(8), 3908-3921.

Mayhew, M. J., Pascarella, E. T., Trolian, T., & Selznick, B. (2015). Measurements matter: Taking the DIT-2 multiple times and college students' moral reasoning development. *Research in Higher Education*, *56*(4), 378-396.

Michels, M. (2022). General Intelligence and the Dark Triad. *Journal of Individual Differences, 43*(1), 35-46.

Miguel, F. K., Machado, G. M., Pianowski, G., & de Francisco Carvalho, L. (2021). Compliance with containment measures to the COVID-19 pandemic over time: Do antisocial traits matter? *Personality and individual differences, 168*, 110346.

Miller, J. D., Gaughan, E. T., & Pryor, L. R. (2008). The Levenson Self-Report Psychopathy Scale: An examination of the personality traits and disorders associated with the LSRP factors. *Assessment, 15*(4), 450-463.

Mitchell, C. P. (2000). Investigating the nature and validity of DIT2 using four validity criteria. *Dissertation Abstracts International: Section B: The Sciences and Engineering, 61*(5-B), 2813.

Moshagen, M., Hilbig, B. E., & Zettler, I. (2018). The dark core of personality. *Psychological Review, 125*(5), 656.

Ni, B., Burns, B., & Kleitman, S. (2025). Cooperation, Different Faces of Morality, and Their Links to Risk, Fear, and Personality During a Crisis. *Personaltiy and Individual Differences, 247,* 113426.

Paulhus, D. L., & Jones, D. N. (2015). Measures of dark personalities. In *Measures of personality and social psychological constructs* (pp. 562-594). Academic Press.

Petersen, M. B., O. M., & Arceneaux, K. (2023). The "need for chaos" and motivations to share hostile political rumors. *American Political Science Review, 117*(4), 1486-1505.

Pizarro, D. A. & Tannenbaum, D. (2012). Bringing character back: How the motivation to evaluate character influences judgments of moral blame. Mikulincer, M. [Ed], Shaver, P. R. [Ed]. *The social psychology of morality: Exploring the causes of good and evil*. Washington, DC, US: American Psychological Association, US; pp. 91-108. https://doi.org/10.1037/13091-005.

Prescott, R. E. (2012). *Applying prospect theory to moral decision-making: The heuristic biases of moral decision-making under risk.* Doctoral dissertation, Walden University.

R Core Team. (2021). R: A Language and Environment for Statistical Computing. R Foundation for Statistical Computing, Vienna, Austria. https://www.R-project.org/

Rest, J. (1974). *Manual for the Defining Issues Test: An objective test of moral judgment development.* University of Minnesota.

Rest, J. R, Narvaez, D., Thoma, S. J. & Bebeau, M. J. (1999). DIT2: Devising and testing a revised instrument of moral judgment. *Journal of Educational Psychology, 91*, 644-659. https://doi.org/10.1037/0022-0663.91.4.644

Richardson, H. S. (2018, August 27). *Moral reasoning*. Stanford Encyclopedia of Philosophy. Retrieved February 24, 2022, from https://plato.stanford.edu/entries/reasoning-moral/#PhilImpoMoraReas

Rosenberg, B. D., & Siegel, J. T. (2018). A 50-year review of psychological reactance theory: Do not read this article. *Motivation Science, 4*(4), 281.

Rosenberg, J. M., Beymer, P. N., Anderson, D. J., Van Lissa, C. J., & Schmidt, J. A. (2019). tidyLPA: An R package to easily carry out latent profile analysis (LPA) using open-source or commercial software. *Journal of Open Source Software, 3*(30), 978.

Rosenfeld, D. L., & Tomiyama, A. J. (2022). Moral judgments of COVID-19 social distancing violations: The roles of perceived harm and impurity. *Personality and Social Psychology Bulletin, 48*(5), 766-781.

Rustichini, A., DeYoung, C. G., Anderson, J. E., & Burks, S. V. (2016). Toward the integration of personality theory and decision theory in explaining economic

behavior: An experimental investigation. *Journal of Behavioral and Experimental Economics, 64*, 122-137.

Shen, L., & Dillard, J. P. (2005). Psychometric properties of the Hong psychological reactance scale. *Journal of Personality Assessment, 85*(1), 74-81.

Smetana, J. G. (2006). Social-cognitive domain theory: Consistencies and variations in children's moral and social judgments. Killen, Melanie [Ed], Smetana, Judith G [Ed]. *Handbook of moral development.* Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers, US; pp. 119-153.

Spurk, D., Hirschi, A., Wang, M., Valero, D., & Kauffeld, S. (2020). Latent profile analysis: A review and "how to" guide of its application within vocational behavior research. *Journal of Vocational Behavior, 120*(103445).

Stankov, L. (2009). Conservatism and cognitive ability. *Intelligence, 37*(3), 294-304.

Stankov, L., & Knezevic, G. (2005). Amoral social attitudes and value systems among Serbs and Australians. *Australian Journal of Psychology, 57*(2), 115-128.

Storbeck, J. S., & Wylie, J. (2024). Sadness and fear, but not happiness, motivate inhibitory behaviour: the influence of discrete emotions on the executive function of inhibition. *Cognition and Emotion*, 1-20.

Talbot, J. (2021). 'We are not going back to shutting down peoples' lives' says the Prime Minister amid record COVID-19 cases across Australia. *Sky News*.

Tamul, D., Elson, M., Ivory, J. D., Hotter, J. C., Lanier, M., Wolf, J., & Martinez-Carrillo, N. I. (2020). *Moral foundations' methodological foundations: A systematic analysis of reliability in research using the moral foundations questionnaire.* PsyArXiv. https://doi.org/10.31234/osf.io/shcgv

Terwee, C. B., Bot, S. D., de Boer, M. R., Van der Windt, D. A., Knol, D. L., & Dekker, J. .. (2007). Quality criteria were proposed for measurement properties of health status questionnaires. *Journal of Clinical Epidemiology, 60*(1), 34-42.

Tomasello, M. (2016). The Interdependence Hypothesis. In M. Tomasello, *A natural history of human morality* (pp. 1-8). Harvard University Press.

Tomasello, M., Melis, A. P., Tennie, C., Wyman, E., & Herrmann, E. (2012). Two key steps in the evolution of human cooperation: The interdependence hypothesis. *Current Anthropology, 53*(6), 673-692.

Uhlmann, E. L., Pizarro, D. A., & Diermeier, D. (2015). A person-centered approach to moral judgment. *Perspectives on Psychological Science*, *10*(1), 72-81.

van Baal, S. T., Walasek, L., Verdejo-Garcıa, A., & Hohwy, J. (2022). Impulsivity and Self-Control as Timeless Concepts: A Conceptual Analysis of Intertemporal Choice.

Van Leeuwen, F., Koenig, B. L., Graham, J., & Park, J. H. (2014). Moral concerns across the United States: Associations with life-history variables, pathogen prevalence, urbanization, cognitive ability, and social class. *Evolution and Human Behavior, 35*(6), 464-471.

Villegas de Posada, C., & Vargas-Trujillo, E. (2015). Moral reasoning and personal behavior: A meta-analytical review. *Review of General Psychology*, *19*(4), 408-424.

Vohs, K. D., & Baumeister, R. F. (Eds.). (2016). *Handbook of self-regulation: Research, theory, and applications.* New York: Guilford Publications.

Von Elm, E., Altman, D. G., Egger, M., Pocock, S. J., Gøtzsche, P. C., & Vandenbroucke, J. P. (2007). The Strengthening the Reporting of Observational Studies in Epidemiology

(STROBE) statement: guidelines for reporting observational studies. *The Lancet, 370*(9596), 1453-1457.

Wake, S., Wormwood, J., & Satpute, A. B. (2020). The influence of fear on risk taking: a meta-analysis. *Cognition and Emotion, 34*(6), 1143-1159.

Waris, O., Karlsson, L., Antfolk, J., Karlsson, L., Karlsson, H., & Soveri, A. (2020). The factorial structure of the Hong Psychological Reactance Scale in two Finnish samples. *Nordic Psychology, 73*(1), 68-90.

Whiteside, S. P., Lynam, D. R., Miller, J. D., & Reynolds, S. K. (2005). Validation of the UPPS impulsive behaviour scale: a four-factor model of impulsivity. *European Journal of Personality, 19*(7), 559-574.

Whiting, J. W. M. & Child, I. L. (1953). Child training and personality: a cross-cultural study. *Child training and personality: a cross-cultural study.* New Haven, CT, US: Yale University Press, US.

Wright, L., Steptoe, A., & Fancourt, D. (2022). Patterns of compliance with COVID-19 preventive behaviours: a latent class analysis of 20 000 UK adults. *Journal of Epidemiology and Community Health, 76*(3), 247-253.

Yalçın, İ., Can, N., Mançe Çalışır, Ö., Yalçın, S., & Çolak, B. (2022). Latent profile analysis of COVID-19 fear, depression, anxiety, stress, mindfulness, and resilience. *Current Psychology, 41*(1), 459-469.

Yamamoto, S., & Maeder, E. M. (2019). Creating the punishment orientation questionnaire: An item response theory approach. *Personality and Social Psychology Bulletin*, *45*(8), 1283-1294.

Zhang, D. C., Highhouse, S., & Nye, C. D. (2019). Development and validation of the general risk propensity scale (GRiPS). *Journal of Behavioral Decision Making, 32*(2), 152-167.

Appendix A Search syntax for all databases

Table A1

Search Syntax for All Databases

Database	Steps	Search Syntax
Medline	1	exp Decision Making/
	2	exp Morals/
	3	exp Ethics/
	4	2 or 3
	5	exp Pain Measurement/
	6	moral dilemma.mp.
	7	5 or 6
	8	1 and 4
	9	moral decision making.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
	10	ethical decision making.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
	11	moral reasoning.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
	12	8 or 9 or 10 or 11
	13	7 and 12

	14	limit 13 to ("young adult (19 to 24 years)" or "adult (19 to 44 years)" or "young adult and adult (19-24 and 19-44)" or "middle age (45 to 64 years)" or "middle aged (45 plus years)" or "all aged (65 and over)" or "aged (80 and over)")
	15	limit 14 to (english language and humans)
PsycINFO	1	exp Decision Making/
	2	exp Morality/
	3	exp Ethics/
	4	2 or 3
	5	1 and 4
	6	moral decision making.mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh]
	7	ethical decision making.mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh]
	8	moral reasoning.mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh]
	9	5 or 6 or 7 or 8
	10	measurement/ or psychological assessment/ or psychometrics/ or risk assessment/ or screening/ or state trait level measures/ or statistical measurement/ or evaluation/ or test construction/
	11	moral dilemma.mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh]
	12	10 or 11
	13	9 and 12
	14	limit 13 to human
	15	limit 14 to english language
	16	limit 15 to "300 adulthood <age 18 yrs and older>"
Embase	1	exp Decision Making/
	2	exp Morals/

3	exp Ethics/
4	2 or 3
5	exp Pain Measurement/
6	moral dilemma.mp.
7	5 or 6
8	1 and 4
9	moral decision making.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
10	ethical decision making.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
11	moral reasoning.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
12	8 or 9 or 10 or 11
13	7 and 12
14	limit 13 to ("young adult (19 to 24 years)" or "adult (19 to 44 years)" or "young adult and adult (19-24 and 19-44)" or "middle age (45 to 64 years)" or "middle aged (45 plus years)" or "all aged (65 and over)" or "aged (80 and over)")
15	limit 14 to (english language and humans)

Scopus	(TITLE-ABS-KEY ("moral decision making" OR "ethical decision making" OR "moral reasoning") AND TITLE-ABS-KEY (measurement OR psychometr* OR "moral dilemma")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (EXACTKEYWORD , "Human") OR LIMIT-TO (EXACTKEYWORD , "Humans"))
Web of Science	TOPIC: ("ethical decision making" OR "moral decision making" OR "moral reasoning") AND TOPIC: (measurement OR psychometr* OR "moral dilemma")

Proquest Military Database	("ethical decision making" OR "moral decision making" OR "moral reasoning") AND (measurement OR psychometr* OR "moral dilemma")

Appendix B Supplementary material for Chapter 3

B1 Original Measures

Compliance Attitudes

Please rate the extent to which each statement applies to you **CURRENTLY/ PRIOR to December 2021**.

	Does not apply at all 0 10 20 30 40 50 60 70 80 90 100 Applies very much n/a
I am aware of the current COVID-19 rules or recommendations	
I understand the current COVID-19 guidelines	
I adhere to the **current** COVID-19 rules and recommendations	
I trust the effectiveness of the current COVID-19 rules	
I adhere to the **current** COVID-19 rules or recommendations	
I'm satisfied with the current COVID-19 rules or recommendations	

COVID-Related Behaviours

To what extent do the following statements describe your behaviour currently (in the past 30 days) and BEFORE December 2021?

If you are currently in self-isolation (due to awaiting test results, contracting COVID-19, or being a close contact), please answer about your behaviours <u>BEFORE</u> you began isolation.

	Currently (Past 30 days)					Before December 2021				
	N/A	Never	Sometimes	Often	Always	N/A	Never	Sometimes	Often	Always
I limit(ed) the number of people I see socially face-to-face.										
I avoid(ed) socialising.										
If I experience(d) flu/COVID-like symptoms, I inform(ed) people before/after meeting them.										
I do/did not hold or attend gatherings where it is difficult to maintain social distancing.										
I avoid(ed) crowded indoor spaces.										
I avoid(ed) going to places which do not provide effective ventilation.										
I stayed at home if I felt unwell with flu/COVID-like symptoms.										
If I go(went) out, I stay(ed) 1.5m away from people.										
I avoid(ed) large gatherings.										
I avoid(ed) meeting face-to-face with at-risk people (e.g., elderly and those with underlying health conditions).										
I wear/wore a mask in indoor public settings.										
I wear/wore a mask outdoors.										
I made sure my mask covers my nose and mouth.										

Multidimensional COVID-19 Worry Index

To what extent do the following statements describe how you feel amid the COVID-19 pandemic?

	Never	Sometimes	Often	Always
I am nervous when I think about the pandemic	○	○	○	○
I am anxious about losing money due to COVID-19	○	○	○	○
I am stressed about global economic recession	○	○	○	○
I am concerned about the possibility of another lockdown in the city/region where I live	○	○	○	○
I am nervous about grocery stores running out of food and/or other supplies	○	○	○	○
I am worried about my health due to COVID-19	○	○	○	○
I am nervous about political systems failing	○	○	○	○
I am concerned about taking public transport due to COVID-19	○	○	○	○
I am worried about becoming unemployed due to COVID-19	○	○	○	○
I am stressed about our healthcare system being overloaded	○	○	○	○
I am stressed about leaving my house	○	○	○	○

B2 Descriptives, reliability, and correlations for risk, impulsivity, and morality

Table B2.1

Descriptive statistics and reliability estimates of morality, risk/impulsivity, and COVID-related fear measures (N=582)

	M	SD	Cronbach's α	Skewness	Kurtosis
MFQ Harm	4.20	.79	.70	-.81	1.08
MFQ Fairness	4.20	.66	.57	-.37	-.04
MFQ Ingroup	2.54	.94	.66	.24	-.26
MFQ Authority	2.70	.95	.70	-.05	-.33
MFQ Purity	2.96	1.06	.73	-.22	-.41
Conservatism	3.09	.88	.62	-.07	-.31
Amorality	2.27	.61	.66	.24	.31
Need for Chaos	2.11	.92	.86	1.02	.82
Psychological Reactance	2.69	.67	.90	-.10	.11
General Risk Propensity	20.16	7.12	.94	.21	-.45
UPPS Negative Urgency	2.23	.69	.80	-.03	-.52
UPPS Positive Urgency	1.82	.64	.82	.59	-.15
UPPS Lack of Perseverance	1.96	.55	.76	.53	.57
UPPS Lack of Premeditation	1.80	.51	.82	.49	1.01
UPPS Sensation Seeking	2.26	.67	.70	.08	-.66
Concerns Infection-Infrastructure	2.28	.66	.92	.28	-.50
Concerns Political-Liberty-Economy	2.00	.61	.74	.63	.04
Concerns Financial	2.13	.86	.82	.56	.20
Compliance attitudes before	83.74	16.36	.85	-1.50	2.69
Compliance attitudes current	72.97	17.67	.81	-.63	.02

Note. UPPS = UPPS Impulsivity Scale. MFQ = Moral Foundations Questionnaire.

Table B2.2

Correlations between Risk, Morality, and COVID-related Fear Measures (N=582).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. MFQ Harm																				
2. MFQ Fairness	.63**																			
3. MFQ Ingroup	.11**	.08																		
4. MFQ Authority	.04	.03	.70**																	
5. MFQ Purity	.17**	.16**	.56**	.65**																
6. Conservatism	-.02	-.04	.62**	.63**	.48**															
7. Amorality	-.18**	-.15**	.01	.03	.05	.07														
8. Need for Chaos	-.11**	-.04	-.09*	-.09*	.00	-.04	.43**													
9. Psychological Reactance	-.08*	-.04	.09*	.06	.11*	.09*	.61**	.42**												
10. General Risk Propensity	-.03	-.05	.10*	.06	.11**	.09*	.17**	.23**	.33**											
11. UPPS Negative Urgency	.05	-.01	-.03	-.01	.04	-.01	.36**	.32**	.35**	.30**										
12. UPPS Positive Urgency	-.07	-.16**	.12**	.09*	.09*	.17**	.33**	.33**	.40**	.51**	.60**									
13. UPPS Lack of Premeditation	-.23**	-.28**	-.14**	-.12**	-.16**	-.08	.10*	.15**	.09*	.20**	.28**	.37**								
14. UPPS Lack of Perseverance	-.19**	-.17**	-.21**	-.17**	-.23**	-.15**	.05	.10*	-.02	-.04	.04	.10*	.54**							
15. UPPS Sensation Seeking	.01	-.03	.11**	.07	.08	.11*	.20**	.20**	.27**	.66**	.23**	.42**	.11**	-.08						
16. Concerns Infection-Infrastructure	.25**	.16**	-.04	-.08	.02	-.10*	.03	.06	.02	-.05	.23**	.06	-.02	-.07	-.04					
17. Concerns Political-Liberty-Economy	.12**	.11**	.12**	.10*	.17**	.10*	.15**	.16**	.26**	.20**	.19**	.18**	.03	-.06	.16**	.44**				
18. Concerns Financial	.06	.08	.03	-.05	.04	-.02	.11**	.14**	.13**	.14**	.24**	.20**	.11**	.05	.10*	.45**	.44**			
19. Compliance Before	.19**	.21**	-.03	.00	-.02	-.08*	-.28**	-.27**	-.30**	-.15**	-.04	-.13**	-.13**	-.17**	-.11**	.18**	-.18**	.02		
20. Compliance Now	.16**	.15**	.12**	.07	.05	.04	-.23**	-.25**	-.24**	-.07	-.04	-.04	-.09*	-.17**	-.05	.11**	-.10*	.03	.65**	

Note. UPPS = UPPS Impulsivity Scale. MFQ = Moral Foundations Questionnaire. ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

B3 Data Quality Control

To ensure good-quality data, the following checks were used to identify careless responders. Fewer checks were included at Time 2 relative to the length of the survey (20 minutes) compared to the Time 1 survey (1 hour).

1. Five bogus items at Time 1 and two at Time 2 (Huang, Bowling, Liu, & Li, 2015; Meade & Craig, 2012). Table B3.1 presents bogus items, criteria for failing the check, and the percentage of respondents flagged for failing each item.

2. Five logic checks at Time 1 and three at Time 2 (Wardropper, Dayer, Goebel, & Martin, 2021). Five items were added to check for logically inconsistent responding. These items were identical to the original survey items except for the addition of a negative adverb (e.g., not) to invert the meaning. Table B3.2 presents logic check items and the percentage of respondents flagged for failing each check. Logic check items were all rated on a 6-point Likert scale (1=strongly disagree; 2=somewhat disagree; 3=disagree; 4=somewhat agree; 5=agree, 6=strongly agree). The logic for determining inconsistent responding was that if the response to Item 1 was 1 to 3 (somewhat to strongly disagree), then the response to Item 2 should be 4 to 6 (somewhat to strongly agree), and vice versa. That is, it would be logically inconsistent to agree or disagree with both items in a pair, and respondents who did so were flagged.

Table B3.3 presents frequencies for the total number of flags received by participants. Respondents with three or more flags in total were removed from the sample. A total of 16 participants (2.6%) received three or more flags and were excluded.

Participants were also screened based on completion time. The median completion time of all participants (N=598) was 36.25 minutes. Nine people were identified as fast completers, defined by completing in less than half the median, and were reviewed on a case-

by-case basis. The two fastest completers were unvaccinated and, thus, were not required to complete a large portion of the survey; thus, their completion time was justified. All had circumstances which meant some questions were skipped for them, e.g., had no children, had not done any COVID-19 tests, or had no vaccination symptoms. Thus, they were left in the sample. Five did not fail any of the bogus or logic checks, two failed one check, and two participants failed two checks.

Table B3.1
Bogus items

			Time 1 (N = 598)		Time 2 (N = 446)	
Item	**Responses**	**Incorrect Response**	**Frequencies**	**% Flagged**	**Frequencies**	**% Flagged**
I have been to every country in the world (Meade & Craig, 2012)	1=strongly disagree, 2=disagree, 3=somewhat disagree, 4=neither agree nor disagree, 5=somewhat agree, 6=agree, 7=strongly agree	3, 4, 5, 6, 7	533 (89.1%) 36 (6%) 7 (1.2%) 11 (1.8%) 6 (1.0%) 1 (0.2%) 4 (0.7%)	4.9	406 (91%) 26 (5.8%) 6 (1.3%) 0 (0.0%) 7 (1.6%) 0 (0.0%) 1 (0.2%)	3.1
I sleep less than one hour per night (Meade & Craig, 2012)	1=very inaccurate, 2=moderately inaccurate, 3=neither inaccurate nor accurate, 4=moderately accurate, 5=very accurate	3, 4, 5	550 (92%) 31 (5.2%) 9 (1.5%) 6 (1%) 2 (0.3%)	2.8	n/a	n/a
I do not understand a word of English (Meade & Craig, 2012)	1=strongly disagree, 2=disagree, 3=neither agree nor disagree, 4=agree, 5=strongly agree	3, 4, 5	569 (95.2%) 9 (1.5%) 14 (2.3%) 4 (0.7%) 2 (0.3%)	3.3	n/a	n/a
I have never brushed my teeth (Meade & Craig, 2012)	1=very inaccurate, 2=moderately inaccurate, 3=neither inaccurate nor accurate, 4=moderately accurate, 5=very accurate	3, 4, 5	551 (92.1%) 25 (4.2%) 9 (1.5%) 12 (2%) 1 (0.2%)	3.7	440 (98.7%) 2 (0.4%) 2 (0.4%) 1 (0.2%) 1 (0.2%)	1.2
I have never used a computer in my life (Huang et al., 2015)	1=strongly disagree, 2=disagree, 3=somewhat disagree, 4=neither agree nor disagree, 5=somewhat agree, 6=agree, 7=strongly agree	3, 4, 5, 6, 7	575 (96.2%) 7 (1.2%) 1 (0.2%) 9 (1.5%) 1 (0.2%) 1 (0.2%) 4 (0.7%)	2.8	n/a	n/a

Table B3.2
Logic Checks

Item 1 (original item)	Item 2	Frequency flagged T1	Frequency flagged T2
I feel there are safe COVID-19 vaccines available	I do **not** feel there are safe COVID-19 vaccines available	1 (0.2%)	n/a
I worry about the unknown effects of COVID-19 vaccines in the future	I am **not** worried about the unknown effects of COVID-19 vaccines in the future	67 (11.2%)	n/a
COVID-19 vaccines protect people	COVID-19 vaccines do **not** protect people	0 (0.0%)	n/a
Natural immunity lasts longer than a COVID-19 vaccination	Natural immunity does **not** last longer than a COVID-19 vaccination	26 (4.3%)	18 (4.0%)
I can rely on COVID-19 vaccines to prevent serious symptoms and death from COVID-19	I **cannot** rely on COVID-19 vaccines to prevent serious symptoms and death from COVID-19	14 (2.3%)	14 (3.1%)
Should another lockdown be needed, I will follow the rules	Should another lockdown be needed, I will **not** follow the rules	n/a	7 (1.6%)

Table B3.3
Frequencies for number of flags received by participants in total.

Number of total flags	T1 Frequency	T2 Frequency
0	436 (72.9%)	400 (89.7%)
1	120 (20.1%)	36 (8.1%)
2	26 (4.3%)	9 (2.0%)
3	5 (0.8%)	1 (0.2%)
4	5 (0.8%)	0 (0.0%)
5	6 (1.0%)	0 (0.0%)

B4 Description of Sample Characteristics

Table B4

Demographic characteristics of the samples and Australian general population.

Variable	Level	T1 Sample % (N=582)	T2 Sample % (N=436)	Population %[1]
Sex	Male	41.1	41.1	49.1
	Female	57.2	57.3	50.9
Age	18-29 years	44.3	41.74	21.1
	30- 39 years	24.9	25.69	18.8
	40-49 years	15.5	15.83	16.5
	50-59 years	10.0	10.55	15.6
	60-69 years	4.5	5.05	13.5
	70 years or older	0.9	1.15	14.7
State	ACT	2.4	2.1	1.7
	NSW	30.1	31.4	32.0
	NT	.5	.7	1.0
	QLD	18.4	19	20.1
	SA	7.9	8.3	7.2
	TAS	2.2	2.3	2.2
	VIC	28.4	27.8	25.3
	WA	10.1	8.5	10.6
Citizenship	Australian citizen	85.4	86.2	82.4
Marital status	Married (registered) or living with someone in a relationship	26.8	27.1	48.1
	Separated but not divorced	1.2	.9	3.2
	Divorced	4.5	5.0	8.5
	Widowed	.5	.5	5.2
	Never married and not living with someone in a relationship	45.4	43.8	35.0
Highest level of education	Year 11 or below	2.1	2.5	21.2
	Year 12	19.9	17.0	15.7
	Trade certificate/apprenticeship	7.6	8.3	24.3
	Diploma	8.8	8.9	10.1
	Bachelor's degree	38.7	39.9	16.0
	Higher degree	23	23.4	12.7
In general, would you say that your health is:	Excellent	9.3	8.5	9.9
	Very good	31.1	29.1	34.2
	Good	38.3	37.8	36.9
	Fair	16.7	19.3	15.2
	Poor	4.6	5.3	3.7
Chronic conditions	Asthma, emphysema, or chronic bronchitis	11.7	13.3	n/a
	Arthritis or rheumatism	4.0	3.9	20.5
	Cancer diagnosed in last 3 years	1.0	1.1	n/a
	Diabetes	2.4	3.0	6.2
	Digestive problems (e.g., stomach ulcer, colitis, gallbladder disease)	5.8	6.2	7.4
	Heart trouble (e.g., angina, congestive heart failure, coronary artery disease)	2.9	3.4	n/a
	HIV illness or AIDS	0.0	0.0	n/a
	Kidney disease	.2	.2	1.2
	Liver problems (e.g., cirrhosis)	1.2	1.1	n/a
	Stroke	.2	0.0	0.8
	None of these	78.5	76.6	n/a

[1]Age and sex values were obtained from national, state and territory population data, Australian Bureau of Statistics, published June, 2021: https://www.abs.gov.au/statistics/people/population/national-state-and-territory-population/latest-release. Population values for State, Australian Citizenship, Status and Marital Status were obtained from the Australian Bureau of Statistics 2016 Census (note, this data was not limited to those aged 18 and over). Population values for Highest Level of Education and the General Health Question were derived from the Household, Income and Labour Dynamics in Australia Survey (HILDA, Wave 19), limited to those aged 18 and over. Prevalence

of chronic conditions were derived from the Australian Bureau of Statistics National Health Survey, published December, 2018: https://www.abs.gov.au/statistics/health/health-conditions-and-risks/national-health-survey-first-results/latest-release. Population data for other chronic conditions was not directly comparable in format.

B5 Examination of Study Method Biases

Non-response bias at follow-up

To examine non-response bias at follow-up, we compared the distribution and descriptive statistics of demographic variables between participants who only participated at Time 1 and participants who participated in both Time 1 and Time 2 (see Table B5.1).

Table B5.1

Demographic characteristics of the samples and the Australian general population.

Variable	Level	Only T1 Sample % (N=146)		T2 Sample % (N=436)	
Sex	Male	42.0		41.7	
	Female	58.0		58.3	
Comorbidities	0	84.2		76.6	
	1	11.0		16.1	
	2	4.8		6.0	
	3	0.0		1.1	
	4	0.0		0.2	
Citizenship	Australian citizen	82.9		86.2	
How well do you speak English	Very well	94.5		94.7	
	Well	5.5		5.3	
		M	**SD**	**M**	**SD**
Age		31.97	12.06	35.58	12.91
Gross household annual income		10.36	4.64	10.57	4.38
Financial comfort		57.22	22.54	55.03	25.53
Highest level of education		4.14	1.58	4.37	1.48

Note. M = Mean, SD = Standard Deviation.

Common Method Bias

To address common method bias, a principal component analysis (CPA) was conducted on key variables within the study. Table B5.2 presents the variables included and results of the PCA. The results indicate that the largest factor only accounted for 16.04% of the total variance, thus ruling out common method bias.

Table B5.2
PCA results of key study variables

Total Variance Explained

		Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Component	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
General Risk Propensity	1	4.17	16.04	16.04	4.17	16.04	16.04
UPPS Negative Urgency	2	3.54	13.63	29.67	3.54	13.63	29.67
UPPS Positive Urgency	3	2.69	10.34	40.01	2.69	10.34	40.01
UPPS Lack of Perseverance	4	1.90	7.30	47.31	1.90	7.30	47.31
UPPS Lack of Premeditation	5	1.67	6.42	53.73	1.67	6.42	53.73
UPPS Sensation Seeking	6	1.35	5.20	58.93	1.35	5.20	58.93
MF Harm	7	1.22	4.70	63.63	1.22	4.70	63.63
MF Fairness	8	1.00	3.84	67.47			
MF Ingroup Loyalty	9	.82	3.15	70.62			
MF Authority	10	.77	2.98	73.59			
MF Purity	11	.71	2.72	76.31			
Amorality	12	.68	2.60	78.91			
Social Conservatism	13	.57	2.19	81.10			
Psychological Reactance	14	.55	2.11	83.21			
Need for Chaos	15	.52	1.99	85.20			
Compliance Attitude Before	16	.48	1.86	87.06			
Compliance Attitude Now	17	.45	1.74	88.79			
Infection Infrastructure Concerns	18	.42	1.62	90.41			
Political, Liberties, and Economy Concerns	19	.39	1.49	91.90			
Financial Concerns	20	.36	1.37	93.27			
Agreeableness	21	.35	1.34	94.61			
Conscientiousness	22	.35	1.33	95.94			
Neuroticism	23	.31	1.18	97.11			
Extraversion	24	.27	1.03	98.15			
Openness	25	.25	.95	99.10			
Esoteric Analogies Test	26	.23	.90	100.00			

Early-Late Bias

Due to the phased sampling procedure we employed, a systematic test of early versus late response bias was not feasible. The survey was launched in multiple stages to ensure demographic diversity. Initially, we recruited a broad demographic sample, with approximately 400 participants responding within the first three to four weeks. Subsequent targeted recruitment phases aimed to increase representation of underrepresented groups, including unvaccinated individuals, those from lower socioeconomic backgrounds, and older

adults. These phases extended data collection by an additional three weeks. All major analyses statistically controlled for key demographic variables. Importantly, the risk of early–late response bias was minimal, given the rapid response rate following the survey's release on Prolific.

B6 CFA for risk/impulsivity measures

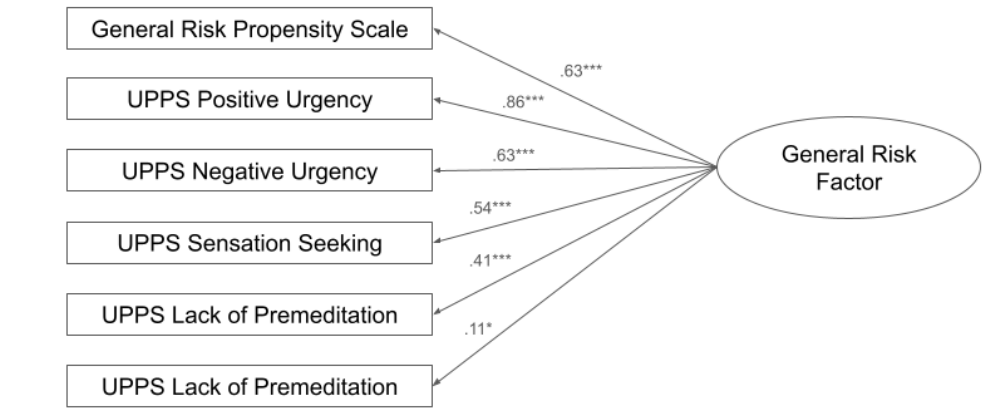
Risk-taking as a disposition has been traditionally regarded as a domain-specific construct (Figner & Weber, 2011; Hanoch, Johnson, & Wilke, 2006). More recently, however, researchers have found evidence for a general risk factor (R) emerging from multiple self-report measures (Frey et al., 2017; Highhouse et al., 2017). General Risk Propensity (GRiPS; Zhang, Highhouse, & Nye, 2019) conceptualises a domain-general construct of risk-taking tendencies, defined as a "general willingness to enter or avoid risk situations". The authors found that the general risk-taking factor could predict unique variance in important work, life, and academic outcomes over and above the Big Five personality traits and the DOSPERT (a measure of domain-specific risk-taking).

Impulsivity can also be considered as part of the risk propensity nomological network (Boyer, 2006). The UPPS-P Impulsivity Model (Whiteside et al., 2005) is a multidimensional framework of impulsivity composed of five traits: Positive Urgency, Negative Urgency, Sensation Seeking, (Lack of) Premeditation, and (Lack of) Perseverance. These five factors capture various affective, motivational, and cognitive mechanisms for rash actions without deliberation. Positive Urgency, Sensation Seeking, and Lack of Premeditation can all contribute to rash actions focusing on excitement and gains and suppressing deliberations on losses. Negative Urgency can also result in impulsive decisions that alleviate immediate aversive stimulus without consideration of potential consequences that may worsen the situation (e.g., maladaptive coping mechanisms). Research has found that impulsivity is related to risk-taking behaviours (Stanford, Greve, Boudreaux, Mathias, & Brumbelow, 1996; Baumann & Odum, 2012; Lawrence, Allen, & Chanen, 2010). The present study examines the conceptual connection between general risk-taking propensity and impulsivity. We consider the UPPS-P Impulsivity factors as mechanisms for general risk propensity and

expect them to converge into one general risk-taking factor (R) (Frey et al., Risk preference shares the psychometric structure of major psychological traits., 2017).

An initial one-factor model was fitted by loading general risk propensity and all UPPS-P Impulsivity factors onto one single factor, which resulted in poor fit, $CFI = .606, TLI = .343, RMSEA = .285$ (90% CI [.263, .308], $SRMR = .142, \chi^2(9) = 433.90, \chi^2/df = 48.21$. After examining the standardised regression weights, all factors except for Lack of Perseverance had substantial loadings (>.40) on the General Risk Factor (see Figure B6.1). We then re-analysed the conceptual definitions of each factor (see Table B6.1). Lack of Perseverance entails switching or termination of tasks due to distractions or difficulties. In contrast, the rest of the factors all entail rash decisions to obtain rewards or alleviate aversive stimuli. Therefore, we consider Lack of Perseverance to be conceptually dissimilar to the other factors, which are more closely aligned with the definition of a general risk-taking propensity. All further CFA analyses were conducted without Lack of Perseverance.

Figure B6.1
Model of the one-factor CFA model (with Lack of Perseverance) with standardised regression and correlation coefficients for risk variables (N=582).



Note. UPPS = UPPS Impulsivity Scale. * p< .05, ** p<.01, *** p< .001

Table B6.1

Definition of Risk and Impulsivity Factors

General Risk Propensity	A person's cross-situational tendency to engage in behaviours with a prospect of negative consequences such as loss, harm, or failure.
UPPS Positive Urgency	A disposition to act rashly in response to positive affect.
UPPS Negative Urgency	A disposition to act rashly in response to negative affect.
UPPS Sensation Seeking	Engagement in thrill-seeking behaviours
UPPS Lack of Premeditation	Propensity to act without planning.
UPPS Lack of Perseverance	Tendency to leave tasks unfinished or to give up.

Table B6.2 presents the description and fit indices of risk/impulsivity CFA models without Lack of Perseverance. In line with the theory of a general risk factor, we fit risk and impulsivity measures into a single latent variable. The one-factor model had poor fit. To improve the model, we allowed General Risk Propensity and Sensation Seeking to covary (r = .57). The modified one-factor model had excellent fit. Figure B6.2 displays the summary of this CFA model for risk measures.

Table B6.2

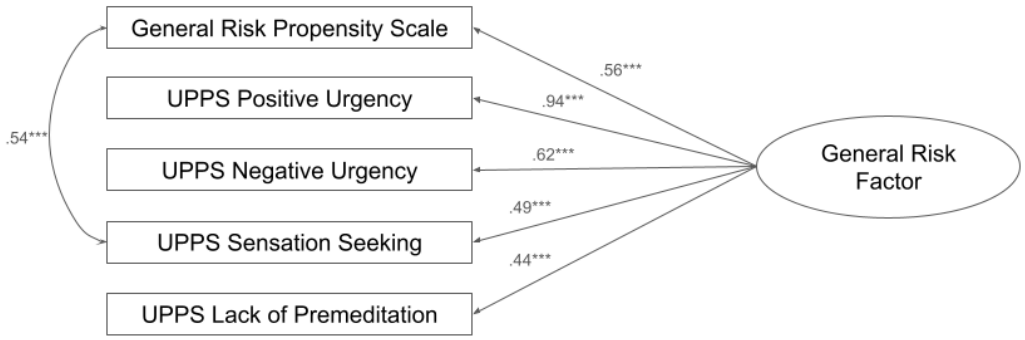
Model description and fit statistics for CFA with risk/impulsivity measures.

	χ^2	df	χ^2/df	TLI	CFI	RMSEA (90% CI)	AIC	SRMR
One-factor model	212.464	5	42.493	.515	.758	.267 (.237-.299)	242.464	.098
Two-factor model	7.711	4	1.928	.989	.996	.040 (.000-.082)	39.711	.021
One-factor model modified	7.711	4	1.928	.989	.996	.040 (.000-.082)	39.711	.021

Note. χ^2—Chi-squared, df—degrees of freedome, TLI—Tucker-Lewis Index, CFI—Comparative Fit Index, RMSEA—Root Mean Square Error of Approximation, CI—Confidence Interval, AIC—Akaike Information Criterion, SRMR—Standardized Root Mean Squared Residual.

We also examined the two-factor model with a second factor defined by General Risk Propensity and Sensation Seeking, which had the same fit as the modified one-factor model. This is expected given that the one-factor model can be viewed as a more constrained version of the two-factor model (Brown, 2015, p. 145). The two factors correlated ($r = .57$) with each other. Thus, we decided in favour of a more parsimonious one-factor model.

Figure B6.2
Path model of the split-half one-factor CFA model with standardised regression and correlation coefficients for risk variables (N=294).



Note. UPPS = UPPS Impulsivity Scale. * p< .05, ** p<.01, *** p< .001

B7 LPA Results

Looking at the fit statistics, AIC, BIC, SABIC, and log-likelihood all showed a decreasing trend (see Table B7.1), indicating that solutions with a higher number of classes showed better model fit. Significant BLRT p-values also indicate that the solutions with more classes are mostly superior (Spurk et al., 2020). Entropy is highest for the 3-class solution, indicating high accuracy with which cases are classified into their true profile. Researchers have suggested a cut-off of entropy for >.80 but a range between .60 and .80 might also be appropriate (Clark & Muthén, 2009; Jung & Wickrama, 2008).

Table B7.1
Fit statistics and profile descriptions of LPA.

Classes	Log Likelihood	AIC	BIC	SABIC	Entropy	BLRT p-value
1	-7427.9	14891.79	14970.39	14913.25	1	NA
2	-7245.49	14546.98	14669.25	14580.35	0.72	0.01
3	-7043.47	14162.93	14328.86	14208.22	**0.79**	0.01
4	-6994.83	14085.67	14295.26	14142.88	0.76	0.01
5	-6938.39	13992.78	14246.04	14061.91	0.73	0.01
6	**-6902.52**	**13941.03**	**14237.95**	**14022.08**	0.75	0.01

	Class Size and Proportions		**Latent class probabilities for most likely membership (row) by latent class (column)**		
2-Class Solution					
	p	**n**	**Class 1**	**Class 2**	
Class 1	.37	216	**.90**	.10	
Class 2	.63	366	.07	**.93**	
3-Class Solution					
	p[1]	**n[1]**	**Class 1**	**Class 2**	**Class 3**
Class 1	.14	82	**.92**	.05	.02
Class 2	.55	321	.02	**.91**	.07
Class 3	.31	179	.03	.09	**.89**

Note. AIC = Akaike Information Criterion. BIC = Bayesian Information Criterion. SABIC = Sample-adjusted BIC. BLRT(p) = p-value of Bootstrapped Likelihood Ratio Test.
1. Numbers in parentheses represent profile proportions/sizes at follow-up.

We then turn our attention to theoretical and content-related considerations for selecting the profile solution. Further examination led to the rejection of 4-, 5-, and 6-class solutions due to poor posterior classification probabilities for at least one class (p<.81).

Figure B7.1

Comparison of 2- and 3-Class LPA Solutions (Error bars represent 95% CI)

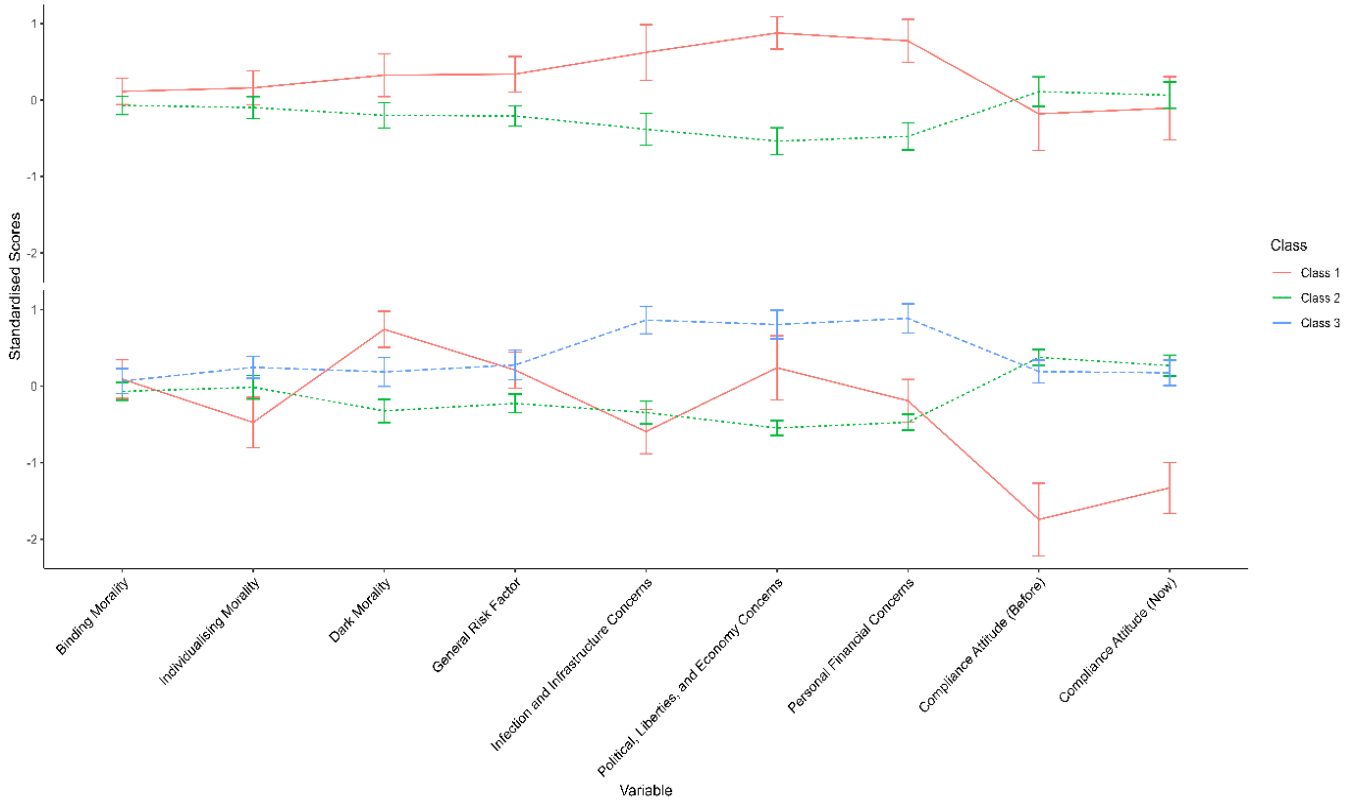


Figure B7.1 present the profile characteristics (i.e., mean values of variables entered in LPA) for the 2- and 3-class solutions. The 2-class solution shows two distinct profiles: Class 1—the ***amoral risk-seeking*** group—had higher levels of Dark Morality, General Risk, and COVID-related concerns in all three aspects (depicted by the red line), and Class 2 — the ***moral risk-averse*** group—had lower levels of Negative Morality, General Risk, and COVID-related concerns. (depicted by the green line).

The 3-class solution offers profiles that show pronounced differences in compliance attitudes and two characteristically different compliant classes: Class 1—the ***amoral non-compliant class***—was relatively smaller in size and showed high Dark Morality and General Risk, and much lower Individualising Morality and Compliance Attitudes, 2) Class 2—the ***moral compliant class***—showed lowest levels of Negative Morality and General Risk, and higher levels of Compliance Attitudes, and 3) Class 3—the ***anxious compliant class***—was characterised by elevated levels in all three aspects of COVID-related Concerns; comparing to ***moral compliant class***, it did not differ in Compliance Attitudes but had higher levels of Negative Morality and General Risk.

B8 ANOVA and Post hoc Comparisons of Behaviours between LPA Classes

Table B8

Descriptives, One-Way ANOVA, and post-hoc comparisons of protective behaviours between classes at Retrospective, Time 1, and Time 2.

	Time	Classes			N	Two-Way Mixed ANOVA						Scheffe Post-hoc Comparison between Classes		
						Time		Class		Time × Class				
		Amoral Risk-Seeking (1)	Moral Risk Averse (2)	Anxious Compliant (3)		F	η_p^2	F	η_p^2	F	η_p^2	1-2	1-3	2-3
Social Distancing														
I limit(ed) the number of people I see socially face-to-face.	Retrospective	2.07 (1.02)	2.87 (0.96)	2.96 (1.00)	425	10.87**	.03	22.03**	.10	1.29	.01	**<.01**	**<.01**	.08
	Time 1	2.00 (1.10)	2.58 (1.01)	2.83 (0.90)										
	Time 2	1.95 (1.00)	2.45 (0.97)	2.67 (0.98)										
I avoid(ed) socialising.	Retrospective	2.08 (1.00)	2.68 (0.97)	2.85 (0.99)	426	25.10**	.06	13.82**	.06	3.86**	.02	**<.01**	**<.01**	**.01**
	Time 1	1.98 (1.06)	2.41 (0.99)	2.78 (0.91)										
	Time 2	1.96 (1.01)	2.11 (0.91)	2.31 (0.93)										
If I experience(d) flu/COVID-like symptoms, I inform(ed) people before/after meeting them.	Retrospective	2.24 (1.23)	3.07 (1.16)	3.27 (1.02)	260	3.49	.01	15.52**	.11	.54	<.01	**<.01**	**<.01**	.22
	Time 1	2.29 (1.27)	3.16 (1.13)	3.36 (0.97)										
	Time 2	2.56 (1.02)	3.18 (0.92)	3.39 (0.77)										
I do/did not hold or attend gatherings where it is	Retrospective	2.04 (1.13)	2.94 (1.12)	3.00 (1.03)	389	23.75**	.06	24.12**	.11	2.31	.01	**<.01**	**<.01**	.08
	Time 1	1.88 (1.14)	2.78 (1.11)	3.08 (1.00)										

difficult to maintain social distancing.	Time 2	1.75 (0.96)	2.31 (1.02)	2.60 (1.08)										
I avoid(ed) crowded indoor spaces.	Retrospective	2.23 (0.99)	3.11 (0.96)	3.15 (0.96)	429	47.18**	.10	28.07**	.12	2.67*	.01	**<.01**	**<.01**	.17
	Time 1	2.07 (1.02)	2.91 (0.97)	3.17 (0.87)										
	Time 2	1.89 (0.91)	2.45 (0.96)	2.63 (0.99)										
I stayed at home if I felt unwell with flu/COVID-like symptoms.	Retrospective	2.52 (1.20)	3.56 (0.82)	3.44 (0.87)	299	3.51	.01	26.44**	.15	.71	.01	**<.01**	**<.01**	.82
	Time 1	2.70 (1.19)	3.61 (0.72)	3.56 (0.82)										
	Time 2	2.58 (1.00)	3.42 (0.76)	3.44 (0.78)										
If I go(went) out, I stay(ed) 1.5m away from people.	Retrospective	2.27 (0.94)	3.06 (0.88)	3.14 (0.84)	429	51.15**	.11	26.27**	.11	.75	.00	**<.01**	**<.01**	.34
	Time 1	2.30 (0.93)	2.92 (0.86)	3.05 (0.81)										
	Time 2	1.91 (0.77)	2.49 (0.86)	2.62 (0.90)										
I avoid(ed) large gatherings.	Retrospective	2.11 (1.11)	3.07 (1.02)	3.11 (1.00)	430	41.00**	.09	24.59**	.10	4.15**	.02	**<.01**	**<.01**	.17
	Time 1	2.00 (1.10)	2.84 (1.08)	3.12 (0.91)										
	Time 2	1.89 (1.05)	2.38 (1.00)	2.59 (1.01)										
I avoid(ed) meeting face-to-face with at-risk people (e.g., elderly and those with underlying health conditions).	Retrospective	2.23 (1.10)	3.13 (0.97)	3.17 (0.96)	386	57.23**	.13	25.28**	.12	2.20	.01	**<.01**	**<.01**	.12
	Time 1	2.15 (1.11)	2.95 (1.01)	3.19 (0.89)										
	Time 2	1.79 (0.85)	2.31 (0.94)	2.57 (0.96)										
Mask Wearing														
I wear/wore a mask in indoor public settings.	Retrospective	2.91 (1.09)	3.40 (0.92)	3.47 (0.86)	429	229.37**	.35	20.90**	.09	.70	.00	**<.01**	**<.01**	.39
	Time 1	3.29 (0.92)	3.64 (0.66)	3.73 (0.55)										

	Time 2	1.80 (0.89)	2.42 (0.96)	2.51 (0.93)										
I wear/wore a mask outdoors.	Retrospective	2.02 (0.99)	2.49 (1.06)	2.78 (1.10)	429	93.51**	.18	14.76**	.07	.85	.00	**<.01**	**<.01**	**<.01**
	Time 1	1.96 (1.02)	2.37 (1.02)	2.71 (1.01)										
	Time 2	1.40 (0.78)	1.73 (0.86)	1.92 (0.95)										
I made sure my mask covers my nose and mouth.	Retrospective	3.25 (1.01)	3.78 (0.63)	3.78 (0.59)	422	12.51**	.03	28.59**	.12	2.51*	.01	**<.01**	**<.01**	.71
	Time 1	3.29 (0.98)	3.78 (0.55)	3.79 (0.54)										
	Time 2	2.92 (1.04	3.62 (0.71)	3.76 (0.54)										

Note. N = valid sample size for each item. Significance levels are indicated next to the F values: * p <.05, ** p <.01. Non-significant F values for interaction terms are underlined.

p < .05 for Scheffe post-hoc comparisons are bolded.

Retrospective: prior to Dec 31 2021. Time 1: Jan-March, 2022. Time 2: June, 2022.

Appendix C Supplementary material for Chapter 4

C1 Data Screening and Sample Characteristics

To examine the number of non-serious responses from each participant, overall response time and response times for each CNI dilemma were analysed (see Table C1). Participants were excluded if they responded unreasonably fast. That is, participants were excluded if they 1) finished the study in less than 20 minutes, or 2) spent less than 5 seconds on more than 16 CNI dilemmas (~40% of the battery).

Table C1

Sample Characteristics (N=369)

Variable	Level	Frequency	Sample %
Sex	Male	102	28.33%
	Female	258	71.61%
Country of Birth	Australia	209	58.06%
English as a First Language	Yes	253	70.28%
	No	107	29.72%
Dictionary Use	All of the Time	1	0.28%
	Most of the Time	8	2.22%
	Sometimes	30	8.33%
	NA	330	89.17%

C2 Counterbalancing of measures and statistics results

The counterbalanced order of measures is presented in the Table C2.1. Measures were grouped into four blocks to have a similar number of items. The 40 scenarios from the CNI moral dilemmas were split into two halves of 20.

Block 1 (48 items): Moral Identity (10), Cultural Tightness/Looseness (6), Psychological Reactance (11), Social Desirability (13),

Block 2 (59 items): Short Dark Triad (27), Amorality (20),

Block 3 (52 items): General Risk Propensity (8), BIS/BAS (24), Impulsivity (20)

Block 4 (50 items): Psychopathy (26), Brief HEXACO (24)

Table C2.1

Order of measures in counterbalancing conditions

Condition A	Demographics	Block 1	CNI part 1	Block 2	CNI part 2	Block 3	EAT	Block 4
Condition B		Block 2	CNI part 2	Block 3	CNI part 1	Block 1		Block 4
Condition C		Block 3	CNI part 1	Block 1	CNI part 2	Block 2		Block 4
Condition D		Block 4	CNI part 2	Block 1	CNI part 1	Block 2		Block 3

Note. EAT = Esoteric Analogies Test. Demographics and EAT are fixed in their positions in all four counter-balancing orders.

Table C2.2 presents the descriptive statistics, reliability estimates, and ANOVA analysis between different conditions. Variable means generally did not differ as a function of presentation order. For the variables that differed significantly, the effect sizes are generally small ($\eta^2 < .03$) .

Table C2.2

Descriptive statistics, reliability estimates, skewness, kurtosis, and ANOVA results for all variables in total and by each counterbalancing condition.

Variables	Total (N=369)	A (N=72)	B (N=99)	C (N=77)	D (N=112)	α	skewness	kurtosis	ANOVA p-value	η^2
MI Internalisation	6.03 (.94)	6.07 (.91)	6.07 (.91)	6.07 (.91)	6.07 (.91)	.75	-1.38	2.36	.66	.00
MI Symbolisation	3.43 (1.36)	3.62 (1.30)	3.62 (1.30)	3.62 (1.30)	3.62 (1.30)	.85	.42	-.53	.62	.01
SDT Machiavellianism	2.92 (.71)	3.17 (.76)	2.92 (.72)	2.86 (.57)	2.82 (.72)	.85	.14	-.11	.01	.03
SDT Narcissism	2.83 (.55)	2.89 (.53)	2.82 (.52)	2.87 (.54)	2.77 (.60)	.68	.03	-.36	.45	.01
SDT Psychopathy	2.23 (.55)	2.28 (.58)	2.17 (.52)	2.28 (.59)	2.22 (.52)	.70	.34	.54	.47	.01
Primary Psychopathy	1.88 (.48)	2.00 (.50)	1.90 (.46)	1.82 (.48)	1.83 (.47)	.88	.33	-.63	.06	.02
Secondary Psychopathy[a]	2.34 (.49)	2.29 (.49)	2.34 (.45)	2.34 (.52)	2.35 (.51)	.70	-.15	-.42	.84	.00
Amorality	2.24 (.55)	2.35 (.66)	2.21 (.47)	2.29 (.57)	2.17 (.53)	.85	.63	.36	.12	.02
Psychological Reactance	2.86 (.55)	2.92 (.49)	2.82 (.57)	2.88 (.61)	2.85 (.52)	.77	-.05	.65	.69	.00
GRiPS	2.80 (.78)	2.62 (.77)	2.76 (.81)	3.01 (.72)	2.82 (.77)	.90	.14	-.12	.02	.03
UPPS Impulsivity										
Positive Urgency	2.13 (.61)	2.15 (.62)	2.12 (.59)	2.20 (.68)	2.09 (.56)	.73	.31	-.05	.65	.00
Negative Urgency	2.46 (.65)	2.41 (.65)	2.48 (.70)	2.52 (.68)	2.45 (.58)	.72	.10	-.47	.76	.00
Sensation Seeking	2.65 (.65)	2.47 (.65)	2.71 (.67)	2.79 (.61)	2.61 (.64)	.67	-.06	-.56	.01	.03
Lack of Premeditation	1.91 (.58)	1.86 (.60)	1.90 (.55)	1.93 (.62)	1.94 (.57)	.80	.40	.21	.83	.00
Lack of Perseverance	1.98 (.53)	1.88 (.54)	1.99 (.48)	1.97 (.58)	2.04 (.54)	.72	.38	.39	.23	.01
BISBAS Scale										
Drive	2.63 (.55)	2.71 (.56)	2.61 (.58)	2.73 (.53)	2.53 (.53)	.74	-.02	-.04	.05	.02

Reward Responsiveness	3.40 (.46)	3.49 (.46)	3.41 (.41)	3.48 (.41)	3.27 (.52)	.74	-.77	.50	.00	.04
Fun Seeking	3.06 (.52)	3.04 (.54)	3.06 (.55)	3.21 (.46)	2.98 (.51)	.64	-.49	.38	.02	.03
BIS	3.15 (.51)	3.13 (.56)	3.16 (.53)	3.14 (.44)	3.16 (.52)	.77	-.51	-.06	.97	.00
Esoteric Analogies Test	.64 (.16)	.63 (.17)	.63 (.17)	.63 (.17)	.63 (.17)	.67	-.26	-.50	.80	.00
Age	20.26 (2.93)	20.25 (2.37)	20.31 (2.52)	20.36 (3.48)	20.13 (3.20)	-	4.52	31.03	.95	.00
Sex (M/F)	102/258	17/55	31/68	16/61	38/74	-	-	-	.16	.01

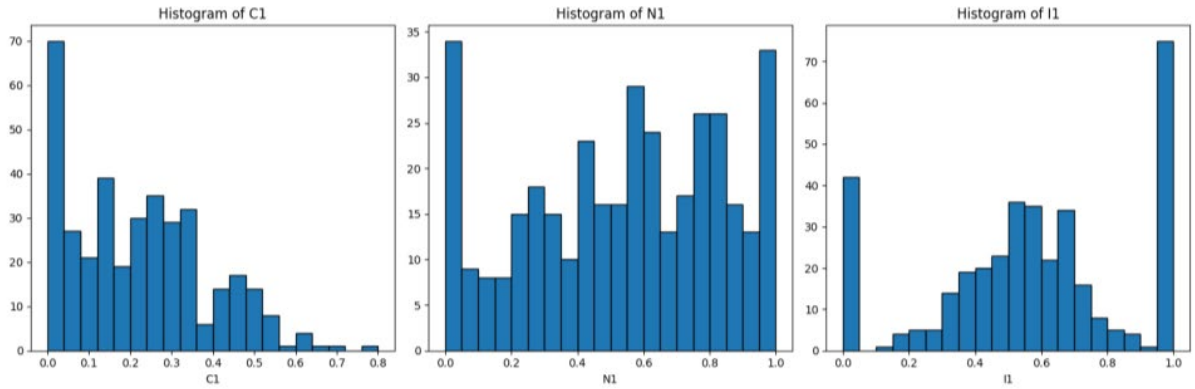
Note. For descriptives, means and standard deviations (in parentheses) are reported for total and each condition. MI—Moral Identity. SDT—Short Dark Triad. GRiPS—General Risk Propensity Scale. BIS—Behavioural Inhibition System. ANOVA p-values < .05 are bolded. α—Cronbach's alpha.

[a] For Secondary Psychopathy, items 24, 25, and 26 correlated negatively with the rest of the items. All statistics were computed after removing these three items.

C3 CNI Parameter Estimation

The CNI model parameters were estimated using the multinomial modelling software multiTree (Moshagen, 2010) and the multiTree template file for the CNI model analyses provided by Gawronski et al. (2017) and Körner et al. (2020). The adequacy of the model in describing the data can be evaluated using goodness-of-fit statistics for each individual, where significant deviations between empirically observed probabilities and the probabilities predicted by the model. With an alpha-criterion of $p = .05$, the model fit 94.3% of the participants fit the model. The observed proportion of participants for whom the model did not fit aligns with the expected false-positive rate. However, the distribution of the parameters exhibited non-normal trends and extreme outliers even after removing participants whose responses did not fit the model (see Figure C3.1).

Figure C3.1
Distributions of CNI Model Parameters



Nonnormal distribution and outliers were criticised as a limitation of the multinomial modelling technique being sequential (Liu & Liao, 2021). In short, the model first explains variability in dilemma decisions with the C parameter, then the remaining variability with the N parameter, and lastly, with the I parameter. If the C parameter perfectly explains dilemma

decisions, there is no variability left to be explained by the other two parameters, which leads to unreliable and extreme estimations of these parameters.

To address this limitation, (Liu & Liao, 2021) proposed an alternative method to simultaneously measure three parameters: sensitivity to consequences (C), general tendency for action (A, inverse of the I parameter), and sensitivity to norms (N). The CAN parameters showed strong correlations to the original CNI parameters and led to almost the same statistical conclusions when validated against other constructs (Liu & Liao, 2021). In the present study, the respective CAN parameters showed more acceptable distributions (see Figure C3.2) and correlated strongly with the CNI parameters (see Table C3.2).

Table C3.2

Correlations between CNI and CAN parameters (N=369)

	CNI C	CNI N	CNI I	CAN C	CAN N	CAN A
CNI C						
CNI N	.11*					
CNI I	-.01	.05				
CAN C	**.97****	.13*	-.03			
CAN N	-.21**	**.91****	.04	-.17**		
CAN A	.09	.09	**-.68*****	.12*	.08	

Note. * = p<.05, ** = p<.01. Correlations for corresponding parameters between different methods are bolded

Figure C3.2
Distributions of CAN Parameters

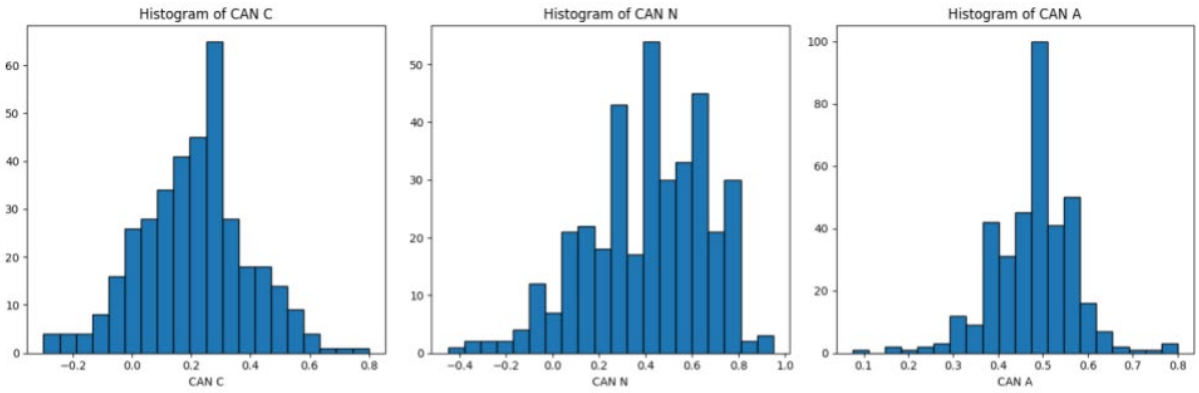


Table C4

Correlations between CNI parameters and individual differences measures.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. CAN C	1																			
2. CAN N	-.17**																			
3. CAN A	.12*	.08																		
4. SDT Machiavellianism	-.07	-.30**	-.03																	
5. SDT Narcissism	-.07	-.05	.03	.33**																
6. SDT Psychopathy	-.15**	-.19**	-.01	.57**	.37**															
7. Levenson Primary Psychopathy	-.23**	-.31**	-.13*	.68**	.30**	.59**														
8. Levenson Secondary Psychopathy	-.06	-.07	.00	.24**	.02	.44**	.26**													
9. Amorality	-.18**	-.30**	-.14**	.66**	.38**	.67**	.70**	.37**												
10. Psychological Reactance	-.08	-.11*	-.07	.36**	.21**	.49**	.33**	.39**	.50**											
11. GRiPS	-.07	.04	.05	.15**	.33**	.43**	.11*	.24**	.26**	.28**										
12. UPPS PU	-.13*	-.06	-.09	.24**	.19**	.48**	.32**	.46**	.42**	.30**	.30**									
13. UPPS NU	.00	-.08	.02	.20**	.10	.35**	.20**	.39**	.29**	.24**	.22**	.53**								
14. UPPS SS	-.09	.10	.03	.00	.26**	.15**	.00	.07	.04	.13*	.58**	.24**	.05							
15. UPPS LPer	-.04	-.02	.03	.04	-.10	.16**	.01	.42**	.08	.16**	.14**	.15**	-.01	-.01						
16. UPPS LPre	-.06	.00	.00	-.02	-.02	.34**	.05	.51**	.15**	.21**	.28**	.37**	.27**	.06	.46**					
17. BAS Drive	-.01	.00	.04	.25**	.37**	.19**	.22**	-.19**	.18**	.03	.21**	.16**	.16**	.24**	-.35**	-.12*				
18. BAS Reward Responsiveness	.10	.11*	.07	.02	.21**	-.15**	-.09	-.13*	-.11*	-.08	-.03	.05	.12*	.19**	-.38**	-.25**	.45**			
19. BAS Fun Seeking	.03	.10	.01	-.01	.23**	.12*	-.04	.16**	.04	0.11*	.37**	.30**	.20**	.50**	-.02	.10	.41**	.47**		
20. BIS	.15**	.08	.00	-.11*	-.17**	-.22**	-.20**	.12*	-.13*	-.09	-.17**	.06	.29**	-.19**	-.17**	-.10	-.04	.37**	.07	1

Note. * = p<.05, ** = p<.01. SDT=Short Dark Triad. GRiPS=General Risk Propensity Scale. PU=Positive Urgency. NU=Negative Urgency. SS=Sensation Seeking. LPer=Lack of Perseverance. LPre=Lack of Premeditation. BAS=Behavioral Activation System. BIS=Behavioral Inhibition System.

C5 Class distributions, posterior probabilities, and comparisons of LPA solutions

Table C5.1
Class Distribution, and Posterior Probabilities of 2- to 6-Class LPA models.

Classes	LogLik	AIC	BIC	SABIC	Entropy	BLRT(p)
1	-11226.98	22541.96	22712.94	22573.35	1.00	NA
2	-10757.64	21649.28	21909.65	21697.09	.86	.01
3	-10592.03	21364.05	21713.80	21428.27	.84	.01
4	-10476.66	21179.31	21618.44	21259.95	.85	.01
5	-10348.97	20969.93	21498.44	21066.98	.88	.01
6	-10252.52	20823.03	21440.92	20936.49	.88	.01

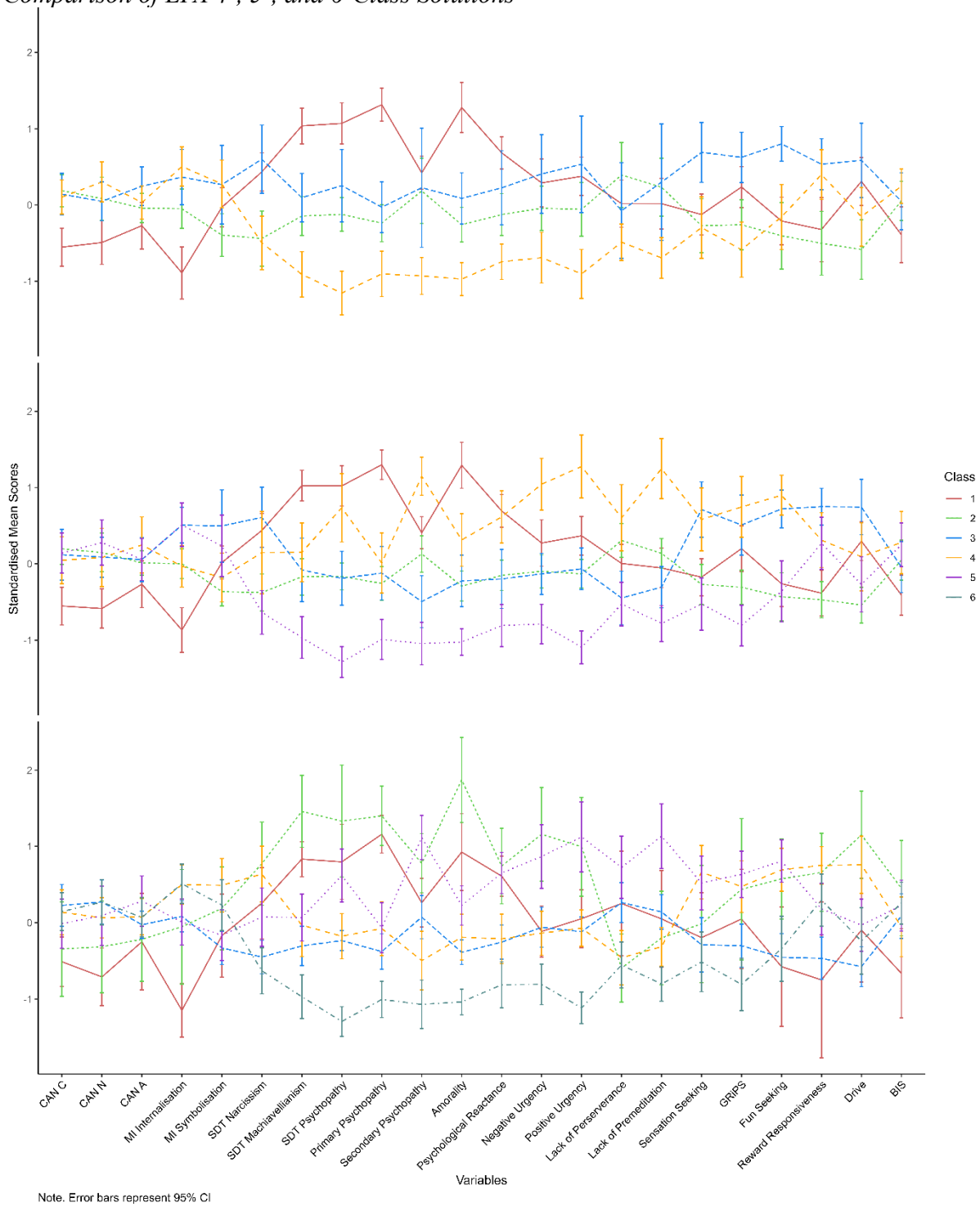
	Class Sizes and Proportions		**Latent class probabilities for most likely membership (row) by latent class (column)**				
2 Class Solution							
	p	**n**	**Class 1**	**Class 2**			
Class 1	.42	153	**.96**	.04			
Class 2	.58	207	.04	**.96**			
3 Class Solution							
	p	**n**	**Class 1**	**Class 2**	**Class 3**		
Class 1	.22	81	**.94**	.00	.06		
Class 2	.36	131	.00	**.94**	.06		
Class 3	.41	148	.03	.06	**.91**		
4 Class Solution							
	p	**n**	**Class 1**	**Class 2**	**Class 3**	**Class 4**	
Class 1	.21	76	**.96**	.01	.03	.00	
Class 2	.31	113	.02	**.90**	.05	.04	
Class 3	.26	92	.02	.06	**.90**	.01	
Class 4	.22	79	.00	.05	.02	**.93**	
5 Class Solution							
	p	**n**	**Class 1**	**Class 2**	**Class 3**	**Class 4**	**Class 5**
Class 1	.21	74	**.96**	.02	.01	.01	.00
Class 2	.32	116	.01	**.90**	.04	.02	.03

Class 3	.19	68	.01	.05	**.90**	.01	.03	
Class 4	.12	44	.02	.03	.01	**.94**	.00	
Class 5	.16	58	.00	.04	.02	.00	**.94**	
6 Class Solution			**Class 1**	**Class 2**	**Class 3**	**Class 4**	**Class 5**	**Class 6**
Class 1	.17	62	**.93**	.01	.03	.01	.02	.00
Class 2	.07	24	.06	**.93**	.00	.00	.01	.00
Class 3	.28	102	.02	.00	**.89**	.04	.02	.03
Class 4	.19	67	.01	.00	.03	**.92**	.02	.03
Class 5	.14	49	.02	.00	.04	.03	**.91**	.00
Class 6	.16	56	.00	.00	.03	.02	.00	**.95**

Note. AIC = Akaike Information Criterion. BIC = Bayesian Information Criterion. SABIC = Sample-adjusted BIC. BLRT(p) = p-value of Bootstrapped Likelihood Ratio Test. Correct classification probabilities (values on the diagonal) are **bolded**.

Figure C5.1

Comparison of LPA 4-, 5-, and 6-Class Solutions



Note. Error bars represent 95% CI

C6 HEXACO Personality

Table C6

Descriptive Statistics, reliability estimates, ANOVA, and pairwise comparisons between LPA Classes.

	α	Total	Amoral Risk-Seeking (1)	Moral Risk-Averse (2)	Opportunistic Risk-Seeking (3)	F	p	η^2	2 vs 1	3 vs 1	3 vs 2
Honesty-Humility	.52	3.64 (.69)	3.00 (.63)	4.12 (.50)	3.55 (.54)	109.85	<.01	.38	**<.01**	**<.01**	**<.01**
Extraversion	.55	3.70 (.63)	3.51 (.56)	3.75 (.64)	3.77 (.63)	5.41	<.01	.03	**.02**	**<.01**	.95
Emotionality	.52	3.15 (.64)	3.06 (.55)	3.20 (.64)	3.15 (.69)	1.21	.30	.01	.30	.58	.82
Agreeableness	.40	3.01 (.60)	2.79 (.48)	3.20 (.59)	2.96 (.62)	12.93	<.01	.07	**<.01**	.10	**<.01**
Conscientiousness	.58	3.19 (.69)	3.10 (.64)	3.53 (.67)	2.95 (.63)	29.02	<.01	.14	**<.01**	.25	**<.01**
Openness	.41	3.76 (.60)	3.62 (.59)	3.73 (.60)	3.85 (.58)	4.20	.02	.02	.41	**.02**	.24

Note. Means (SD) are presented in total and for each class. α = Cronbach's alpha. Post-hoc pairwise comparisons were conducted with Scheffe correction. Significant p-values for pair-wise comparisons are in **bold**.