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**Virtue in Measurement: An Interdisciplinary Study of Conscientiousness through
Aristotelian Theory**

A thesis
submitted in fulfilment
of the requirements for the degree
of
Doctor of Philosophy in Psychology
at
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By
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Abstract

Virtues are traits that promote happiness, well-being, and the good of others. Understanding which traits constitute virtues has direct implications for education, character development, and well-being interventions. Aristotelian virtue theory remains highly influential, yet it overlooks conscientiousness, which is a trait that psychological research shows as one of the strongest predictors of life success, health, and longevity. This disconnect is not only theoretical: it means our approaches to character education and personal development may be missing a vital component. The overarching aim of this thesis was to investigate conscientiousness as a virtue from an Aristotelian perspective, bridging philosophical and psychological insights to better guide how we cultivate beneficial character traits.

To address this aim, this thesis investigated conscientiousness as a virtue from an Aristotelian perspective by (1) developing a theoretical framework aligning conscientiousness with core features of Aristotelian virtue theory, (2) addressing limitations of current approaches to virtue assessment, (3) validating the Aristotelian Virtue of Conscientiousness Scale (AVCS) through Rasch analysis, confirmatory factor analysis, and network modelling, and (4) examining how virtuous conscientiousness and its facets relate to one another and to well-being outcomes such as life satisfaction, positive affect, mindfulness, and virtuous gratitude.

Across three independent samples from New Zealand and the United States (total $N = 1,478$), the AVCS showed strong psychometric properties, conformed to fundamental measurement principles, and was best represented by a multifaceted eight-factor model. Network analyses indicated that excellent behaviours were especially central to the virtue, and that mindfulness may buffer against excessive forms of conscientiousness. Virtuous conscientiousness was positively associated with life satisfaction, positive affect, gratitude, and Big Five conscientiousness, while excessive tendencies were linked to stress, anxiety, and depression.

These findings advance both the theory and science of virtue by showing that Aristotelian constructs can be operationalised and empirically validated. The results provide a foundation for future research on character development and suggest practical applications for education, organisational contexts, and well-being interventions aimed at fostering virtuous forms of conscientiousness while mitigating maladaptive excess.

Keywords: Aristotle, conscientiousness, virtue measurement, character, psychometrics, Rasch analysis, validity, network analysis

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List of Publications

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Commonly Used Abbreviations

AVCS	Aristotelian Virtue of Conscientiousness Scale
SWLS	Satisfaction with Life Scale
DASS	Depression, Anxiety and Stress Scale
FFMQ	Five Facet Mindfulness Questionnaire
MGM	Multi-Component Gratitude Measure
VIA	Values in Action Survey
CFA	confirmatory factor analysis
EFA	exploratory factor analysis
BGGM	Bayesian Gaussian graphical model
DAG	directed acyclic graph model
LPA	latent profile analysis

Chapter 1: General Introduction

This thesis forms part of an interdisciplinary project investigating the virtue of conscientiousness within an Aristotelian framework. The work draws on insights from both philosophy and psychology. From philosophy, the thesis develops a theory of conscientiousness grounded in Aristotelian virtue ethics, the most influential tradition in contemporary virtue theory (Wright et al., 2020). From psychology, the focus on conscientiousness is motivated by its prominence as a major personality trait. Yet, despite this prominence, it has received little attention in philosophical discussions of virtue. By bringing these fields together, the thesis aims to make a novel contribution to both disciplines. Philosophical analysis has the potential to enrich the science of character and well-being, while psychological methods provide empirically grounded tools for assessing virtue and informing philosophical thought.

The introduction briefly outlines the key areas addressed in the research, including Aristotelian virtue theory, limitations of current approaches in virtue science, and the account of conscientiousness as a virtue advanced in this project. The overview is kept concise, as each of these topics is explored in greater detail in the chapters that follow.

Virtue Theory

Virtues are generally regarded as admirable traits of character consisting of dispositions to think, feel, and act in praiseworthy ways (Hursthouse, 2001). Across history and cultures, many different lists of virtues have been proposed, typically including qualities such as kindness, courage, and temperance (Peterson & Seligman, 2004). Contemporary philosophers have also developed a range of detailed theories of virtue (e.g., Driver, 2001; Slote, 2001; Swanton, 2003). The most influential of these is Aristotelian virtue theory (Hursthouse, 2001), which has been operationalised in a variety of modern forms (Wright et

al., 2020; Fowers et al., 2024). Aristotle's theory is often presented as a theory of well-being, in which the good life is understood as *eudaimonia*, commonly translated as human flourishing (Crisp, 2021; Hursthouse, 2001).

Well-being is defined here as that which makes life intrinsically good or worthwhile for the person living it (Crisp, 2021). As a philosophical theory of well-being, flourishing is not synonymous with psychological states, such as happiness or life satisfaction; rather, it refers to the activity of developing and exercising the virtues (Kraut, 2009). On this view, virtues are considered excellent ways of functioning as social and rational beings (Aristotle, ca. 350 B.C.E./2020; Snow, 2020). In psychological language, virtues can be understood as adaptive traits that help people function well in their environments. For this reason, many theorists argue that virtuous activity often promotes health as well as subjective states of happiness, meaning, and fulfilment (Badhwar, 2014; Van Zyl, 2018).

The Aristotelian theory of virtue is attractive to many because of its moral psychology, which includes interacting psychological components (Morgan et al., 2017). Aristotelians do not see virtue as merely involving desirable behaviour; instead, they believe virtues also involve appropriate affective states and cognitions (Hursthouse, 2001; Fowers 2024). These internal aspects of virtue play important roles in motivating and guiding the behaviour in consistently appropriate ways over time. For this reason, they see virtues as deep traits (Hursthouse, 2001). A person with the virtue of kindness, for instance, will actively care about other people's well-being, believing it to be valuable and worth promoting, and feeling compassion towards others who struggle. These internal qualities will then motivate compassionate and kind behaviours, which may manifest as various types of helping behaviours.

Although psychology has tended to focus on the behavioural aspect of virtue, in recent years, a few interdisciplinary researchers have taken an Aristotelian or multi-component approach to virtue (Fowers et al., 2021). For instance, Morgan et al. (2017) have developed the Multi-Component Gratitude Measure (MGM), which conceptualises gratitude as a multidimensional construct that includes emotions, attitudes, and behaviours. Importantly, the researchers found incremental validity for the scale compared to other measures of gratitude in predicting well-being variables such as positive emotions and life satisfaction, over previously developed assessments of gratitude. Importantly, each facet of their scale independently correlated with well-being variables, indicating the unique importance of each separate component (Morgan et al., 2017). The MGM highlights the potential of virtue-based models to explain additional variance in well-being along with other character assessments, such as the VIA Survey (Peterson & Seligman, 2004).

A well-known but controversial feature of Aristotle's theory of virtue is that he thinks of virtue as a “golden mean” between two corresponding vices (Aristotle, ca. 350 B.C.E./2020). This has become known as the doctrine of the mean. For instance, being courageous involves avoiding the vices of cowardice on the one hand, and recklessness on the other. For virtue assessments, it may be beneficial to assess whether people go too far in their behaviour, emotion, and beliefs to the point of dysfunction. For assessment purposes, this helps provide a more realistic picture of people’s characters, which may lead to better interventions for improving well-being.

Aristotelian theory holds that avoiding the vices of deficiency and excess requires the exercise of practical wisdom. Practical wisdom is understood as an intellectual virtue in its own right, but it is also a necessary component of every character virtue (Schwartz & Sharpe, 2006). This is because virtues are conceived as rational excellences. Practical wisdom serves two main functions: first, the ability to discern valuable ends that are worth pursuing,

protecting, and promoting; and second, the possession of the practical skills, experience, and knowledge required to successfully realise those ends (Russell, 2009).

Recently, Darnell (2019) proposed a four-function model of practical wisdom designed for empirical investigation. According to this model, the core functions of practical wisdom are: (1) *moral perception*; the ability to recognise morally salient features of a situation; (2) the *integrative function*, the capacity to weigh and balance multiple values or goals; (3) the *blueprint function*, involving an understanding of what constitutes a good or flourishing life to guide action; and (4) *emotion regulation*, where emotions are shaped and informed by reasoning to support virtuous responses. More recently, McLoughlan et al. (2025) developed a scale to assess this model. Their study identified a ten-facet structure using exploratory and confirmatory factor analyses. These facets correlated positively with various character strengths, going some way to support the link between virtues and practical wisdom.

Virtue Ethics: A Lack of Empirical Foundations and Descriptive Clarity

Despite being the most popular philosophical theory of virtue, there are very few tools for measuring virtues based on an Aristotelian theory of virtue. With the exception of the MGM and the Short Phronesis Measure, current psychological scales lack the necessary components to properly assess character from an Aristotelian perspective (see Chapter 3). For instance, scholars have critiqued existing character trait assessments in positive psychology, such as the Values in Action Survey (VIA), for being too behaviourally focused and for not being based on a deep theory, like Aristotelianism (Van Zyl et al., 2023; Fowers et al, 2001). As such, there is still minimal empirical evidence supporting an Aristotelian theory of virtue. This is problematic for virtue theorists who make descriptive claims about moral psychology and the structure of traits.

If people's moral psychology functions differently than virtue theorists claim, then Aristotelian virtue theory may largely be undermined (Prinz, 2009). For instance, Aristotelian virtue theorists believe that internal states, such as affect, cognition, beliefs and motivations, interact together, and that they can drive behaviour (Fowers et al., 2024). If these claims are correct, then it's likely that through empirical testing, psychologists should find correlations between the different aspects of virtue. For instance, it should be the case that people higher in internal aspects of virtue, such as appropriate cognitive and affective states, should be more likely to manifest virtuous behaviour and vice versa. Alternatively, if these types of connections cannot be found, and virtue-based psychological structures cannot be identified in people's psychology, then this could indicate virtue theorists are off track in their understanding of moral psychology, indicating a need to update the descriptive elements of the philosophical theory.

Conscientiousness: A Neglected Virtue in Philosophy

Although philosophical virtue theory has often been overlooked in psychological science, philosophers have at times neglected key insights from psychology. In the case of virtue theory, it is striking that conscientiousness, one of the most well-established traits in personality psychology (Wilmot & Ones, 2019), is rarely discussed in philosophical literature and is not typically considered a virtue (Angle, 2013). This neglect is puzzling given the substantial body of empirical evidence showing clear parallels between conscientiousness and the structure and function of virtues more broadly. For example, conscientiousness is widely regarded as adaptive and valued in everyday contexts such as education and the workplace (Wilmot & Ones, 2019), and its positive connection to well-being is well supported by research (Anglim et al., 2020). Studies further show that conscientiousness develops over time and is shaped by environmental influences (Roberts et al., 2007), while still displaying trait-like stability across situations (Fleeson et al., 2009). At the same time, extremely high

levels of conscientiousness can be maladaptive (Carter et al., 2018), a finding that resonates with Aristotelian accounts of virtue as lying in a mean between deficiency and excess (Aristotle, ca. 350 B.C.E./2020).

To understand how conscientiousness might be conceptualised as a virtue, it is helpful first to clarify how character traits differ from personality traits. Personality traits are defined as stable dispositions to think, feel, and behave in particular ways over time (Miller, 2014). Character traits are commonly thought of as the subset of personality traits for which people can be held accountable, making them appropriate objects of praise or blame. Character traits include virtues and vices, with virtues being those traits needed for human flourishing. Personality traits are stable but not immutable, and it is generally accepted that they can be developed through intentional effort (Roberts et al., 2007). However, virtues are traits that we ought to cultivate, and they can only be developed through education and deliberate effort (Hursthouse, 2021).

As a Big Five personality trait, conscientiousness is very broad, containing multiple dimensions or sub-traits, including Dutifulness, Deliberation, Orderliness, Achievement-Striving, Competence, and Self-Discipline (Costa et al., 1991). Because of this breadth, individuals may differ markedly in which of these tendencies they exhibit most strongly. For instance, one person might be highly orderly while not very dutiful, and so on. The task of developing an account of conscientiousness as a virtue is, in effect, an attempt to identify which combination of these tendencies, when integrated with practical wisdom, constitutes the ideal form of conscientiousness, the form that contributes to human flourishing. One suggestion is that high (or optimally high) scores in all facets are indicative of virtue. The problem with this approach is that it results in a performance virtue—an instrumentally useful trait that can be put to good or ill ends (Dunne, 2022). A self-disciplined and orderly criminal, for instance, might score highly on conscientiousness without being virtuous. To identify

conscientiousness as a genuine character virtue, we must therefore specify its distinctive target and what makes it a good trait to possess. This task is taken up in Chapter 2, *The Virtue of Conscientiousness: Bridging the Gap between Psychology and Philosophy*, though I will briefly summarise the account of the virtue developed there below.

As a character virtue, the primary target of conscientiousness is the excellent performance of worthwhile roles. This involves fulfilling one's role-specific duties and responsibilities. Consider, for example, a medical professional who chooses to become a doctor because they genuinely value promoting public health and welfare. In this case, they are pursuing a worthwhile role for the right kinds of reasons. They manifest the virtue of conscientiousness by taking the obligations of their role seriously, by intentionally striving to provide high-quality care to patients, arriving punctually to appointments, and keeping up with ongoing medical research. By contrast, a doctor may fail to be conscientious if they neglect key responsibilities, for example, by avoiding important discussions with patients, failing to offer appropriate medical alternatives or not bothering to check the latest research developments. Further, one may fail to manifest the virtue by not knowing or considering what roles are worth pursuing. They may, for instance, overcommit themselves to a role that brings little happiness to themselves or others, such as being their home cleaner and spending hours meticulously colour-coding laundry or alphabetising the contents of the fridge, not because it improves cleanliness or serves others, but simply for the sake of rigid order.

The Aristotelian Virtue of Conscientiousness Scale

In studying the virtue of conscientiousness, an assessment tool was employed that was initially developed during my Master's research: the Aristotelian Virtue of Conscientiousness Scale (McManus, 2022; AVCS). As an initial measurement tool, the AVCS is a self-report questionnaire. While self-report methods have well-known limitations, such as discrepancies

between self-perception and actual behaviour (Fowers et al., 2024), they also offer important advantages, especially in the early stages of research. For example, self-report is a cost-effective way to begin establishing the structure and measurability of a construct before investing in more resource-intensive methods. Its efficiency also makes it easier to recruit larger samples, thereby increasing the reliability, confidence, and generalisability of findings. This, in turn, makes results easier to replicate. This is a major strength of quantitative research: it provides a practical foundation for building an interdisciplinary science of virtue.

The AVCS is designed to measure virtuous conscientiousness in a general, domain-independent way. While this broad approach has advantages, it also comes with certain limitations. For instance, it cannot capture domain-specific variations in how conscientiousness is expressed. A person may display high levels of conscientiousness in one context, such as at work, but much lower levels in another, such as in their personal or domestic life. Additionally, some AVCS items are more abstract in nature, which may limit their immediate relevance to specific behavioural contexts. Nonetheless, a general measure like the AVCS is useful for establishing the overarching structure and content of the virtue. Like self-report methods more broadly, this general approach enables researchers to identify patterns that are potentially applicable across a wide range of individuals and situations, thereby improving generalisability. Developing and applying domain-specific measures of conscientiousness represents a valuable next step, one that could help clarify how the virtue manifests differently across roles and contexts.

The Importance of Studying Virtue

Throughout history and across cultures, virtues have been observed, valued, and admired (Peterson & Seligman, 2004). Research suggests that generally people place high importance on character traits, for example, preferring romantic partners who are loyal, kind,

and honest (Li et al., 2002; Fletcher et al., 1999). Employers seek staff who are resilient, fair, and determined, while parents and teachers often go to great lengths to instil certain character traits in children, viewing them as worthwhile to develop (Berkowitz & Bier, 2005). This widespread admiration also appears well-founded: character strengths associated with virtue are consistently related to desirable outcomes ranging from life satisfaction and positive emotions to broader measures of well-being, including social connection and meaning (Green, 2022; Wagner et al., 2020; Bruna et al., 2019). Yet despite these promising findings, these studies do not address virtues from an Aristotelian perspective, and there are few tools available that align with Aristotelian virtue theory, leaving the precise ways that virtue contributes to well-being unclear.

Because virtues are generally regarded as both valuable and necessary for flourishing, there are strong incentives to study them as a means of improving human well-being. An Aristotelian approach is particularly useful, as it can help researchers identify traits that are virtues while also offering a systematic framework for developing an account of each of these virtues. In addition to providing an alternative to existing assessments in positive psychology, the Aristotelian framework, by emphasising multiple components of each virtue, may reveal which aspects of character are most influential for trait development and for enhancing subjective well-being. In particular, by examining not only deficiencies but also vices of excess, it becomes possible to test whether certain capacities, such as mindfulness, can help to reduce negative tendencies while promoting desirable aspects of character. More comprehensive assessments of traits such as conscientiousness can also improve the evaluation of character-based interventions in educational and workplace contexts. In this sense, society will be better equipped to identify which methods are most effective for cultivating virtue and promoting well-being. Assessing conscientiousness as a virtue is especially promising: its role-based focus has the potential to enhance functioning in

educational and occupational settings, producing benefits at both personal and organisational levels, with possible wider implications for social and economic performance.

Research Aims and Thesis Outline

The overarching aim of this research project was to understand conscientiousness as a virtue from an Aristotelian perspective and to advance our understanding of how to cultivate moral character. This involves both developing a theoretical account of the virtue and using psychological methods to examine its real-world structure and correlates, including how it functions as a whole and how its components relate to one another. Specifically, the project sought to:

- 1) Develop a theoretical framework that shows how conscientiousness can be understood as a virtue by aligning it with the core features of Aristotelian virtue theory.
- 2) Evaluate existing criticisms of virtue-related assessments in positive psychology and explain how Aristotelian theory can strengthen current approaches to the science of character.
- 3) Validate the Aristotelian Virtue of Conscientiousness Scale (AVCS) and its facets.

This included addressing three research questions:

- a) Does the AVCS conform to fundamental measurement principles?
 - b) Can a multifaceted theory-driven model be used to represent the structure of virtuous conscientiousness?
 - c) How are the different components of the AVCS internally related to each other?
- 4) Investigate whether the virtue of conscientiousness is related to desirable outcomes.
 - a) Does the general construct of virtuous conscientiousness correlate with variables related to well-being?

- b) Do particular facets of the AVCS correlate with facets of mindfulness in ways that strengthen the adaptive components of conscientiousness while buffering against excessive tendencies constituting the vice of excess?

To address these aims, the thesis is organised as follows. Chapter 2 offers a theoretical overview of the virtue of conscientiousness, positioning it within the Aristotelian tradition and arguing for its status as a genuine character virtue. Chapter 3 discusses measurement strategies and addresses potential ethical concerns associated with the scientific study of virtue. In Chapter 4, I present the first validation study of the Aristotelian Virtue of Conscientiousness Scale (AVCS), establishing conscientiousness as a measurable construct consistent with key principles of psychometric theory. Chapter 5 builds on this by validating a theoretically derived structure of the virtue, enabling meaningful facet-level analysis.

Chapter 6 applies network analysis to explore how the components of virtuous conscientiousness relate to one another, with the aim of understanding whether the virtue is sustained through mutually reinforcing connections between its facets. Chapters 7 and 8 focus on how virtuous conscientiousness relates to well-being. Chapter 7 examines the association between the overall virtue score and various well-being outcomes. Chapter 8 explores how specific facets of conscientiousness relate to mindfulness, providing a more nuanced account of how the virtue may support psychological functioning while reducing excessive tendencies related to the vice of excess. Finally, Chapter 9 offers a general discussion of the combined findings across each paper.

Chapter 2: The Virtue of Conscientiousness: Bridging the Gaps between Psychology and Philosophy

Paper Reference:

McManus, J., & Van Zyl, L. (manuscript under review). The virtue of conscientiousness: Bridging the gaps between psychology and philosophy. Manuscript submitted for publication in *Philosophical Psychology*.

Chapter Introduction

This paper is currently under review in *Philosophical Psychology*. It provides a detailed account of the virtue of conscientiousness and how it was arrived at. Its purpose is to contextualise the subsequent empirical studies by clarifying the underlying philosophical framework and the challenges of translating a rich theory into a parsimonious psychometric scale. A recurring challenge in presenting this work is that conscientiousness is often regarded as a performance trait within the Big Five framework rather than as a moral virtue. To address this, the chapter distinguishes the Aristotelian virtue of conscientiousness from Big Five conscientiousness, while also acknowledging the influence of the latter on the conceptualisation of the virtue. The central claim advanced here is that the target of conscientiousness as a virtue is the excellent performance of worthwhile roles.

Abstract

Conscientiousness is widely recognised as a good trait—encouraged in schools, rewarded in the workplace, and praised in everyday life. It is also one of the most extensively studied traits in psychology, where it is seen as an adaptive disposition that can be cultivated over time. This raises the question of whether conscientiousness might be understood as a virtue. Surprisingly, however, it has been largely neglected in the philosophical literature, and psychologists have typically avoided describing it as a virtue. This paper argues that there is a virtue of conscientiousness, where “virtue” is understood as a stable disposition to act, reason, and feel in ways that promote individual and collective flourishing. We distinguish this from moral conscientiousness, which involves acting according to abstract moral duties, as well as from conscientiousness as a performance virtue, which is a useful but morally neutral trait. Instead, the virtue of conscientiousness involves a more grounded dutifulness directed toward excellent role performance. We propose a theory of conscientiousness as a virtue that is rooted in Aristotelian ethics and accessible to psychological measurement—offering a foundation for future research on character development.

Keywords: Conscientiousness; personality; virtue; character; Aristotelian virtue ethics

Conscientiousness—understood, very roughly, as the tendency to have high standards and to be hard-working, well-organised, and self-disciplined—is widely viewed as a good trait, particularly in workplace and educational settings. Parents and teachers reward children for behaving conscientiously—for carefully following instructions, completing assigned tasks on time and to a high standard, and so on. Employers actively seek to recruit conscientious individuals, valuing their responsibility, attention to detail, and strong work ethic. In short, conscientious people are often admired and rewarded, and many of us aspire to become more like them.

Based on our initial reflections it seems plausible to suggest that conscientiousness, or rather, some form of conscientiousness, is a character virtue—where “virtue” is understood in the Aristotelian sense of a character trait that involves a reliable disposition to act, reason, and feel in appropriate ways, and that contributes to the good of the individual and society. Somewhat surprisingly, however, conscientiousness is absent from the philosophical literature on character. Some moral philosophers use the term to refer to the Kantian notion of being motivated by a sense of moral duty, or a disposition to act in accordance with the dictates of one’s moral conscience (Grovier, 1972; Angle, 2013; Graham, 2021). We refer to this as “moral conscientiousness,” to distinguish it from the virtue of conscientiousness that is the focus of this paper. Roughly, whereas moral conscientiousness involves being motivated by a desire “to do the (morally) right thing,” the virtue of conscientiousness is more a matter of “doing things the right way” or “doing a job well.”

Personality psychology has produced a rich body of research on conscientiousness. Individuals who are highly conscientiousness are described as, for example, goal-oriented, hardworking, meticulous, organised, self-disciplined, persistent, and cautious, whereas individuals low in conscientiousness are easy-going, spontaneous, disorganised, unreliable,

and impulsive (Phillips et al., 2023; Roberts et al., 2014; Spielmann et al., 2022). Research in psychology supports the commonsense view that there is a link between conscientiousness and successful achievement in academic and workplace contexts (Kim et al., 2016; Wilmot & Ones, 2019; Wang, 2019). Psychologists therefore consider it to be a “beneficial” (or “adaptive”) trait (Anglim et al., 2020; Boggs & Roberts, 2004; Vedel, 2014). Further, many psychologists challenge the traditional view that an individual’s degree of conscientiousness is mainly determined by genetics, and there is a growing interest in strategies for developing or improving the degree of conscientiousness in individuals (Roberts et al., 2014; 2017). To the Aristotelian virtue ethicist, these two things (i.e., that conscientiousness is a beneficial trait and one that it can be acquired) suggest that the trait is a virtue—a good character trait or human excellence. One possibility is that conscientiousness is merely a performance virtue, that is, an instrumentally valuable trait that is sometimes useful for achieving worthwhile ends, but which can also be put to ill use (Dunne, 2022). This seems plausible, as related traits, like grit and determination are also considered performance virtues. However, while we agree that conscientiousness can be included in the list of performance virtues, we think there is a form of conscientiousness that belongs on the list of character virtues.

Our aim in this paper is to develop a theory of conscientiousness as a character virtue, drawing on research in personality psychology as well as philosophical work on character, in particular Aristotelian virtue ethics. We agree with scholars such as Kristjánsson (2013), Jayawickreme and Fleeson (2017), and Wright et al. (2020) that the fundamental goals and commitments of Aristotelean virtue theory are compatible with those of personality psychology. As Christian Miller (2014) explains, character traits are a sub-set of personality traits, which can be defined as stable dispositions to act, think, and feel in certain ways. Character traits differ from other personality traits in that they have an ethical or normative dimension, making their possessor subject to praise or blame. Seen in this way, the task of

identifying the virtue of conscientiousness amounts to asking: which form of conscientiousness is the ideal form, the one needed to flourish as a human being?

We begin by giving a brief overview of the structure of conscientiousness within the Five-Factor Model of personality and then explore the main differences between personality traits, as studied by psychologists, and character traits (virtues and vices), as understood by Aristotelian virtue ethicists. In the second half of the paper we present our theory of conscientiousness as the virtue that is aimed at excellence in performing the duties and responsibilities that come with a good or worthwhile role. While it is grounded in Aristotelian ethics, our theory of conscientiousness as a virtue is accessible to psychological measurement and empirical investigation—thus helping to pave the way for more research in character development and education that can contribute to individual and societal flourishing.

Conscientiousness as a Personality Trait

Personality psychologists view personality as unique and relatively stable patterns of behaviour, cognition, and emotion that are elicited in trait-evoking situations and that distinguish individuals from one another (Roberts et al., 2014). In the dominant Five-Factor Model (FFM) of personality, Conscientiousness is one of five broad personality traits, alongside Agreeableness, Neuroticism, Openness, and Extraversion. Each of these broad traits include multiple narrower sub-traits. In the case of Conscientiousness, these are:

Dutifulness: the tendency to perform one’s duties and responsibilities and to obey or adhere to (e.g. social, cultural, legal, moral) rules and norms;

Deliberation or Cautiousness: the tendency to be thoughtful and cautious; to think before acting;

Orderliness: the tendency to keep one's environment clean and tidy, being organised and prepared;

Achievement-Striving or **Industriousness:** being goal-directed, hard-working, and striving to achieve excellence;

Competence or **Self-Efficacy:** belief or confidence in one's ability to succeed;

Self-discipline: the tendency to regulate behaviour and complete difficult or unpleasant tasks; working without hesitation (Costa et al., 1991; Roberts et al., 2014).

Conscientiousness is linked to positive outcomes, particularly in workplace and educational settings. For example, a second-order meta-analysis by Wilmot and Ones (2019), drawing on data from over 1.1 million participants, found that Conscientiousness was positively related to 98% of 175 occupational variables, including outcomes related to increased job performance and academic achievement. These effects were attributed not only to motivational qualities such as goal-directedness and perseverance, but also to self-regulation and performance proficiency (Wilmot and Ones, 2019). This suggests that Conscientiousness—perhaps more so than other personality traits—involves the possession and application of certain skills, such as organisational skills, self-control, and the ability to focus on a task. However, it is important to note that what distinguishes the highly conscientious individual from others is not the mere the possession of certain skills or capacities. Rather, it is the fact that they exercise these skills as part of a stable pattern of behaviour (Roberts et al., 2014; Fleeson & Gallagher, 2009). That is, Conscientious individuals have a tendency to be organised, to focus on long-term goals, to think before acting, and so on, and it is these patterns that help explain the positive outcomes associated with the trait.

The classical view of personality suggests that traits like Conscientiousness are stable dispositions, remaining consistent over an individual's lifespan. From this perspective, many trait-expressive behaviours are habitual, occurring automatically and with minimal deliberation. Paul Costa and Robert McCrae (1992), two early proponents of the FFM, attribute much of the stability of personality traits to genetic influences—in their view, Conscientiousness (or the lack thereof) is largely “in one's nature.” For example, an individual high in the sub-trait Order is not necessarily someone who decides to be well-organised for the sake of achieving a goal. Rather, their behaviour stems from an innate need for order. Hence, they might prefer a working environment that is more structured, predictable, or routinized, feel more comfortable in a neat and tidy setting, and be inclined to follow rules and instructions (Phillips et al., 2023).

The predominant view appears to be that Conscientiousness is the result of a combination of genetic and environmental factors, such as education and socialisation, and that it is relatively stable but not unchangeable trait (Krueger & Johnson, 2008; Roberts et al., (2014). Research indicates that the trait mainly develops during childhood and adolescence, but that it continues to develop well into adulthood, particularly in response to significant life events such as entering the workforce, getting married, and having children, before declining later in life (Roberts et al., 2007; Schwaba et al., 2022; Soldz & Vaillant, 1999). Further, most of the interpersonal variation in Conscientiousness appears to be the result of education and upbringing, rather than genetics (Krueger & Johnson, 2008). Some studies have shown that individuals can increase their levels of Conscientiousness through intentional effort and practice, suggesting that it can be cultivated over time (Roberts et al., 2014; Hudson & Fraley 2015; Kim et al., 2016).

There is growing support for the view that Conscientiousness—or at least, conscientious patterns of behaviour—is partly the result of deliberate and reasoned choices.

Given that it includes Deliberation (the tendency to think before acting) and Self-discipline as sub-traits, reasoning and volition may play a more prominent role in Conscientiousness than in other personality traits. Further, empirical evidence indicates that individuals adjust their behaviour depending on situational demands. For example, Fleeson (2001) found substantial intrapersonal variation in behaviours associated with all Big Five traits, including Conscientiousness. Individuals may display different levels of tidiness, self-restraint, or task focus across different contexts. According to Fleeson, this kind of variability arises from interactions between situational demands and individual goals and interpretations of what the situation requires (Fleeson & Gallagher, 2009; Fleeson & Jayawickreme, 2015). As we will explain in more detail in the next section, this explanation is consistent with the Aristotelian view that individuals can adjust their behavioural dispositions in response to their own reasoned judgments about what is important or valuable.

In summary, then, the FFM views Conscientiousness as a stable personality trait, involving reliable patterns of behaviour, thoughts, and feelings. It is a beneficial or “adaptive” trait, being linked to various positive outcomes. Further, it appears to be possible to acquire and develop the trait through education and personal effort. Finally, intrapersonal variation in conscientious behaviours is consistent with the view that Conscientiousness is responsive to reasoning, that is, that individuals choose certain behaviours based on reasoned judgement. These considerations support the view that Conscientiousness should be included in the list of performance virtues, alongside traits such as grit, resilience, perseverance, leadership skills, and confidence—traits or skills that have instrumental value, allowing the individual to successfully achieve their goals. Performance virtues are distinguished from character virtues (or moral virtues), given that they can be used to achieve selfish or worthless goals. Although we accept that some form of conscientiousness is a performance virtue, our aim in this paper is more ambitious: to show that there is a form of

conscientiousness that should be included in the list of character virtues, alongside virtues such as courage, compassion, and honesty.

Personality Traits and Character Traits

The aim of personality psychology is to describe individual differences in behaviour, reasoning, and emotions. It does this by using data-driven methods (Ratchford et al., 2024). Early personality research used the lexical method, which involved identifying traits encoded in language and using dictionaries to create inventories of terms denoting individual differences. They found clusters of behaviours, emotions, and cognitions that tend to occur together (Allport & Odbert, 1936). These inventories laid the foundation for the FFM of personality, which measures five broad personality traits on a spectrum ranging from low to high levels (Saucier & Goldberg, 1996). As noted earlier, each of these personality traits is made up of closely related sub-traits. Conscientiousness includes Dutifulness, Competence, Order, Achievement-Striving, Self-discipline and Deliberation. One implication of this trait structure is that individuals with similar overall scores on Conscientiousness may exhibit different behavioural patterns, depending on their unique sub-trait profiles. For example, one person may be highly organised but less driven by achievement, while another may be highly self-disciplined but less dutiful. This suggests that there are multiple forms of Conscientiousness, which raises the question: what will conscientiousness look like as a virtue?

Aristotelian virtue theorists use a theory-driven approach in describing virtues. They begin by stipulating that a virtue is a trait that human beings need in order to flourish, and that it consists of ideal patterns of behaviour, reasoning, and emotion within a given domain. Thus, whereas personality traits in the Five-Factor tradition aim to describe tendencies that people display, the virtue ethicist's aim is to give an account of a virtue as an ideal trait or

excellence—the best version of the trait in question. Virtue ethicists typically identify traits with reference to a given field (or area of concern) as well as a target (the good aimed at within that field) (Audi, 1977; Swanton, 2021; Curzer, 1997). For example, the field of the virtue of temperance is our appetites for bodily pleasures, and its target is to regulate these appetites, thereby avoiding both excessive and defective enjoyment of food and drink. Likewise, the field of benevolence is the needs and interests of others, and its target is to promote their welfare. Thus, although virtue- and vice- terms have descriptive content, they differ from personality traits in that they are essentially evaluative terms. Each virtue requires a commitment (or pro-attitude) to a particular good, such as truth, justice, or the welfare of others. A virtue is a “human excellence,” a trait that is both desirable and praiseworthy and that is connected to living a good life, whereas a vice is a flaw or defect, which stands in the way of flourishing.

Virtue theorists explore the links between emotional, cognitive and behavioural components of character traits. In the virtuous person, these components will be in harmony, in that their behaviour and emotions will be guided by reasoning. As Kristjánsson (2013) explains, the virtues are “reason-responsive”—a virtuous agent chooses to perform certain actions for good reasons, and will modify their attitudes and emotions in light of rational thought. Thus, for example, a benevolent person understands that other people’s welfare matters, and will therefore be concerned about their welfare and motivated to help them when he is able to do so. He will also find it rewarding to do so, because he recognises their happiness as a good or worthwhile end. A virtuously benevolent person will experience a certain inner harmony: They will perform a right action for the right reasons and with the right emotions (Aristotle, ca. 350 B.C.E./2020). A lack of harmony is usually indicative of vice (or at least a lack of virtue).

Virtue ethicists give a broad and complex account of the cognitive component of traits. As noted earlier, Deliberation is one of the sub-traits of Big Five Conscientiousness—that is, highly conscientious individuals have a tendency to think before acting, rather than acting impulsively. Aristotelian virtue ethicists will agree that thinking before acting is required for virtue. One of the ways the virtuous person differs from the non-virtuous is that they have a disposition to act for reasons. But acting for reasons is not sufficient for virtue. The virtuous person acts for *good* reasons (Hursthouse, 1999). More generally, virtuous people are thought to possess practical wisdom (*phronesis*), a form of intelligence or skill that is acquired through experience and that guides their actions and emotions. Although practical wisdom is a complex capacity with multiple functions, there are at least two broad functions that are particularly important to consider regarding conscientiousness. Firstly, practical wisdom involves an understanding of which things are truly important or worthwhile for human beings, thus allowing them to identify goals that are worth pursuing and to prioritise things that are more important. Secondly, practical wisdom allows us to develop the practical skills and knowledge required to pursue valuable goals (Russell, (2009). For instance, in the case of the virtue of temperance, practical wisdom allows the individual to appreciate that controlling one’s appetite is needed to maintain good health, that good health is more important than momentary pleasure, and to figure out ways to resist or avoid temptation. Similarly, and as we will argue below, a virtuously conscientious person will be committed to roles that are worthwhile, have a good understanding of the relative importance of tasks required by the role, and will acquire the relevant practical skills and knowledge needed to perform these tasks well.

Finally, virtuous behaviours are appropriate relative to the situation. For instance, a generous person is not someone who habitually and freely gives away their resources. Rather, the virtue of generosity involves freely giving when it is appropriate to do so, to the right

causes, in the right manner, and so on. Their actions are informed by practical wisdom, allowing them to succeed in achieving a worthwhile goal.

In summary, the cognitive, emotional and behavioural aspects of the virtues are defined with reference to a theory of what it means to function well as a social and rational being. As a result, the content of each aspect of a particular virtue, as well as the relationships between them, differ significantly from the content of personality traits. In the remainder of this paper, we provide a philosophical account of conscientiousness as a virtue.

Identifying the Virtue of Conscientiousness

As we've seen, Conscientiousness as a personality trait consists of a collection of sub-traits, each of which include several "nuances" or sub-sub-traits. Thus, for example, Dutifulness includes a tendency to follow the rules, keep promises, pay one's bills on time, tell the truth, and follow instructions; Orderliness includes a preference for a clean and tidy environment, a desire to have everything "just right", a tendency to make plans, a tendency to do things according to a plan, and an inclination to be "bothered" by messy people. Given the variety and multiplicity of this list, the virtue theorist should begin by identifying the target of the virtue.

One proposal is that self-control or self-regulation is the target of conscientiousness. Turiano (2017, p2) claims, for instance, that "constraint and control of impulses are the hallmarks of this personality trait," as it allows individuals "to engage in more goal-directed and responsible behaviors" and to "delay gratification, plan for the future, and follow the norms/rules set by society." For someone to possess conscientiousness as a virtue, then, we might propose that they have excellent control over their impulses, desires, appetites, and so on. However, Aristotelian virtue theorists will reject this proposal. To begin with, the ability to exercise self-control is a skill or strength, rather than a character trait, that is, a reliable

disposition to act, reason, and feel in certain ways. It could form a part of a virtue, but it is not a virtue in its own right. Further, self-control is not a *distinctive* feature of conscientiousness—it is also associated with a traits such temperance (avoiding or resisting temptation for bodily pleasure), honesty (resisting the temptation to lie, cheat or steal), and perseverance (continuing a task despite difficulty or hardship). Finally, and perhaps the most important reason for rejecting the claim that the ability to self-control is the target of conscientiousness is the fact that it can be used to pursue an evil end. Whether exercising self-control is good or admirable in the circumstances will always depend on whether one's aim is worthwhile.

Another proposal is that the virtue of conscientiousness is aimed at successfully performing one's duties. The term "dutifulness" is often offered as a synonym for conscientiousness, and closely linked with self-control. As noted earlier, moral conscientiousness is associated with both dutifulness and self-control: the morally conscientious person is committed to performing their moral duty, regardless of their feelings, desires, or inclinations, and, given that these can run counter to the demands of morality, dutifulness requires self-control. Virtue ethicists reject the view that moral conscientiousness is a virtue, because (among other reasons) they deny the claim that we have *moral* duties, that is, duties that exist independent of our beliefs and conventions (Hursthouse; 1999). Rather, as McManus et al., (2024) argue, the virtue of conscientiousness involves a different, and less abstract form of dutifulness, which is to reliably perform the duties (tasks, responsibilities, chores, obligations) associated with particular roles we occupy in society.

The clearest example of such duties are the ones that come with a given role or position in the workplace. In this context, describing an employee as dutiful does not suggest that they are pious or moral but rather that they reliably perform the tasks that are assigned to

them. In the case of someone employed as a chef in a restaurant, for instance, these will include tasks set out in an employment agreement, such as planning the menu and developing new dishes, ordering ingredients, inspecting equipment and work areas for cleanliness and functionality, and so on. Their duties will also include adhering to relevant laws and regulations, such as health and safety standards, procedures for managing complaints, and so on. We might propose, then, that the virtue of conscientiousness is targeted at performing one's workplace duties to a high standard. One strength of this definition is that it explains how the trait is connected to some of the sub-traits listed above. Successfully performing one's duties in the workplace will typically require one to be hard-working, meticulous, thoughtful (rather than impulsive), well-organised, and competent. It will also require self-discipline—both the ability to resist hedonistic impulses, and the ability to persist when the work is difficult or tedious.

However, this definition is vulnerable to two objections. First, dutifulness is not always consistent with virtue. It is associated with obedience—*adhering* to rules and regulations, *conforming* to norms, *following* instructions. Thus, individuals who are dutiful may encounter difficulties in complex or novel situations where they are required to act independently or creatively. A study by Wilmot and Ones (2019) found that although Conscientiousness is associated with performance in occupations that are low to moderate in complexity, it has weaker effects for complex occupations, such as managerial and professional occupations. In the Aristotelian view, we've seen, virtue requires practical wisdom—a kind of intelligence that enables the individual to see what is appropriate in the situation. Following rules or instructions is not sufficient for virtue, and indeed, strict rule-following will often act as a constraint on an individual's ability to act appropriately in a situation. Stephen Angle (2014) argues that the conscientious person, while reliable, will act

too rigidly—following rules or obeying instructions is important for learners who are not yet sufficiently virtuous to act independently and spontaneously.

A closely related objection is that defining the virtue of conscientiousness as successfully fulfilling one's role-specific duties implies that a member of a criminal gang could possess the virtue if he is highly committed to performing his duties, careful to follow orders, and perseveres when the task becomes difficult (Kristjánsson 2013).

To avoid these objections, we need to move away from defining conscientiousness in terms of dutifulness. Instead, the target needs to be further specified as excellence in performing the duties that come with a worthwhile role. As mentioned earlier, each virtue involves a commitment to a good or worthwhile end, so conscientious individuals will pursue roles that promote flourishing rather than one which are pointless or harmful. For instance, guided by practical wisdom, one might pursue a career in a legitimate area of medicine, such as surgery or pathology rather than pursuing a career in pseudoscience, like homeopathy. Accordingly, the virtuously conscientious person performs their duties in a manner and to the extent necessary to excel in their chosen role. In this way, conscientiousness as a virtue is closely connected to the sub-trait of Achievement-striving: being goal-directed and diligent, having high standards, and being committed to doing a job well.

Thus far, we have described conscientiousness as a virtue that involves performing the duties that come with an occupation or role in the workplace. But it should be obvious that the virtue of conscientiousness can also be exercised in other settings. In educational settings, for example, the role of student comes with a set of duties or responsibilities, such as attending lectures, submitting assignments, and so on. Similarly, individuals can take on various roles (and role-specific duties) in domestic settings, ranging from broadly defined roles (e.g. homemaker) to more specific roles (e.g. budgeting, cleaning, trash, etc.). Each of

these roles involve a set of duties—tasks we have to perform in the course of our daily lives, as opposed to activities that are entirely optional, such as recreation and entertainment. The virtuously conscientious person then, will choose to commit to worthwhile roles, and perform the duties that come with them to a high standard, where this is measured with reference to the good in question.

We need to add two further points to distinguish the virtue of conscientiousness from the personality trait. For an individual to have conscientiousness as a virtue they must be committed to achieving excellence in a *worthwhile* role. We understand a worthwhile goal in the Aristotelian sense of being connected to flourishing, as objectively valuable. For a role to be worthwhile in this sense is not simply for the individual to value it. Rather, a role is worthwhile if the individual correctly believes that it makes a positive contribution, however modest, to the good functioning of society.

It is also useful to distinguish the virtue of conscientiousness from ambition. Both traits are connected to Achievement-striving (being goal-oriented, hard-working, and having high standards), but there are important differences. Most notably, the ambitious person's aim is ultimately to improve their own standing in society; thus, they might excel in their career or other endeavours, not because they value the role, but in order to acquire wealth or power, which can, in turn, be used for either good or ill (Pettigrove, 2007; Annas, 2021). By contrast, the conscientious person's aim is to perform their role well, because they recognise it as a worthwhile end.

In the following section we flesh out this account of the virtue by exploring its behavioural, cognitive, and emotional dimension.

Three Dimensions of Virtuous Conscientiousness

The virtues involve characteristic patterns of behaviour, cognition, and emotion (McManus et al., 2024). A substantive theory of the virtue of conscientiousness, then, should be able to give a broad description of each of these dimensions and how they are aimed at the target of role-specific excellence.

In terms of behaviour, we can begin by stating that a virtuously conscientious person will perform the duties and responsibilities associated with their role. For example, a conscientious teacher will consistently and reliably show up to class on time, be prepared to give their lesson, mark students' work, write reports, and attend staff meetings. But performing these tasks is not sufficient for virtue. A conscientious teacher will perform these tasks with a view to advancing students' learning. For instance, they might revise the content of old lesson plans to suit students' interests, give useful feedback, and adapt learning strategies to individual students. While these behaviours are not strictly required or specified in an employment contract, they demonstrate a commitment to excellence beyond basic expectations—this makes conscientious behaviour particularly praiseworthy and admirable.

Most roles come with a long list of tasks that make competing demands on the individual's time and attention, often necessitating complex decision-making about the importance of each task, the amount of time to allocate to them, the relative importance of timeliness and quality, and so on. Successful prioritisation requires an understanding of the connection between the various tasks and the central goals of the role in question. The kind of intelligence and insight needed is what Aristotelians refer to as practical wisdom—broadly speaking, it is an understanding of what is truly important for human flourishing, and includes a clear grasp of which things (projects, activities, states, experiences, etc.) are valuable and worth pursuing in a well-lived life. In the case of conscientiousness, practical

wisdom guides decision-making about prioritising tasks. Thus, for example, a conscientious teacher might prioritise tasks that directly affect student learning, while minimising time spent on administrative duties.

Practical wisdom also allows individuals to prioritise some roles over others. Most people occupy more than one role, and given constraints on our time and energy, it is not wise to pursue excellence in every role. One implication of this is that we should expect to find a greater degree of intrapersonal variance in behaviours associated with the virtue of conscientiousness, compared to the personality trait. For instance, individuals who have Tidiness as a personality trait (a sub-trait of Orderliness) will tend to display this trait across the board—at home, in the workplace, in the way they dress, and so on, because they have a need for a tidy environment. By contrast, the virtuously conscientious person will keep an environment tidy when and to the extent they judge it to be appropriate or necessary for achieving their aims. Thus, for example, a conscientious teacher might keep their desk and classroom tidy, if this allows them to do their job more effectively, but have a much more relaxed regimen at home.

Practical wisdom also allows the individual to make good decisions when role duties stand in the way of the other things we might want to do with our time. Role-specific duties are similar to moral duties in that they make demands on us, independent of our desires or inclinations (Annas, 2014; 2015). For instance, a teacher might have no inclination to mark her students' essays, but this doesn't change the fact that she has a duty to do so. Therefore, the conscientious person will often prioritise work-related duties over other things—the teacher might apologise for missing a party by saying that she *must* complete her marking this evening. Unlike moral duties, however, role-specific duties do not make a categorical demand on us—that is, they are not unconditional. Thus, for example, a conscientious teacher

might judge that it is appropriate to miss a work meeting to attend their daughter's dance recital.

As mentioned earlier, virtue ethicists claim that practical wisdom also allows the individual to successfully achieve the goals that they correctly judge to be worthwhile. In the case of the virtue of conscientiousness, the connection between the two functions of practical wisdom can be illustrated as follows. A newly appointed young teacher will come equipped with theoretical knowledge but, lacking experience, will not yet have conscientiousness as a virtue. However, if they understand the importance of their role—why it is worth doing well—they will be motivated to acquire the practical skills needed to achieve excellence in the role. They will become well-organised, learn to pay attention to the right details, pursue relevant opportunities for professional development, and so on. In short, then, an understanding of what is important for human flourishing, including how their role contributes to this end, guides and motivates the individual to attain the practical skills required to achieve excellence in their role.

According to the Aristotelian doctrine of the mean, every virtue (the ideal form of a particular trait) lies in a mean between two vices, a deficiency and an excess (Gottlieb, 2009). In the case of conscientiousness, the virtue will lie in the mean between placing either too little or too much value on performing one's role well. The mean can sometimes be specified in quantitative terms, such as temporal duration or intensity. For example, the virtuously conscientious person will avoid spending either too little or too much time and energy tidying up their working environment (where the ideal or mean is specified relative to the role in question.) In many cases, however, the mean is not a quantitative matter but rather a matter of "getting it right" and doing what is reasonable in the circumstances. For example, being well-organised cannot be measured based on people's propensity to make lists and stick to schedules. It can only be understood as the level of organisation that is conducive to

performing well relative to an individual's needs and capacities in a given domain. It is a mistake to claim, as Carter et al. (2018) does, that people with "moderate levels of the conscientiousness facets of dutifulness, self-discipline, and cautiousness" possess an "optimal" level of the trait—the virtue of conscientiousness.

A deficiency in conscientiousness can manifest in many ways, but they all stem from a lack of appreciation and understanding of the importance or value of their role and how it contributes to flourishing. The unconscientious teacher, lacking an appreciation of the difference they can make to a student's learning, might view any attempt to do more than the bare minimum as a waste of time. The ambitious employee might be motivated to do their job well, but only to the extent that it affects their paycheck. Again, this may demonstrate a lack of appreciation of the value of their role, and of the importance of engaging in a meaningful activity for their own flourishing. Still others might understand the value of their role and be genuinely motivated to acquire the skills needed to perform it well, but lack insight into their ability to do so.

On the other hand, the vice of excess ("hyperconscientiousness") also manifests a lack of practical wisdom. In this case, however, it stems from placing too much value on one's role (or certain aspects of it). For example, the workaholic might spend an excessive number of hours at the office, while neglecting family and other aspects of their life, leading to burn-out and the need to take extended periods of leave. The perfectionist might fixate on unimportant details, while neglecting duties that are more central to their role. In essence, people with the vice of excess have misplaced priorities, but unlike the unconscientious, who show an insufficient amount of care or concern for doing their job well, they care too much, ultimately at the expense of more valuable pursuits.

Interestingly, recent research in psychology supports the view that conscientiousness is a mean between a defect and an excess (Carter et al., 2018). Psychologists typically measure personality traits on a linear scale. Lower scores on Conscientiousness measures are linked to worse outcomes in terms of academic achievement, income, job satisfaction, and health, whereas higher scores are associated with good outcomes (Zell & Lesick, 2021). However, many psychologists note that very high scores on conscientiousness are indicative of perfectionism and workaholism, which renders the individual more prone to anxiety and burnout. Perfectionists tend to have unrealistic goals, standards, and expectations, and hold inappropriately demanding or restricted views of what it means to “do things the right way.” As a result, they tend to be overly rigid and inflexible, and lacking in spontaneity and creativity. In their quest for perfection, they might take too much time to make urgent decisions, be too attached to rules and regulations, and be overly resistant to change (Flett & Hewitt, 2007; Soeber & Otto, 2006; Tett, 1998).

In short, then, practical wisdom is the form of intelligence or insight that allows the virtuous person to find the mean between a defect and an excess. For example, the virtue of conscientiousness requires one to be well-organised. But being well-organised is not just a matter of avoiding disorganisation (a lack of routine and structure, etc.). It also requires one to avoid excessive organisation, seen, for example, in the person who devotes inordinate amounts of time and energy to keeping their home perfectly clean and tidy, to the point that they become anxious about minor imperfections.

Finally, the emotional dimension of conscientiousness involves having an appropriate attitude to one’s role and the role-specific duties. Aristotelian virtue ethicists claim that the emotions of virtuous people are aligned with reason. That is, virtuous people do not only act in accordance with reason; they also experience emotions in harmony with reason. This

means that their emotional responses—such as anger, fear, or joy—are appropriate to the situation. For instance, a benevolent person will be pleased when they are able to help a friend, rather than having to resort to willpower to do what they believe to be right.

This suggests that the virtuously conscientious teacher will be motivated to perform their various duties, such as providing helpful feedback on assignments, by a genuine desire to promote her students' learning. That is, rather than having to resort to willpower, she will look forward to performing these tasks, and do so with pleasure. However, this rather cheerful description appears at odds with the general conception of conscientiousness as involving hard work and determination, requiring the ability to persevere when the work is difficult or demanding. We can avoid this problem by noting that the conscientious person will be committed to achieving excellence in a role that she values and therefore feels enthusiastic about. However, almost any role will include tasks that are tedious, unpleasant, or demanding, and finding it difficult to perform these tasks is not indicative of vice—unlike the person who finds it difficult to help a friend because he is reluctant to sacrifice an afternoon relaxing on the couch. Further, role-specific duties often demand of one to make genuine sacrifices, such as missing a family gathering. Performing one's duties will therefore require self-discipline, and it will be entirely appropriate or reasonable for the virtuous person to experience feelings of regret while doing so. In much the same way that the virtue of courage is manifested at times of great danger, the virtue of conscientiousness is most evident when the work that needs to be done is challenging. Both virtues are most evident when the individual faces challenges that test their character and require deliberate effort to maintain their commitment to doing the right thing.

We have argued, then, that conscientiousness requires self-discipline. However, the conscientious person will generally find it easier to perform their duties than someone who

relies solely on self-discipline. For example, the conscientious teacher will enjoy many aspects of their role and find it rewarding to help students who are struggling. They might be excited about learning new teaching strategies and planning new lessons when these are likely to contribute to students' learning. They will also find it easier to perform arduous tasks, such as grading essays, because they understand why the task is necessary for achieving a valued end. In short, because conscientious people are committed to attaining excellence in a role they consider worthwhile, they will generally be able to complete role-specific tasks without experiencing a significant degree of inner conflict. Overall, even though the emotions of a conscientious person are nuanced, and it may be difficult for a someone to meet the ideal Aristotelian standard, within a given context we are able to identify attitudes and emotional responses that are indicative of the virtue of conscientiousness.

Conclusion

Philosophers have not attempted to give an account of conscientiousness as a virtuous character trait. And although there is a vast body of research on Conscientiousness in psychology, it is considered to be a broad personality trait rather than a virtue. Nevertheless, some of the findings in psychology support the view that there is a virtue of conscientiousness—it is viewed as a beneficial or adaptive trait that individuals can acquire, and that involves characteristic patterns of behaviour, cognition, and emotion. The task of reconceptualising conscientiousness as a virtue is complicated by the conceptual and theoretical differences between virtue theory and personality psychology. Existing psychological models of Conscientiousness do not align well with a more fine-tuned Aristotelian theory of virtue.

Our aim in this paper was to sketch an account of conscientiousness as a virtue. We draw on Aristotelian virtue ethics as well as empirical research in psychology. We propose that the virtue of conscientiousness involves performing role-specific duties, requires self-discipline, and is aimed at achieving excellence in a worthwhile role. The virtue is a mean between a deficiency, characterised by carelessness, a lack of responsibility, and a failure to appreciate the importance of one's role, and an excess, typically manifested as perfectionism or workaholism, where the individual takes their role, or aspects of the role, too seriously. The virtue of conscientiousness requires practical wisdom, which allows the individual to pursue worthwhile ends, prioritise effectively, and avoid the vices of excess and defect.

Overall, we have presented a theory of conscientiousness grounded in Aristotelian virtue ethics. Because Aristotelian virtue theory is naturalistic, this framework offers a foundation for empirical investigation. Such work is already underway, with the development of the Aristotelian virtue of Conscientiousness Scale (AVCS), which has been used to identifying a measurable construct based on this framework (McManus et al., 2024). This work suggests that the virtue of conscientiousness is positively associated with life satisfaction, whereas more extreme scores representing the vice of excess also related to higher levels of depression, anxiety, and stress. While this research is promising, future work can address existing limitations by drawing even more deeply on our theoretical contribution. For instance, as a self-report scale, the AVCS is limited in assessing whether people have a correct understanding of what is good, and in assessing whether people are, in fact, pursuing worthwhile roles. For this reason, future work can look at administering qualitative or ability-styled questioning alongside the AVSC for a more comprehensive research design. In this way, the theoretical work provided here can inform further research into how conscientiousness is cultivated, perhaps through education or targeted interventions.

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Chapter 3: Measuring Virtue: An Aristotelian Perspective on Advancing Positive Psychology

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Chapter Introduction

This paper was written and published as part of a special issue in the *International Journal of Applied Positive Psychology*, which focused on addressing challenges in positive psychology and contributing to debates and potential solutions within the field. This paper is presented as the second chapter because it bridges the move from theory (Chapter 2) to measurement (Chapters 4–6). It also introduces several of the measurement techniques, such as confirmatory factor analysis, Rasch analysis, and network analysis, that are later applied in my empirical studies. The paper also engages with broader ethical criticisms of virtue science. Although these concerns do not undermine the value of either positive psychology or the study of virtue, it is important to consider them early in the research process.

Abstract

In philosophical discourse, flourishing is widely thought to require the development and exercise of virtues. Positive psychology, as the science of happiness and flourishing, should, therefore, include the scientific investigation of the virtues. However, the main classification of virtues and strengths, the Values in Action Inventory of Strengths (VIA-IS), faces major criticisms that, if not addressed, may undermine the credibility of positive psychology as a science. One such criticism is that virtue-based classifications lack a conceptual foundation; another is that these classifications may harm individuals by attaching potentially stigmatising labels to them. In this paper, we propose that positive psychologists can address these critiques by taking an interdisciplinary approach, which involves adopting a philosophically rich Aristotelian theory of virtue, and further developing this approach through empirical research. Adopting a philosophical theory will provide a strong conceptual base for psychologists, guiding the construction of measures and the formation of hypotheses about virtues. However, as many scholars acknowledge, it is difficult to measure all aspects of Aristotelian virtues, such as emotions, reasons, and attitudes. Another aim of this paper is, therefore, to suggest appropriate methods for measuring these aspects of Aristotelian virtues.

Keywords: Positive Psychology, Philosophy, interdisciplinary research, Aristotelian virtue theory, psychometric assessment.

Positive Psychology is the scientific study of human happiness, well-being, and flourishing (Gable & Haidt, 2005). In Philosophy, human flourishing is thought to require the exercise and development of the virtues (Kraut, 2009). For this reason, Positive Psychology should include a conception of the virtues that can form the basis of empirical study. However, the most popular model of virtues and strengths in Positive Psychology, the Values-in-Action Inventory of Strengths (VIA-IS), faces major criticisms (Efendic & Van Zyl, 2019; Van Zyl et al., 2023). Among the strongest of these criticisms is the claim that it lacks an adequate conceptual foundation, and the claim that it forms part of a neoliberal ideology that harms individuals by labelling and blaming them for qualities that are not within their control (Van Zyl et al., 2023; Bright et al., 2013; Fowers et al., 2021; Kristjánsson, 2012; Kristjánsson, 2013; Fernández-Ríos & Novo, 2012; Burr & Dick, 2021; Thompson, 2018). These critiques of the study of virtues in Positive Psychology threaten to undermine the credibility of the discipline (Efendic & Van Zyl, 2019).

To respond to these critiques, we propose that positive psychologists should take an interdisciplinary approach to virtue measurement by drawing from Aristotelian virtue theory, which is considered the dominant virtue theory in Philosophy (Swanton, 2021). We argue that positive psychologists should focus on developing measurement tools that capture a complete account of virtue, based on an Aristotelian theory of virtue. This entails that scholars operationalise each main component of the virtues, including appropriate behaviours, emotions, reasoning, motivations, and practical wisdom as well as the corresponding vices. As some scholars have noted, measuring each of these components is challenging (Fowers et al., 2021; Shahab et al., 2020). For this reason, we propose measurement strategies and specific statistical analyses that we believe will be useful for measuring virtues, such as confirmatory factor analysis (CFA), exploratory structural equation modelling (SEM), latent profile analysis (LPA), and network analysis.

In the first section of this paper, “How the VIA-IS Lacks a Conceptual Foundation,” we begin by introducing the VIA-IS and the critique that it lacks a strong conceptual foundation. In the second section we introduce Aristotelian virtue theory by explaining the key components of virtues, such as appropriate behaviours, emotions, reasoning, motivations, and practical wisdom as well as the corresponding vices. Section three, “Measuring Virtue,” explains how Aristotelian virtues should be operationalised. We propose that psychometric virtue measurements should include specially designed facets that measure each component of virtue individually. In section four, “Measurement Analyses for Virtue Scales,” we explain specific statistical techniques, such as Exploratory Structural Equation Modelling, which we believe will be helpful for validating and investigating virtue scales. In the final section we discuss the critique that Positive Psychology is a neo-liberal ideology that causes harm to individuals by blaming them for character traits that are the result of situational influences rather than personal responsibility. We discuss this critique in relation to an Aristotelian approach to virtue, explaining that care needs to be taken to minimise stigma and harm.

How the VIA-IS Lacks a Conceptual Foundation

Positive psychologists focus on the positive aspects of human beings—they are interested in what makes it possible for people to flourish or thrive (Gable & Haidt, 2005). It is commonly accepted that the development and exercise of virtuous character traits are required for flourishing or happiness (Kraut, 2009). For this reason, virtues should be fundamental objects of concern and importance to positive psychologists generally. Indeed, they underpin the popular VIA-IS—currently the dominant positive psychological tool for assessing and studying virtues (Peterson & Seligman, 2004; Kristjánsson, 2013). Although there are useful approaches to happiness and well-being in psychology, such as hedonic accounts that utilise measures of positive emotions and life satisfaction, flourishing and

virtue-based approaches offer an alternative conception of well-being which can complement existing theories and research (Delle Fave, 2020; Diener et al., 1985; Watson et al., 1988). Numerous empirical studies have been conducted with the VIA-IS, and the evidence strongly supports the notion that character strengths are related to various aspects of well-being; in particular, they correlate with the PERMA model, which is designed to measure flourishing (PERMA stands for Positive Emotion, Engagement, Relationships, Meaning, and Accomplishment) (Green, 2022; Wagner et al., 2020; Bruna et al., 2019; Wagner & Ruch, 2015; Boiman-Meshita & Littman-Ovadia, 2021).

The VIA-IS is a classification of 24 character strengths that are arranged under six broad virtue categories: Wisdom, Courage, Humanity, Justice, Temperance and Transcendence (Peterson & Seligman, 2004). Each of the 24 character strengths represents one way of exhibiting a particular virtue. For instance, Temperance is represented by the strengths of forgiveness, gratitude, humility, prudence, and self-regulation. The virtues and strengths included in the VIA-IS were partly selected because they are valued across cultures and historical periods and are thought to contribute to the flourishing of all human beings (Peterson & Seligman, 2004). However, despite promising findings, and as noted in a systematic review conducted by Van Zyl et al. (2023), several critics of positive psychology have argued that although the virtues are a fundamental element of the VIA-IS, they are poorly conceptualised and viewed merely as a set of behaviors. Virtue theorists have similarly argued that the VIA-IS is inconsistent with an Aristotelian account of virtue, despite being inspired by it (Bright et al., 2013; Fowers et al., 2021; Kristjánsson, 2012; Kristjánsson, 2013).

One of the significant drawbacks of the VIA-IS is its focus on observable behaviours as opposed to the internal characteristics of individuals. Aristotelian virtue theory, being the

dominant philosophical theory, views virtues as deep traits, reflecting people's inner states, including their values, desires, emotions, reasoning and motivations (Hursthouse, 2001). Moreover, Aristotelians define virtues as excellences of character, constituting appropriate responses to virtue-relevant stimuli. Despite the richness of the Aristotelian virtue theory offered by philosophers, the VIA-IS pays little attention to the non-behavioural aspects of virtues. Several scholars, including Fowers et al. (2021), Snow (2022), and Bright et al. (2013), have criticised Positive Psychology for its focus on measurable behaviours as well as its neglect of the Aristotelian theory in relation to excellence. Bright et al. (2013) observe that the tools employed by positive psychologists (namely, self-report questionnaires) take a continuous approach to virtue, implying that virtue is something everyone possesses to some degree. This behaviourally driven and continuous approach is, they argue, incompatible with the idea that virtues are excellences. For instance, they cite several studies that suggest that virtue expression can be maladaptive; for example, forgiveness has been found to perpetuate relationship abuse, and generosity to impair workplace functioning (McNulty, 2011; Flynn, 2003). Based on these findings, some scholars claim that virtues are not inherently valuable, but neutral and context-dependent (Bright et al., 2013). This contrasts with the Aristotelian idea that virtues are excellences, consisting of appropriate responses to any given circumstance. They also argue that the continuous approach to virtues comes apart from the traditional understanding of virtues as types of traits that consist of a mean between two vices, one of excess, the other of deficiency (Bright et al., 2013; Aristotle, ca. 350 B.C.E./2020). Taking a purely continuous approach may also restrict the influence of Aristotelian theory in Positive Psychology by neglecting other character dispositions, such as continence and incontinence, which are dispositions that fall short of full virtue due to a lack of one or more necessary component of virtue (these terms will be explained in more detail shortly).

In response to these criticisms, we propose that rather than merely taking inspiration from some aspects of Aristotelian virtue theory, positive psychologists should develop measures that are based on all major aspects of this theory. As a rich and well-developed position in Philosophy, Aristotelian virtue theory offers a conceptual foundation or basis for empirical models of virtue, which, as noted earlier, is currently lacking in the most popular classification of virtues and character strengths in Positive Psychology, the VIA-IS. A number of interdisciplinary scholars have attempted to measure virtue as informed by Aristotelianism (Wright et al., 2021; Morgan et al., 2012; Darnell et al., 2022). Before discussing these scales and offering further suggestions on measuring virtue, we will briefly outline the important aspects of Aristotelian virtue theory.

The Aristotelian Theory of Virtue

According to Aristotelian virtue theorists, virtues such as honesty, kindness, and courage, are multifaceted dispositions of character that are necessary for achieving *eudaimonia* (Aristotle, ca. 350 B.C.E./2020). ‘Eudaimonia’ originates from ancient Greek and is variously translated as ‘human flourishing’, ‘true happiness’, ‘a good life’ and ‘well-being’ (e.g., Blackburn, 2016). Aristotelians prefer ‘flourishing’ as it captures Aristotle’s naturalistic approach to living well (Hursthouse, 2001). Regardless of the specific translation, *eudaimonia* is seen as an end that is good or desirable in itself (Hursthouse, 2001; Kraut, 2022; Blackburn, 2016; Aristotle, ca. 350 B.C.E./2020). Thus, although the virtues are descriptive of real psychological tendencies, they are also defined in terms of normative standards—virtues are traits that enable people to flourish.

According to Aristotle, flourishing is not merely a matter of experiencing happy or positive affective states (although he accepts that a happy life will include pleasant feelings). Rather, to flourish is to function well as a human being, which he argues involves virtuous

activity (Aristotle, ca. 350 B.C.E./2020). For Aristotle, humans are by nature rational and social beings. He therefore considers the virtues—the traits required for functioning well as human beings—to be rational excellences that allow people to thrive in human societies. Following Aristotle, contemporary virtue theorists claim that being virtuous is good for the individual, given that it makes it possible for them to live a life that is both desirable or worthwhile as well as admirable. But virtuous activity (e.g. being honest in one's dealings with others, courageously pursuing worthwhile goals, etc.) also contribute to the happiness of others as well as the good of society as a whole (Aristotle, ca. 350 B.C.E./2020; Hursthouse, 2001).

Virtues are deep traits, in that they involve a person's behavioural, affective, and cognitive propensities, including desires, reasoning, emotions, and motivations (Hursthouse, 2001). A virtuous person has a tendency to behave in certain ways (e.g. tell the truth, help friends in need, etc.), but what distinguishes them from someone who does these things out of habit or from selfish or deplorable motives, is that their behaviour aligns with appropriate and praiseworthy forms of reasoning, feeling, and desiring (Hursthouse, 2001). For example, giving expensive gifts is not truly generous if it is motivated by a desire to embarrass the recipients or bolster their own social status. Instead, someone with the virtue of generosity will be motivated by desire to contribute to the welfare or happiness of others, because they view this as a desirable or worthwhile goal (Aristotle, ca. 350 B.C.E./2020).

Further, and somewhat less intuitively, Aristotle argues that someone who aims to act virtuously but fails to do so due to ignorance or incompetence, does not possess the relevant virtue either (Aristotle, ca. 350 B.C.E./2020). For example, the person who is motivated by compassion for starving children, but donates large sums of money to ineffective charities, does not have generosity as a virtue. In the Aristotelian view, virtues require *phronesis*

(practical wisdom), which can be defined as the ability to make good judgments about which goals are worth pursuing, as well as possessing the necessary practical skills, knowledge, and experience to successfully pursue these goals (Russell, 2009). Indeed, this nuanced understanding of practical wisdom is important, yet inappropriately captured by most extant measures of virtue, such as the VIA-IS.

As practical wisdom enables one to see which acts are good or virtuous in any given situation, people with the virtues behave, reason, and feel in ways that are appropriate in each context (Russell, 2009). For Aristotle, virtue is defined in terms of appropriateness, as an excellence. He sees each virtue as a mean corresponding to vices of excess and deficiency, that is, as inappropriate extremes in behaviour, reasoning, and emotion (Aristotle, ca. 350 B.C.E./2020). For example, the virtue of courage is the mean between the vices of cowardice and recklessness. Cowards experience too much fear relative to the situation, thereby not performing behaviours they should, whereas reckless people don't experience enough fear and perform risky behaviours that are unlikely to serve a desirable end. By contrast, the virtuous mean (courage) involves experiencing an appropriate amount of fear relative to the situation. In the Aristotelian view, expressing emotions such as fear and anger is not always consistent with vice. For example, expressing a certain amount of anger in response to an act of injustice can be appropriate in a given situation and be conducive to the achievement of worthwhile ends. It is important to note that extant measures of virtue currently lack a sufficiently complex understanding of appropriateness in relation to behaviour, emotion, and reasoning), and although scholars acknowledge the difficulty in measuring it, we think it is useful to incorporate the idea of virtue as a mean in assessments of virtue (Fowers et al., 2021).

The vices are extremes (through either excess or defect), but there are ways of failing to be virtuous that do not amount to vice. Aristotle describes various other character types that people may exhibit, namely continence, incontinence, natural virtue and habit (Aristotle, ca. 350 B.C.E./2020). Continence refers to the disposition to behave appropriately based on a correct understanding of why the behaviour is called for. However, continent people do not experience appropriate affect—they typically don't want to do what is right, and so have to resort to the use self-control or will power to behave appropriately. Continence differs from full virtue because a fully virtuous person has a desire to do what is right and good, and therefore does so effortlessly and without having to resist conflicting feelings or desires (Aristotle, ca. 350 B.C.E./2020). Although they are not yet virtuous, continent people have made significant progress in learning how to be virtuous.

Incontinence is described as weakness of will. Like both the continent and fully virtuous person, an incontinent person reasons appropriately and knows what things are important. However, they do not experience the appropriate emotional impetus to perform right actions, and neither do they have the self-control to do so. As a result, they often act inappropriately, despite knowing better (Aristotle, ca. 350 B.C.E./2020).

Finally, Aristotle uses the term 'natural virtue' to refer to a state that is characterised by appropriate emotions and desires but accompanied by a lack of practical wisdom (Aristotle, ca. 350 B.C.E./2020). This disposition is often found in well-natured children who have praiseworthy motivations who lack the practical experience to successfully promote desirable ends. People with this disposition cannot be relied upon to act appropriately. For instance, a well-motivated child might remove a goldfish from its tank to warm it up. Although this act is motivated by compassion, it is not a virtuous action because it is not informed by practical wisdom—an understanding of what is required to promote the welfare

of goldfish. A child who possesses natural virtue are in the beginning states of developing full virtue. It may therefore be useful to study this disposition, perhaps offering insights into improving character development in children and adolescents.

These character types are presented in Table 1. Note that there are more possible combinations involving the different components of character; however, Table 1 presents the main dispositions Aristotle discusses.

Table 1

Aristotelian Character Dispositions

	Appropriate Motivations		
	Appropriate Cognition (Practical Wisdom)	Appropriate Affect	Appropriate Behaviours
Full Virtue	Yes	Yes	Yes
Continence	Yes	No	Yes
Incontinence	Yes	No	No
Natural virtue	No	Yes	Sometimes
Habit	No	No	Yes
Vice (excess or deficiency)	No	No	No

Note. Appropriate cognition subsumes practical wisdom, including the broad deliberative ability to determine what ends are valuable and worth promoting and preserving. When someone has both appropriate cognition and affect, they have appropriate motivations.

Measuring Virtue

In Psychology, to date, there are no comprehensive accounts of Aristotle's virtue theory. This is unfortunate, because it is the dominant theory in Philosophy and offers a detailed conceptual framework for the study of virtue (Swanton, 2021). However, in recent years there has been some very promising interdisciplinary work, which we will discuss here. We propose that such work should continue but that it should pay closer attention to all important aspects of Aristotelian virtue theory.

The Multi-Component Gratitude Scale, developed by Morgan et al. (2017), is one example of a scale created by interdisciplinary scholars to measure Aristotelian virtues. Morgan et al. (2017) contend that any measure of virtue should focus on several psychological components. Consequently, the Multi-Component Gratitude Measure is designed to assess four components of gratitude: a behavioural component, an affective component, an attitudinal component, and a conceptual component. This attempt to measure virtue is commendable and, in our view, one of the best examples of a psychometric scale designed to measure virtue. Morgan et al.'s (2017) scale measures nearly all of the important aspects of virtue emphasised in Aristotelian virtue theory; it has various items relating to emotions, behaviours, and beliefs. Moreover, this scale doesn't just capture important elements of Aristotle's theory, it also predicts well-being scores on the Satisfaction with Life Scale (Diener et al., 1985), the Subjective Happiness Scale (Lyubomirsky & Lepper, 1999), and the Positive and Negative Affect Schedule (Watson et al., 1988). The developers found that according to these scales, the more components of gratitude that participants scored highly on, the higher they reported their well-being to be. This serves to demonstrate the possibility and importance of developing and testing fuller accounts of virtue, as well as the usefulness of Aristotle's virtue theory.

However, despite adhering to a full Aristotelian account of virtue more closely than the VIA-IS classification, the Multi-Component Gratitude Measure still suffers from certain limitations. For one, although it includes an account of appropriateness, the scale gives a very limited account of the vices of excess, with no items measuring the tendencies for excessiveness in emotions and behaviours. As such, it doesn't successfully measure gratitude as a mean between a deficiency (ingratitude) and an excess ('overgratefulness') and is therefore incomplete (Manela, 2019).

Moreover, whereas Aristotelian virtue theory holds that virtuous people have virtuous motivations, the Multi-Component Gratitude Measure doesn't include items about the general and fundamental motivations underlying participants' actions, such as concern for improving their own and others' welfare. Another limitation concerns practical wisdom. The Multi-Component Gratitude Scale assesses people's beliefs and conceptions, tapping into their practical wisdom, but there are no items to assess whether people know (or believe they know) how to express their gratitude successfully. Overall, although this scale is useful, these limitations mean that it is not a suitable model for measuring the Aristotelian virtue of gratitude in all its dimensions.

Another good example of interdisciplinary research on virtue measurement is the Aristotelian Phronesis Model (APM; Darnell et al., 2022). The APM is an empirical model that conceptualises practical wisdom as involving four different functions. These functions include the constitutive, blueprint, emotional regulation, and integrative functions. Briefly, the constitutive function is about being able to perceive the morally relevant stimuli in any given situation. The blueprint function is about comprehending which behaviours are likely to result in flourishing. The integrative function relates to the ability to weigh and balance different virtues in situations where the demands of these virtues conflict. Finally, the

emotional regulation function relates to experiencing emotions that are appropriate and in line with reason, which can be achieved through cognitive appraisals of the situation. In our view, this model of practical wisdom is comprehensive and aligns well with Aristotelian theory.

Recently, Darnell et al. (2022) performed a ‘proof of concept study’, taking items from various scales to assess the APM. This scale draws from different assessment types, such as self-report and ability test questions, including multi-choice, short answer, and vignette style questions, to assess the four functions of practical wisdom. The researchers found that their four-function model was supported by confirmatory factor analysis and that higher scores on the scale are related to performing more pro-social behaviours. Despite the acknowledgement of the researchers that this scale, as a proof of concept, only approximates the real construct, this research is another good example of how interdisciplinary work by psychologists and philosophers can achieve conceptually rich scales. However, as the APM scale assesses practical wisdom, which is an intellectual virtue, it cannot measure every aspect of character virtues, as understood by Aristotelian virtue theorists, such as appropriate behaviours and emotions (Kraut, 2022).

We propose that interdisciplinary approaches, such as the ones taken by Morgan et al. (2017) and Darnell et al. (2022), offer the best method for developing conceptually rich and theory-driven models of virtue. However, current measures of virtues, including those that take an interdisciplinary approach to Aristotelian virtue theory, have shortcomings. For this reason, our aim is to offer suggestions for measuring all the important aspects of virtue highlighted by Aristotelian virtue theorists.

We suggest that psychometric measures of virtue, based on Aristotelian virtue theory, should include all the character dispositions discussed by Aristotle (virtue, vice, continence, incontinence, habit, and natural virtue) and should include the different dimensions or

elements of each of these dispositions (behaviour, emotions, motivation, and reasoning). (Aristotle, ca. 350 B.C.E./2020). This will allow us to investigate the accuracy and consistency of an Aristotelian theory of character. It requires designing separate facets for measuring each dimension of virtue independently. For example, an Aristotelian virtue scale should have separate facets intended to measure appropriate behaviours, emotions and reasons separately. However, to properly measure the coalescence of the different components of virtue, we also propose an additional facet that measures motivations (appropriate motivations involve appropriate reasoning and emotions). Motivations should be measured in a way that ties specific behaviours to praiseworthy and appropriate actions. For example, if we had a behavioural item about donating to charity, we should have a corresponding motivational item assessing whether these behaviours are associated with praiseworthy motives, such as concern for the welfare of others.

One limitation of measuring praiseworthy motives is that there are numerous appropriate motives that could lead someone to perform any particular virtuous act. However, for the sake of a general scale designed to measure virtue, motives can be reduced to the fundamental motivations at the core of Aristotle's secular theory of virtue. Fundamentally, that is, virtues are about living an excellent human life and promoting the flourishing of oneself and others (Aristotle, ca. 350 B.C.E./2020). Therefore, we suggest that any account of virtuous motivations should at least focus on motivations related to promoting and preserving one's own flourishing and the flourishing of others. Moreover, as the virtues are excellences, and people with virtue strive towards excellence, additional motivations that tie behaviours to a general aim to achieve excellence can be included. Motivations of concern for others, self-concern, and appreciation of excellence, measured as separate and distinguishable facets of virtue, should be adequate to measure the general appropriateness of one's motivations, especially in combination with the independent behavioural, emotional, and reasoning items.

Of course, more specific motivations can be added to address more nuanced research questions and to study virtuous motivations in greater depth.

Another concern amongst researchers is how to measure the vices, particularly the vice of excess. Typically, parametric psychology scales measure linear constructs—the higher you score on a measure, the more of the trait you have. However, this poses challenges for Aristotelian virtue theory because exceeding what is appropriate in terms of motivations and behaviours results in the vice of excess, which is no longer a virtue (Aristotle, ca. 350 B.C.E./2020). In the case of honesty, for instance, an individual would not have the virtue of honesty if they were committed to *always* telling the truth, regardless of the situation. A well-known example in this regard is the person who, when asked by a Nazi officer whether there are Jewish people in the house, tells the truth about their Jewish friend hiding in the attic. In this case, telling the truth is not an expression of virtue, especially if the motivation to be honest (just for the sake of honesty) was stronger than their motivation to protect their friend. Rather, telling the truth to the Nazis, in this case, manifests vice because it expresses an inappropriate and excessive concern for the truth. Vice is a way of failing to be virtuous, and, as a disposition, forms a significant part of someone's character. Determining whether someone tells the truth in the wrong ways, in inappropriate circumstances, and so on, is important for determining how virtuous the person is.

Our proposal for measuring the vice of excess is to design an independent facet to measure it (rather than incorporating it into other facets that cover deficient to appropriately high levels). The reason for this is that when measuring vice as an independent facet, it will be possible to investigate vice scores effectively and independently of the other facets, such as appropriate behaviours. This will make it easier to assess how the vice of excess correlates with other constructs, such as life satisfaction and depression, anxiety and stress. Moreover,

although it may sound counterintuitive, we would expect vice items to correlate with the other virtue items, such as behavioural tendencies and motivations. This is because people who are virtuously honest (or courageous) and people who are excessive in honesty (or reckless) are likely to report similar behaviours, such as telling the truth (or standing up to adversities) on scales designed for the general population and in ordinary contexts. The difference between these groups can be found in their sensitivity to context. Whereas people who have the virtue of courage will know when the risks of a situation outweigh the benefits, the person with the vice of recklessness will not.

In terms of the vice of excess and practical wisdom, people higher in practical wisdom will theoretically be less likely to feel and behave in excessive ways (Aristotle, ca. 350 B.C.E./2020). However, when it comes to self-report, people with vices of excess may rate themselves highly, as they might believe (wrongly) that they know which ends are valuable and how to preserve and promote these. In this regard, distinguishing between virtue and the vice of excess may be tricky—what we propose is to investigate and identify the group of participants who score highly on the virtue facets, namely, appropriate behaviours, emotions, practical wisdom and motivations, without scoring highly on a specially designed vice of excess facet. This group of people may be considered high in virtue, whereas people scoring high on the virtue items as well as the excess items (or extremely high on the total scale) can be thought to have the vice of excess. (We will suggest statistical analyses for doing this). For a detailed investigation of the relationship between the vices and practical wisdom, another promising avenue of research would be to assess how people who score highly on the vices respond to a comprehensive practical wisdom scale, ideally one that includes ability test items such as the one employed by Darnell et al. (2022). For an example of how to organise facets and items to measure a virtue, see Appendix A, in which we present a model for measuring the virtue of conscientiousness.

When it comes to scale construction, we recommend that items be written carefully and in accordance with the relevant philosophical literature. This means that the authors should have a working understanding of Aristotelian virtue theory and the philosophical research on the virtue targeted for measurement. This can be a daunting task, especially for someone with little training in Philosophy; for this reason, scale construction can benefit from collaboration with at least one expert in Aristotelian virtue theory.

In some cases, however, establishing what types of items constitute expressions of virtue or what types of situations and stimuli are the most relevant to one virtue rather than others may be difficult. For this reason, some scholars working on virtue measurement recommend using prototype analysis (Wright et al., 2021). Prototype analysis can be performed by creating an index of items denoting situational stimuli relevant to the virtue being measured. These indexes of items can then be given to experts in virtue theory to rate these items in order of how important and prototypical they are of the target virtue. This strategy may be particularly useful for establishing the conceptual boundaries between virtues that appear very similar, such as generosity and compassion. Using this method could also lessen the chances of researchers committing the jingle jangle fallacy, which occurs when the same construct is measured with different names (Wright et al., 2021).

Writing virtue-based items can also be challenging because some parts of Aristotelian theory, such as motivation-based facets, may be more complex and abstract than others. For this reason, specific and clear instructions may be required to guide participants and provide context. Pilot testing on a small sample is also highly recommended before full administration. This is to ensure that the items are comprehensible by non-experts in virtue theory and that they contain accessible wording.

Perhaps the most important thing to consider when creating items to assess an Aristotelian account of virtue is whether the items cover a complete account of the virtue. For this reason, it is important to develop a large enough item pool to capture these various aspects of virtues. Typically, eight to ten items per domain are written during scale development (e.g., Wood et al., 2008; Kun et al., 2017; Pratscher et al., 2019). Additionally, to fulfil key psychometric requirements, scales should contain three items per measurement domain after poor items have been removed (Robinson, 2018). For this reason, virtue scales designed to measure the seven distinctive aspects of virtues discussed in this paper (e.g., appropriate behaviours, emotions, concern for others, self-concern, appreciation of excellence, practical wisdom, and the vice of excess) should contain anywhere between 21-70 items, as three items are required for each measurement domain to establish reliability (Robinson, 2018). However, items in the mid-range of this bracket (i.e., around 30-40) may be more ideal, as 21 items might be insufficient for capturing the entirety of each aspect of virtue. On the other hand, longer scales may become impractical to administer due to response fatigue, making the scale burdensome, especially if administered with other measures of interest. Nevertheless, the exact number of items required to appropriately measure any particular virtue depends on multiple factors, such as the number of facets included and the exact purpose of the scale.

When developing virtue scales, it is also worth considering the particular virtue being targeted for measurement. This is because virtues can be more or less complex; as such, some virtues may require more items to operationalise comprehensively. For instance, Miller (2021) proposes that honesty consists of truthfulness, forthrightness, respect for property, proper compliance, and fidelity to promises. Such an account is very broad and would require a large pool of items. In cases like these, it is also acceptable to measure one domain of the virtue, such as truth-telling, as its own sub-virtue. This may help create deeper measures that

provide sufficient insight into each component of the virtues while still being practical for various purposes.

Response options should also be clear; we suggest four to five response options measuring agreement with each item. This is because fewer than four response categories can impede the sensitivity and the ability of the scale to differentiate between people with different characteristics properly, and more than five items can lead to confusion, making it difficult for participants to determine the differences between each response category (Medvedev et al., 2016; Sprague et al., 2018; Robinson, 2018; Simms et al., 2019). Response options that measure how much people agree with each item (e.g., disagree to strongly agree) work better for assessing virtues compared to response options that ask about the frequency of manifesting virtue (e.g., never to very often). This is because some aspects of virtue necessitate the measurement of core beliefs and motivations that people hold. Attitudes, beliefs, and values are more appropriately assessed by asking the participants whether they agree with such values and beliefs and so on. This contrasts with emotional experiences and behaviours that are performed and experienced with varying frequencies; these items can either be measured with frequency or agreement-styled response options.

Two of the main challenges associated with measuring virtues involve culture and social desirability. So far, research in positive psychology has indeed been criticised for relying on data from Western, Educated, Industrialised, Rich, and Democratic (W.E.I.R.D) populations (Van Zyl et al., 2023). This is concerning, given that virtues are constructs that are, in part, culturally relative. This means that what counts as an expression of virtue in one culture may not constitute an expression of virtue in another, given the its social norms, and so on. In this sense, virtue scales that are designed to be used in Western societies should not

be presented as universal assessment tools—researchers should acknowledge the context and purpose for which the scale has been created.

The lack of tools designed to measure non-W.E.I.R.D populations is also concerning in its own right, as studying how virtue manifests differently across cultures and contexts (and learning how to measure these virtues) will benefit more people across the world. More balanced cultural research will also advance our global understanding of the similarities and differences between the virtues of different countries and the potential impacts these have on the well-being of different people. For these reasons, investigating culturally specific manifestations or expressions of virtues is a commendable research aim. However, it is recommended that culturally specific virtue research be conducted in collaboration with experts from the culture in question.

Social desirability and limiting biased responses are two further concerns in virtue research, as there may be substantial differences between reported virtue and actual virtue (Fower et al., 2021; Miller, 2017; Grimm, 2010). Social desirability can be a problem for any scale that measures behaviour or traits that are socially desirable, and that people may therefore feel pressure to conform to. In the case of virtue measurement, this is particularly problematic, as being virtuous is considered to be both desirable and admirable or praiseworthy, whereas vice is strongly disapproved of. For this reason, some people may be more inclined to rate themselves as more virtuous than they really are, which could possibly reduce the accuracy of scales designed to measure virtues.

Although social desirability is concerning, it is important to note that this type of bias is likely to introduce a consistent type of error variance, as people will tend to be biased in the same direction. Provided that the data that is gathered is normally distributed, scholars will be able to see differences in people's self-assessment of their own traits, despite social

desirability effects. In these cases, useful and effective comparisons between people are still possible for research. Additionally, one way to reduce the error variance introduced to datasets via social desirability is to employ the right sort of analysis, such as applying Rasch analysis and converting ordinal scores into an interval level of measurement, thereby improving the precision of the assessment (Medvedev & Krägeloh, 2022).

Another step that can be taken to reduce the effect of social desirability is to emphasise the anonymity of the research participants in consent forms, advertisements, and invitations. Additionally, social desirability tests can be included in surveys, such as the Balanced Inventory of Desirable Responding Short Form (Hart et al., 2015). Correlations can then be conducted between these scales and the virtue assessment to determine whether the virtue measure correlates to a concerning degree with social desirability or not (e.g., Fowers et al, 2022). So far, previous research has found weak correlations between virtue scales and social desirability measures (Fowers et al., 2021). Another potential way to reduce social desirability is to include some ability test questions, perhaps ones designed to assess the practical wisdom of respondents. Ideally, if the self-report questions are working properly, then they should be able to predict scores on the ability questions and vice versa. Likewise, self-report measures can be administered along with behavioural tests to determine whether particular self-report scales can actually predict behaviour. For instance, Fowers et al. (2022) found that participants who scored highly on their Interpersonal Fairness Scale were less likely to be influenced by situational stimuli that can influence people to not act fairly.

Measurement Analyses for Virtue Scales

To investigate this model of Aristotelian virtues, we propose that scholars use particular statistical analyses, including exploratory and confirmatory factor analysis (EFA & CFA), exploratory structural equation modelling (ESEM), Rasch analysis, latent profile

analysis (LPA), and network analysis. EFA, CFA, and ESEM are essential for validating new scales, especially those with multiple facets, such as scales designed to measure virtues. For this reason, these should be the first major types of analyses applied after developing a virtue measure. CFA and ESEM are useful techniques for confirming whether a proposed theoretical factor structure, such as an Aristotelian model of virtue, appropriately fits and explains the variance of the observed data (Brown, 2015; Van Zyl & ten Klooster, 2022). In particular, these analyses can be used to investigate whether distinguishable but related components of virtues, such as motivational, behavioural, affective, and reasoning components, can be discovered. CFA and ESEM are also important in ensuring that the data fits an idealized and unbiased measurement model.

Assessing whether the variance in the observed data fits the measurement model is important, as it helps to ensure that the data is not biased and that there are no problematic items in the scale. In terms of virtue, it is also important to determine whether theoretical accounts of the factor structure align well with the patterns of variance observed in the data. If the theoretical account does not adequately align with the observed data, it may be inappropriate to use the proposed factor solution to inform subsequent analyses. This could be problematic, especially if one theoretical account of the structure of virtue is necessary to test a particular claim made by Aristotelian theorists, such as the claim that frequently performing virtuous actions allows us to acquire practical wisdom, and whether the vices are related to undesirable outcome variables. In this case, domain validity needs to be established to determine whether a proposed factor structure is appropriate for further study.

Several analyses can be used to establish the domain validity of virtue scales. In most cases, exploratory methods such as EFA should initially be employed. EFA is a good preliminary evaluation of the factor structure of a scale, and it can be used to determine

whether items are loading onto theoretically proposed domains (Yong & Pearce, 2013). After this, confirmatory techniques can be employed with an independent sample to confirm the exploratory observations. Confirmatory techniques, such as CFA, more effectively allow researchers to test a preconceived model based on theory, whereas EFA is primarily an exploratory method for generating hypotheses about possible models (Chumney, 2012). However, because virtues are theory-driven concepts, it is important for researchers to not merely take a data-driven approach by basing their proposed factor structure model only on EFA results. Rather, they should use EFA to provide hints about which potential models are theoretically plausible, striking a good balance between psychometric acceptability and theoretical coherence.

Although CFA is a traditional and common validation technique in Positive Psychology, positive psychologists have been critiqued for using CFA because it can result in poorer measurement quality, with biased factor loadings (Van Zyl & ten Klooster, 2022; Ng et al., 2017). Indeed, critics also point out that some assessment tools in Positive Psychology produce inconsistent factor structures, which is likely due to methodological issues, including the use of standard CFA instead of CFA adaptations and ESEM (Wong & Rory, 2018; Van Zyl & ten Klooster, 2022; Van Zyl et al., 2023). For this reason, it is recommended that future validation studies either apply recent CFA adaptations that mitigate these problems or use ESEM, which may be a useful tool for validating virtue models, as it provides more flexibility than standard CFA models.

One of the limitations of CFA is that cross-loadings are restrained to zero, limiting the dynamic interaction between factors (Van Zyl & ten Klooster, 2022). In CFA, factors are often referred to as ‘pure’, only loading onto their latent factor. This is problematic, as it can lead to stronger relationships between the items and factors and better fit statistics than what

would otherwise be the case, causing unrealistic indicators of measurement quality (Van Zyl & ten Klooster, 2022). Moreover, researchers also note that CFA may be inappropriate for virtue and personality measurements, as these tests contain items that can be interpreted in various ways at once, causing cross-loadings between facets (Ng et al., 2017; Hopwood & Donnellan, 2010; Van Zyl & ten Klooster, 2022).

One strategy for mitigating concerns about cross-loadings is to use CFA adaptations, such as bifactor and hierarchical modelling and the correlated uniqueness model, which can reduce item-specific and method effects (Morin, 2020). Bifactor and hierarchical modelling can be used to separate the effects of general and specific factors and account for both shared and unique variance among items. Essentially, these models assume an underlying latent trait that accounts for the shared variance amongst the items (Reise, 2012). The Correlated uniqueness model is also useful as it can be used to specify the correlations between residuals of items that are conceptually related and cross-load in a way that deviates from the latent factors.

Using ESEM is another potential strategy to mitigate the concerns associated with standard CFA. ESEM allows for more flexibility by enabling a limited number of cross-loadings (close to zero) between items on different factors. This has been said to result in a more realistic model because psychological traits are often complex and correlate with multiple variables in various ways (Marsh et al., 2010; Marsh, et al., 2013; Van Zyl & ten Klooster, 2022). For example, when it comes to virtues, it is likely the case, and theoretically assumed, that one factor, such as virtuous motives, will correlate with virtuous behaviours and appropriate emotions and so on.

ESEM offers several advantages over standard CFA. For one, ESEM is considered to reduce measurement bias and generate models that are more consistent with theoretical

conceptions (Van Zyl & ten Klooster, 2022). Moreover, while ESEM has its limitations, such as the inability to model hierarchical structures and other complex relationships, the recently developed ESEM-within-CFA and SET-ESEM can resolve these and related limitations. Overall, ESEM is considered a more rigorous and robust technique that can provide models more suitable for psychometric virtue and well-being measures (Van Zyl & ten Klooster, 2022).

Rasch analysis is another more advanced statistical technique that can be used for validation and further enhancing a scale reliability after employing EFA, CFA or ESEM. Rasch analysis is mainly used to examine whether an assessment conforms to the fundamental principles of measurement proposed by Thurstone (1931). These principles include unidimensionality (the idea that assessments should measure only one construct), measurement invariance (the measure should work equally well for everyone), and equal distance between measurement units (e.g., the scale should measure at least at an interval level of measurement). Rasch analysis is a generally underused technique in positive psychology, with a few exceptions (e.g., McManus et al., 2024; Medvedev., 2017); however, it is a powerful tool for eliminating error variance, as it can convert ordinal data into interval data, resulting in more reliable measurement instruments (Medvedev & Krägeloh, 2022). It can also assess differential items functioning (DIF), which can inform researchers of whether the scale works differently for different groups, such as gender or age groups. Another notable way in which Rasch is useful is that it can produce person-item threshold distribution plots that can be used to determine whether the scale can effectively measure the range of a person's abilities (e.g., how virtuous people are) in the sample and that there are no floor or ceiling effects.

These various features of Rasch analysis are very relevant to virtue measurement. As previously mentioned, the ordinal to interval conversions can eliminate error variance caused by social desirability. However, the person-item threshold distribution plot can also help mitigate concerns about social desirability. This is because the person-item threshold distribution plot can show whether a virtue scale can measure the full distribution of different amounts of virtue in the sample. If a scale can do so, and the Rasch model fit is acceptable, it is a good indication that the scale can differentiate between different people, regardless of whether social desirability bias influences them. Additionally, Rasch can also be used for cultural research, a topic that's highly relevant to virtues, by revealing whether certain cultural groups respond differently to particular items versus other cultural groups (i.e., whether there is DIF). This can be highly informative about whether meaningful comparisons can be made across cultures. Lastly, the stringent test of unidimensionality in Rasch analysis can provide stronger evidence than other types of analyses about the unidimensionality of virtue scales and whether the components of virtue really relate to each other in a way that constitutes a unified construct. For a recent example of how Rasch analysis can be used to validate a virtue assessment see McManus et al. (2024).

After a virtue measure based on Aristotelian theory has been validated, the next step in the research process is to use the scale to test claims made by Aristotelian theorists. This is vital for establishing an empirical basis for Aristotelianism and determining whether it offers a realistic account of virtue and character. In this regard, LPA will be a particularly important tool. LPA is a statistical technique for investigating personal profiles and patterns of responses. This analysis is often compared to factor analysis; however, instead of identifying groups of related items, LPA identifies groups of individuals that respond similarly to particular groups of items (Spurk et al., 2020). These groups of individuals are typically referred to as latent populations, and people can be clustered according to a broad range of

responses, such as attitudes, behaviours, emotions, and so on. In this sense, LPA is a type of categorical analysis that divides people into groups. LPA will be useful for investigating Aristotelian virtue theory, in particular, whether it is true that people roughly fall into seven character categories, that is, being fully virtuous, continent, incontinent, vicious (as an excess or defect), naturally virtuous or merely having (good or bad) habits (see Table 1). Thus, LPA could be useful for establishing empirical support for Aristotle's overall theory of character and how different components of virtue interact in different types of people. For this reason, LPA analysis, alongside other statistical analyses, will be useful for assessing Aristotelian virtue theorists' complex ideas about character dispositions, including the idea that traits are continuous but also roughly categorical.

LPA can be used to test and identify whether the particular character categories proposed by Aristotle can be discovered in the data. It will also allow for the possible identification of those individuals who score highly on the vice items compared to individuals who score highly on the virtue items. In this sense, we can investigate the character dispositions proposed by Aristotle and assess how these different dispositions relate to valuable outcome variables such as life satisfaction, educational success and health. This analysis is a useful tool for evaluating the empirical viability of Aristotelian virtue theory, as, unlike other analyses, it can identify important sub-categories of people in a data set. For this reason, it can potentially advance theory, development and practice, especially if new subcategories are identified.

Another method that can be used to test claims made by virtue theorists and advance theory about the virtues is network analysis, which is an advanced statistical method used to establish a nuanced picture of the nomological net of associations between sets of variables (Epskamp et al., 2018). It is particularly useful for post-validation analysis as it can display

unique interactive links between facets of virtue that can be used to find clues and generate hypotheses about which components of virtues are the most important. Network analysis has a decided advantage over standard correlational analyses because it can be used to identify direct and indirect relationships between variables. It can also provide visual representations of complex correlational networks, thereby aiding interpretability (Åkerblom et al., 2021; Costantini et al., 2015).

Network analysis will be useful for investigating virtues, given that the virtues have multiple components that are expected to relate to each other (and perhaps to other variables) in different ways (Aristotle, ca. 350 B.C.E./2020). Thus, it can be used to identify which variables directly correlate with each other within the network of variables, thereby revealing the internal structure of the virtues, showing how each component is connected to the others. This will allow us to test an important claim made by virtue theorists, namely that people can learn to become more virtuous by habitually performing virtuous actions, which, in due time, leads them to acquire practical wisdom and have appropriate feelings and motivations. Directional network plots display probability estimates about the expected direction of casualty between these variables (Heeren et al., 2021), thereby helping us to determine whether performing virtuous acts causes increases in virtuous motivation. Network analysis is also useful because it can display indirect relationships, such as between appropriate behaviours and emotions. It could be the case that appropriate behaviours correlate with practical wisdom, and that practical wisdom correlates with appropriate emotions. Thus, seeing these indirect relationships, as well as the direct relationships, helps form a deeper understanding of the correlational network.

Overall, network analysis will be a useful tool for potentially advancing virtue theory. It may, for instance, identify one aspect of virtue as the most vital for attaining full virtue or

experiencing life satisfaction or health. It may also be the case that each separate aspect of virtue offers unique benefits. This will be useful for discovering the components of virtue an individual is lacking in, and which aspects they should focus on in order to develop full virtue. In this way, network analysis can be used to advance future theory. In short, we believe that network analysis offers unique advantages, as it helps in comprehending constructs as networks of interrelated and self-sustaining variables. This understanding might be more realistic than the traditional view that well-being constructs exist as underlying latent constructs (Borsboom, 2013).

A Potentially Harmful Neo-Liberal Ideology

Even though Aristotelian virtue theory offers a rich conceptual foundation for empirical work on the virtues, it is worth noting that this theory may still be susceptible to a different challenge that is sometimes directed at Positive Psychology generally. New Aristotelian virtue scales could be another example of Positive Psychology being a ‘decontextualised neo-liberal ideology that causes harm’ (Van Zyl et al. 2023). A neo-liberal ideology, in this context, refers to the idea that individuals are responsible for their own choices, misfortunes, successes and flourishing, and so on (Van Zyl et al. 2023; Fernández-Ríos & Novo, 2012). Some of the strongest proponents of this kind of view, such as Burr and Dick (2021), engage in a social constructionist critique of Positive Psychology, in particular, they critique the individualistic approach taken by psychologists. It is important to note that this critique is based on the highly controversial assumption that there is no objective reality and that people’s perceptions are mere products of how language shapes reality through discourse and power dynamics. Despite its controversial nature, this view is still worth considering because it highlights potential harms associated with Positive Psychology in general, as well as an Aristotelian approach to flourishing and well-being. This is especially

the case, as flourishing, in the Aristotelian view, partly depends on the character of individuals.

Burr and Dick (2021) observe a tension between the positive psychological and social constructionist's understandings of people. According to Burr and Dick, positive psychologists take an individualistic approach to psychology; that is, they subscribe to "the idea that people are self-contained psychological units that exist prior to society and social relationships" (Burr & Dick, 2021, p.156). They contrast this with their social constructionist view, which emphasises social relations and the construction of knowledge through discourse and power dynamics. From a social constructionist perspective, concepts such as traits and virtues are merely social constructions resulting from power dynamics in modern Western societies (Burr & Dick, 2021). They compare the discourse of Positive Psychology to a supposedly current conflation between large body sizes and poor health in the U.K. They claim that healthy weight standards are a socio-political construction stemming from discourses intended to encourage citizens to take personal accountability for their weight and to lower the cost of public health spending. Similarly, they suggest that personality constructs are designed to get people to take accountability for their own flourishing. These powerful discourses, they argue, often favour certain groups of people and disadvantage others. Burr and Dick (2021) view Positive Psychology as a highly political science that promotes a neoliberal ideology that positions individuals as consumers who are responsible for their own flourishing and character; the quality of their lives is primarily a consequence of their own personal successes or failures. This approach, they argue, neglects the broad external factors that determine how individuals view themselves, placing blame on individuals rather than their cultural and structural situations.

Other theorists also critique this individualistic approach taken by Positive Psychology, arguing that it causes harm. Thompson (2018) notes that classification systems, like diagnoses, necessarily make distinctions between different groups of people. Although making distinctions between things may be fundamental to human cognition, Thompson notes that the labels given to these things are not neutral, carrying meanings that can have varying repercussions on people's lives. For instance, Thompson notes that the label of being Jewish had detrimental implications for people living in Germany during the 1930s. As such, these labels cause stigma and can determine how people are treated and what resources are allocated to them (Thompson, 2018). Thompson (2018) argues that psychological disorders are types of classifications that can cause stigma by labelling individuals as dysfunctional and in need of intervention. With the creation of positive psychological classifications, the number of people thought of as dysfunctional may get even larger, as labelling some people as optimal and flourishing implies that others are languishing or dysfunctional.

This critique about labels and stigma is particularly relevant to the Aristotelian account of flourishing and well-being, as Aristotelians believe people can be classed as virtuous, vicious, continent, and so on, and that these are fundamental evaluative terms to describe people's character (Aristotle, ca. 350 B.C.E./2020). Classifying a particular individual as having a vice, say the vice of laziness, seems to position the problem within the individual, and such a label could cause harm to the individual and affect how other people view and treat them, leading to essentialism about the person's identity.

Concerns about harm and stigma are valid and need to be taken seriously. However, despite the potential risks of Positive Psychology and evaluative individual measurement, happiness, well-being, and flourishing are still important topics. Many people strive for well-being and want to flourish. Moreover, although it is true that social structures and society

play vital roles in this domain, it is also true that individual differences, including the behaviours and attitudes of individuals, are important factors for well-being (Anglim, 2020). This is one of the reasons psychologists are interested in investigating this set of factors.

It's also important to note that although external circumstances are important and can shape the ways in which people view and think about themselves and the world, interventions targeted at individuals and studies investigating individual differences are still helpful because they can reveal which characteristics are the most conducive to desirable outcomes like well-being, educational success and relationship quality (e.g., see Green, 2022; Wagner et al., 2020; Bruna et al., 2019; Wagner & Ruch, 2015; Boiman-Meshita & Littman-Ovadia, 2021). Furthermore, the study of Positive Psychology does not have to impede the work of anthropologists, political scientists, social psychologists and sociologists taking a broader sociological approach to well-being. After all, having facts about individuals, even if these are contingent on culture, can help inform scholars about how people can flourish in the cultural context they find themselves in. Furthermore, this information can complement broader movements to improve society and the political conditions for individual welfare. The evidence for this point is readily available; positive psychological interventions have been found to improve well-being in both non-clinical and clinical populations where individuals face more internal and external barriers (Van Agteren et al., 2021).

The importance of external resources regarding flourishing is acknowledged by Aristotle himself, who observed that virtue alone is not necessary for flourishing and that people also need some degree of luck and access to external resources in order to live well (Aristotle, ca. 350 B.C.E./2020). This is an important part of Aristotelian virtue theory, and the conditions that help cultivate and sustain virtue is a very important area of research—one that can be complementary to developing assessment tools to measure virtue. Indeed, the

proper measurement of Aristotelian virtues allows scholars to empirically investigate the link between external circumstances and virtue.

Power dynamics and oppression are, in fact, areas of interest for some virtue theorists, such as Tessman's (2005) discussion of the phenomenon of 'burdened virtue', which occurs when someone faces oppression to the extent that behaving virtuously doesn't contribute to their flourishing, or when someone who has virtuous motivations is unable to perform virtuous acts because of social or physical restraints. Burdened virtue is, therefore, an important (and testable) aspect of Aristotelian virtue theory. Overall, although virtues are seen as individual characteristics, there have been theoretical analyses of how virtues might interact, what they require, and how they develop in particular conditions. This theoretical work offers a good bridge and theoretical basis for investigating virtues within a social context and accounting for these external conditions. Moreover, burdened virtue may be a promising and valuable area of potential research that can help account for oppressive circumstances, mitigating blame and discouraging the placement of full responsibility on individuals.

When it comes to classifications, although they can cause stigma, it is still true that in order to learn about virtues and flourishing, we need ways of classifying and measuring them. Indeed, because of the potential well-being benefits of psychological measurements for assessing desirable traits, we do not suggest abandoning assessment tools for virtue measurement. Instead, we propose that caution should be taken in their investigation and understanding. Methods should be used to reduce the harm and stigmatisation of vices through anonymising research and emphasising the flexible nature of the virtues, including how they relate to social contexts and conditions. Of course, it is important to note that virtue is just one variable that influences behaviour, and individual psychology is influenced by

many different factors, often beyond the individual's control (Węziak-Białowolska et al., 2019; Steel et al., 2018; Yu et al., 2018; Doris, 2002). This is why it is essential for researchers to be clear about the context in which these instruments are constructed and tested, without making sweeping generalisations based on limited evidence and inappropriate methodologies. Of course, investigating how virtue manifests differently depending on culture and context is an interesting avenue for future research—one that will be aided by more effective assessment tools.

Whether and how character categorisation should be assigned based on individual assessment and intervention is a controversial topic that warrants much discussion. In our view, applications of character categories may be useful in various fields, including employment screening and applied organisation psychology, education, and clinical and forensic psychology. For instance, in education and clinical settings, virtue assessments can be used to test the effectiveness of particular interventions designed to aid virtue cultivation. In education, this is important, as developing virtues may help children flourish. Moreover, integrating effective character development programs into schools may result in a better society where people are more equipped to deal with challenges and work cooperatively. Making categorical classifications in education can also help identify which children may benefit from particular interventions designed to enhance certain aspects of their character. The same is true in clinical and forensic psychology, where patients' lack of virtue may be contributing to maladaptive behaviour that causes harm to themselves or others. Thus, having ways of identifying these problematic character traits and assessing them for improvement may, in some cases, be warranted.

In terms of employment screening, certain jobs require or might benefit from combinations of different character dispositions—to be effective, police officers clearly need

courage, but also compassion, conscientiousness, and patience. These virtues are important for police officers as they take on social responsibility to protect members of society from harm. Employing people with virtuous traits for roles such as policing may have a direct influence on the well-being and safety of citizens. In cases like this, the potential harms associated with assessing applicants' character are likely outweighed by the value of a more effective recruitment process, especially if assessment is handled with professionalism and confidentiality. The same is true in other high-stakes jobs, such as in health care. These are fields where virtue assessments will be useful, as the values and characteristics of these professionals need to align with the goals and purpose of the institutions. Moreover, virtue assessments cannot only be used to screen potential employees but also for professional development in these fields to enhance employees' well-being and effectiveness. Virtue assessments may even benefit employees by steering them away from unsuitable careers and steering them towards a career that they find more fulfilling.

Overall, although there seem to be some fields where virtue assessment and categorisation are appropriate, it's important to be aware of the potential of categorisation to cause stigma. For this reason, virtue assessments and character labels should be applied with care. If causation is taken, it seems possible to apply Aristotelian virtue theory without having to blame particular people as vicious or weak-willed. A sensitive application of virtue theory in psychology is also consistent with advice from virtue theorists regarding moral evaluation. For instance, we should note that most people fall short of full virtue, and that virtue is an ideal we should all strive towards as a community (Aristotle, ca. 350 B.C.E./2020). Further, Van Zyl (2019) cautions against using a virtue- and vice-framework to judge the actions and characters of other people, as this can amount to being judgemental and hypocritical. Instead, we should focus on improving our own character.

Conclusion

In conclusion, Positive Psychology is a relatively new science that faces challenges and criticism. In particular, the most popular classification of strengths and virtues, the VIA-IS, has been criticised for lacking a strong conceptual foundation, thereby undermining the status of Positive Psychology as a respected science (Efendic & Van Zyl, 2019; Van Zyl et al., 2023). In this paper, we have proposed that positive psychologists should respond to these criticisms by engaging in interdisciplinary work on virtue measurement. They can do this by working alongside philosophers (and perhaps scholars from other disciplines) to create measurements based on Aristotelian virtue theory. An interdisciplinary approach may be particularly helpful in terms of developing empirical models that are theoretically accurate. This will also help in designing appropriate methodology, as the important aspects of Aristotelian virtue theory will be more apparent. Given the complexity and nuance of Aristotelian virtue theory, a careful approach to virtue measurement must be taken. For this reason, we have suggested analyses to help guide researchers in validating and investigating new virtue assessments. These analyses include innovative techniques such as Rasch analysis, ESEM, LPA and network analysis.

Despite the promise of the Aristotelian approach to virtue, care must be taken to avoid causing stigmatisation and harm (Burr and Dick, 2021; Thompson, 2018). For this reason, future research should follow appropriate ethical guidelines, while also interpreting their findings in respect to cultural contexts. Future research can also focus on investigating ‘burdened virtues,’ that is, virtues that are restrained by oppression and unfortunate social circumstances (Tessman, 2005). Such work, we argue, will help to maintain a high standard of science, reduce harm to individuals, and promote well-being. Overall, taking an Aristotelian approach to virtue is promising, as it will lead to new and beneficial instruments

that will help scholars understand virtue, flourishing and well-being. The creation of new and rich virtue measurements will also be useful for designing interventions aimed at helping people develop virtue. As such, additional work, involving the careful reflection of critiques of Positive Psychology, can help the discipline advance as a science, promoting a reputation of rigor and effectiveness.

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Chapter 4: Development and Validation of the Aristotelian Virtue of Conscientiousness Scale using Rasch Methodology

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Chapter Introduction

This paper, published in *Current Psychology*, applies Rasch analysis to evaluate the psychometric properties of the AVCS. It is included here as the first empirical paper for it focuses on validating the overarching construct of virtuous conscientiousness and establishes the AVCS as a robust measure with well-functioning items, thereby providing strong psychometric justification for using it in subsequent research. From a practical standpoint, Rasch analysis at the total scale level allows us to identify potential differential item functioning (DIF), check for ceiling or floor effects, and transform ordinal scores into interval-level data for more precise assessment. These benefits were important for establishing the AVCS as both an empirically grounded and psychometrically valid tool.

Abstract

In the dominant Aristotelian view, virtues are traits that contribute to human flourishing, happiness and well-being. Although some scales in psychology are partially based on Aristotelian virtue theory, few of them operationalise all the aspects of virtues that Aristotle took to be essential. The aim of this project was to develop and validate the Aristotelian Virtue of Conscientiousness Scale (AVCS). The initial 60 scale items were developed based on Aristotelian virtue theory. This item pool was piloted and administered to a sample ($n = 301$) together with measures of distress, satisfaction with life and Big Five Conscientiousness. The twenty-eight most reliable items were selected based on psychometric criteria and subjected to Rasch analysis. The best model fit was achieved when items were combined into six testlets to address local dependency. The AVCS scale displayed excellent reliability (Person Separation Index = 0.88) and was invariant across gender and age. The ordinal-to-interval conversion tables were generated for the AVCS ordinal scores, which strongly correlated with life satisfaction. The AVCS is a reliable and valid measure with good psychometric properties that can be used in future happiness research. The ordinal AVCS scores can be transformed into interval level data using conversion tables published here, which improves accuracy of measurement.

Keywords: Aristotelian virtue; conscientiousness; character assessment; reliability; validity; Rasch analysis.

Recently, character strengths and virtues have received increasing attention from psychologists and philosophers. Psychological interest in virtue grew with the work of Seligman and Peterson (2004), who developed the Values-in-Action Scale (VIA-IS), a classification of 24-character strengths, but psychologists have been interested in personality traits, more generally, for longer, with the Big Five Model arguably being the most influential (Maltby et al., 2017). In philosophy, a resurging interest in the virtues began with Anscombe (1958), who expressed her dissatisfaction with the dominant normative ethical theories of Utilitarianism and Deontology. Since then, neo-Aristotelian virtue ethics has become a major theory in contemporary moral philosophy, offering the most dominant account of philosophical virtues (Snow, 2020; Swanton, 2021).

Aristotle claimed that living a life of virtue is necessary for flourishing (*eudaimonia*); that is, one cannot flourish without possessing and exercising the virtues (Aristotle, ca. 350 B.C.E./2020). The Greek term *eudaimonia* is translated in different ways, as human flourishing, a good life for a human being, or true happiness (Hursthouse, 2001). It is a moralised concept: to flourish is, in part, to live a life that is admirable. However, Aristotelians also think that a life of flourishing is attractive in that it is good for the one who lives it. For this reason, there will be some overlap between the Aristotelian notion of flourishing and the concepts of well-being and happiness employed by psychologists.

Psychologists also believe that virtues are important to well-being and have created their own tools to assess them, the most popular being the VIA-IS (Peterson & Seligman, 2004). The VIA-IS is a classification of 24-character strengths arranged into six virtue categories. Research by psychologists, using self- and informant-reports, indicates that all 24 of the VIA-IS strengths positively correlate with the PERMA model of well-being, which consists of positive emotions, engagement, relationships, meaning and accomplishment (Green, 2022; Wagner et al., 2020). However, certain strengths have displayed stronger

effects relative to particular aspects of well-being; for instance, the strengths of persistence, zest and perspective have shown a stronger association with accomplishment, whereas love, kindness and teamwork relate more strongly to positive relationships (Wanger et al., 2020). Moreover, a meta-analysis between VIA-IS strengths and life satisfaction found that love, hope, zest, curiosity and gratitude are the strengths most related to life satisfaction (Bruna et al., 2019). These findings are supported by other studies demonstrating that VIA-IS strengths positively correlate with relationship quality and that the strengths of zest, love of learning, hope, gratitude and perspective positively correlate with school accomplishment (Boiman-Meshita & Littman-Ovadia, 2021; Wagner & Ruch, 2015).

Neo-Aristotelian Virtue—Behaviour, Reason and Emotion

Aristotelian virtue theorists define the virtues as excellent dispositions of character; this distinguishes them from standard personality traits, which are often thought of as merely descriptive constructs (Snow, 2020; Maltby et al., 2017). Although virtue theorists define virtues descriptively, they do so in terms of normative criteria—virtues are praiseworthy dispositions of character, and vices are character defects. Virtues (and vices) are also considered to be “deep” traits in the sense that they form a core part of an individual’s identity and worth as a human being and are manifested through different forms of expression: behaviours, motivation, reasoning, and emotion (Hursthouse, 2001).

Despite beneficial actions being an important part of virtue, Aristotelians note that performing virtuous actions is insufficient for virtue. This is because it is possible (and not uncommon) for people to act virtuously but to be motivated by desires or reasons that are not praiseworthy (Hursthouse, 2001). Aristotle, therefore, claims that virtuous people perform virtuous actions for appropriate reasons; in the case of generosity, an appropriate reason is the

desire to satisfy the needs of others; that is, virtuous agents see the welfare of others as an intrinsically valuable goal (Aristotle, ca. 350 B.C.E./2020).

The reasoning aspect of the virtues involves the exercise of practical wisdom (*phronesis*). Practical wisdom has two main functions. Firstly, it is the ability to see which ends are good or worth striving for. Secondly, it consists of the practical knowledge or skills needed to achieve these ends, including the ability to weigh the value of different ends and to prioritise them appropriately (Russell, 2009). Practical wisdom is both a constitutive part of every virtue and a virtue in its own right; it is often referred to as ‘the master virtue’ (Russell, 2009; Schwarts & Sharpe, 2006).

Virtuous people also experience appropriate emotions. For Aristotle, virtue involves feeling pleasure and displeasure toward the right things (Aristotle, ca. 350 B.C.E./2020). People who are genuinely virtuous don’t have to exercise self-control or make an effort to resist the temptation to ignore the needs of others; rather, they are happy to be in a position to help others and will do so with ease or with pleasure (Aristotle, ca. 350 B.C.E./2020). According to virtue theorists, then, appropriate emotions and reasons form part of the motivations that cause virtuous people to act. Appropriate emotions (according to philosophical virtue theorists) can be broadly thought of as encompassing people’s core affect, involving emotions, feelings, and moods (Russel, 2003).

One of the main differences between (Aristotelian) virtues and personality traits is that virtues consist of a mean between a vice of deficiency and a vice of excess. Aristotle defines the vices as extremes, going too far or falling too short in experiencing emotion and performing behaviours (Aristotle, ca. 350 B.C.E./2020). The virtue of courage, for instance, sits between the deficiency of cowardice and the excess of recklessness. Cowardice refers to experiencing too much fear relative to the situation, whereas recklessness refers to

experiencing too little fear. Cowards, then, often fail to act when they should, for instance, by not standing up for themselves. Reckless individuals may act inappropriately in a given context, perhaps putting their own or others' safety at risk.

Psychometric Virtue Scales

Despite their shared interest in character traits and virtues, the disciplines of psychology and philosophy have largely ignored each other's work on the topic. Most of the attempts by psychologists to develop psychometric assessments of character traits have neglected the rich body of philosophical literature on virtue theory. The VIA-IS and the Virtues Scale do not cohere with the neo-Aristotelian theory of virtue, despite its dominance in contemporary moral philosophy (Peterson & Seligman, 2004; Crawley, 2000; Swanton, 2021). The VIA-IS has been criticised by philosophers for being philosophically ill-informed, and both the VIA-IS and the Virtues Scale do not systematically capture the motivational components of virtue, including reasons for acting, and neither do they measure the vices of excess (Snow, 2022).

A systematic literature review of psychometric virtue assessments has found that, recently, researchers have developed measures of specific virtues, emphasising their behavioural, emotional, and cognitive aspects (Ames et al., 2022). This is a good step towards a neo-Aristotelian approach; however, these scales are still inadequate. For instance, the Virtue of Thrift Questionnaire (TQ21) includes motivation-based questions, but these only pertain to religious-based motives and do not track specific behaviours (Ratchford et al., 2021). The Gratitude Questionnaire–20 Items (G20) lacks motivational items. Both the G20 and TQ21 exclude items that measure the vice of excess (Bernabe-Valero et al., 2020).

Shahab and Adil (2020) express scepticism about the measurability of philosophical virtues, opting to base their temperance scale on a conception of temperance from positive

psychology (e.g., Peterson & Seligman, 2004). Shahab and Adil's (2020) model of temperance consists of four facets: prudence, forgiveness, humility, and self-regulation. Apart from prudence, none of these facets form part of the Aristotelian conception of temperance, which is mainly targeted at experiencing appropriate bodily desires and pleasures (Curzer, 1997).

Several other virtue scales were neither intended to nor happen to measure each aspect of Aristotelian virtues. These scales include the Deontic Justice Scale (Beugre, 2012), the Professional Moral Courage Scale (Sekerka et al., 2009), the Engagement with Beauty Scale (Diessner et al., 2013), the Self-Regarding and Other-Regarding Virtue Scale (Grappi et al., 2013), the Status Attainment Scale (Bai et al., 2020), the Good and Evil Character Traits Scale (Jiao et al., 2020), and the Enright Self-Forgiveness Inventory (Kim et al., 2021).

There are other scales that measure virtuous traits that are not specifically referred to as virtue scales. Examples include the Justice Sensitivity Scale (Schmitt et al., 2010), the Interpersonal Fairness Scale (Fowers et al., 2020), the Tendency to Forgive Scale (Brown, 2003), a three-item kindness questionnaire (Otake et al., 2006), humility scales (Krause, 2010; Qin et al., 2021) and the Comprehensive Intellectual Humility scale (Krumrei-Mancuso, 2016). Although each of these scales can offer contributions to trait theory, none of these examples explicitly attempt to measure the *Aristotelian* theory of virtue, and each is inappropriate for measuring all of the components of virtue that Aristotelian virtue theorists believe are necessary. None of these scales measure the motivational aspects of Aristotelian virtue theory and none of them measure the vice of excess.

Some promising interdisciplinary research on virtue, can be seen in work on gratitude by Morgan et al. (2017). Morgan et al. (2017) have noted that new scales attempting to measure virtue should pay more attention to the cognitive, affective, attitudinal and

behavioural components of virtues, and have constructed a measure of gratitude as an example of how to do so. This measure of gratitude consists of six facets: Feelings of Gratitude, Attitudes to Appropriateness, Behavioural Shortcomings, Attitudes Towards Gratitude, Rituals/Noticing Benefits, Expressions (of gratitude), and Attitude of Gratitude (Morgan et al., 2017). One noteworthy finding from this study was that the more components of gratitude a participant possessed, the more likely they were to report higher well-being scores (Morgan et al., 2017). This suggests that scales with broader item pools for measuring virtues may offer richer insights about these traits. This scale, however, still has several shortcomings regarding the assessment of virtues according to Aristotelian virtue theory, mainly, due to the lack of items measuring practical wisdom (including fundamental motivations) and the vice of excess.

Promising interdisciplinary work has also been done investigating practical wisdom. For example, a recent proof-of-concept study has used several existing scales (both self-report and ability tests) to investigate a four-function model of practical wisdom called the neo-Aristotelian Phronesis Model (APM) (Darnell et al., 2022). The four functions of this model are referred to as the constitutive function, the integrative function, the blueprint function, and the emotion regulation function. Using confirmatory factor analysis, these researchers found that their proposed model fit the observed data. Moreover, the scale positively correlated with prosocial behaviour (Darnell et al., 2022). However, although these results are promising, the scholars note that this is exploratory research, and the scale only approximates the four functions proposed. Nonetheless, these findings demonstrate the promise of scales based on Aristotelianism and can complement other scales designed to measure both the moral and intellectual virtues.

Other scholars, noting the inadequacies of psychological scales attempting to measure virtue, have also created an interdisciplinary model of virtue called the STRIVE-4 model

(Fowers et al., 2021). These researchers claimed that previous attempts to measure virtues were shallow, focusing too heavily on their behavioural aspects. As such, they created the STRIVE-4 Model to guide future attempts at creating measures of virtue. This model is seemingly consistent with Aristotelian virtue theory, however, it excludes Aristotle's idea of the golden mean, as the authors express concerns regarding the measurability of it (Fowers et al., 2021).

While psychologists have generally neglected philosophical virtue theory, philosophers have largely ignored the psychological study of personality and character (Ames et al., 2022; Miller, 2020). For instance, conscientiousness is one of the most widely researched and understood personality traits in psychology, and psychologists have suggested reconceptualising it as a virtue (Crawley, 2000). Despite this, philosophers have barely discussed whether conscientiousness can be a virtue.

Conscientiousness as a Virtue

Conscientiousness does not appear among the long list of virtues discussed by philosophers. The main reason for this is that moral philosophers tend to define the virtue of conscientiousness as a form of self-control or self-regulation: in the Kantian view, a conscientious person is someone who characteristically does what is morally right (or performs their moral duty) motivated purely by a commitment to duty, irrespective of their emotions and desires (Angle, 2013). Aristotelian virtue ethicists reject the view that we have abstract moral duties (Anscombe, 1958). Further, Aristotelian virtue theorists emphasise that a truly virtuous person is motivated by appropriate emotions and desires. They do not have to resort to self-control in order to avoid temptation or suppress inappropriate emotions and desires. Aristotelians, therefore, dismiss the Kantian trait of Conscientiousness as mere

continence (self-control): it is preferable to incontinence (weakness of will), but is not a virtue (Aristotle, ca. 350 B.C.E./2020; Angle 2013).

The Big Five Model describes conscientiousness as “the work dimension” of personality, consisting of five facets: Competence, Order, Dutifulness, Deliberation, Achievement-Striving and Self-Discipline (Maltby et al., 2017). This form of conscientiousness cannot be described as a virtue, given that it is too broad and lacks a normative component, (e.g., Swanton, 2021), but it does point the way towards an alternative (Aristotelian) definition of conscientiousness, namely as the virtue that allows us to act well with regards to our role-specific (as opposed to moral) duties.

Although they reject the Kantian idea that virtue consists in acting from a sense of moral duty, virtue ethicists accept that we have duties that are role-specific (e.g., Annas, 2015; Swanton, 2021). For instance, teachers have a set of duties or responsibilities towards their students and other staff members, and nurses have certain duties towards their patients, and they can perform these duties well or poorly. Thus, we propose that the virtue of conscientiousness be defined as an excellence of character in performing role-specific duties. Someone who possesses this virtue will fulfil, and correctly prioritise, the duties or responsibilities that come with the role(s) they occupy and will do so with the right emotions and attitudes and for the right reasons. Our aim in this paper is to measure this virtue.

There are two differences between the virtue of conscientiousness and Big Five Conscientiousness that are important to keep in mind when measuring them. First, whereas Big Five Conscientiousness consists of closely related behaviours often exhibited by conscientious people, Virtue Conscientiousness is focused more narrowly on role-specific duties. Second, whereas Big Five Conscientiousness refers to a descriptive set of behaviours, Virtue Conscientiousness is a normative standard that includes behavioural as well as

emotional and cognitive aspects. Given these differences, items intended to measure the virtue of conscientiousness should not correspond to the Big-Five Conscientiousness facets. For example, orderliness is not a necessary part of the virtue—it is possible to perform one's role well without being organised. Depending on the role in question, orderliness can be instrumentally beneficial, but it is not required for the virtue of conscientiousness. A scale of Virtue Conscientiousness should contain items measuring all of the aspects of a virtue, including items measuring appropriate behaviours, appropriate emotions appropriate motivations, practical wisdom and the vices of excess and deficiency.

Rasch Analysis

The Aristotelian theory of virtue has been subjected to the charge of empirical inadequacy by situationist philosophers like Doris (2002) and Harman (2009), who argue that people do not, in fact, possess cross-situationally consistent character traits. Prinz (2009) argues that we cannot acquire (Aristotelian) virtues because our moral psychology differs quite radically from the Aristotelian conception. In order to determine whether the components of virtue relate together in the ways that philosophers presume, a virtue scale should be developed using Rasch analysis, which involves stringent criteria for assessing the overall unidimensionality of the construct being measured (Smith, 2002). Rasch methodology also offers various advantages over classical test theory (CTT); for example, CTT does not account for item difficulty, and total scores are calculated by adding up participants' scores across all the scale items. This is problematic because different items can measure different amounts of the latent trait (Stucki et al., 1996). In Rasch analysis, both item difficulty and person ability are accounted for, and scores are transformed from ordinal to interval level data, which provides greater precision of measurement (Brogden, 1977; Rasch 1961).

In the dominant Aristotelian view, virtues are traits that contribute to human flourishing, happiness and well-being. However, there is a lack of research about how Aristotelian virtues contribute to well-being largely due to lack of assessment instruments for measuring such virtues. Although some scales in psychology are partially based on Aristotelian virtue theory, none of them operationalise all the aspects of virtues that Aristotle took to be essential, such as appropriate behaviour, emotion, and reason. The aim of this project was to develop and validate the overarching construct of the Aristotelian Virtue of Conscientiousness Scale (AVCS) using Rasch methodology.

Virtue Conscientiousness is a more normative version of conscientiousness compared to Big Five Conscientiousness, and investigating this virtue can contribute to researcher's understanding of individual differences, personality and virtue. Virtues are excellences of character which, according to virtue theorists, involves being successful in one's virtuous aims and pursuits—especially in ways that leads to flourishing (Hursthouse, 2001). As excellence and flourishing involve both subjective experiences and objective achievements, it is expected that people who score higher on the AVCS will report more satisfaction with their lives. However, as this scale contains items measuring the vice of excess (extreme scores), the general construct is expected to relate to well-being in complex ways. In this sense, weak positive correlations between anxiety and stress with the AVCS are expected. As the AVCS represents character rather than personality, discriminant validity is also predicted to be found between the AVCS and the Big Five scale of Conscientiousness, indicating the AVCS represents a distinctive construct.

This scale is intended for scientific use and for the investigation of virtues and character traits, especially in relation to well-being, by research psychologists. This scale was not designed for individual, clinical, or educational assessments. The scale and instructions were created for the measurement of Virtue Conscientiousness in the general adult

population, specifically for those living in Western cultures. Indeed, this study aims at the development and initial validation of the overarching construct of Virtue Conscientiousness as potential tool for further well-being research.

Method

Participants

A recent sample size recommendation for Rasch analysis suggests having of 250-500 cases (Hagell and Westergren 2016). This number is considered acceptable for reducing type 1 error and for achieving adequate item calibration. Based on this recommendation, data were collected from 334 participants dwelling in the USA. Each participant was recruited using Amazon Mechanical Turk (MTurk), an online crowdsourcing website. The survey was presented to participants on Qualtrics, a platform for creating and administering surveys, which participants accessed via a link. Each participant received a living wage of \$8.00 NZD (based on the average completion time of the survey) unless they failed an attention test or completed the survey in under five minutes. None of the data from the unpaid participants, including those who completed the survey in under five minutes were used for analyses. The attention test refers to a survey item stating, “to demonstrate your attention, select the disagree option for this question.” Before beginning the survey, all participants provided an informed consent to participate in the study. Thirty-three participants were removed from the data set because they either failed the attention test, did not finish the survey, or completed it too quickly. At the end of the survey, participants were asked to provide their age and gender. Although multiple gender options were provided, participants either identified as male ($n = 206$) or female ($n = 95$). Participants were aged 21 to 78, with a mean age of 37.84 (SD = 10.29) with one participant missing data. The authors’ institutional ethics committee approved the study, which follows the ethical principles of the American Psychological Association, 7th edition (American Psychological Association, 2022). The data used for the study are available at the OSF under following link:

https://osf.io/rvfx4/?view_only=5e1c712f89cd40f1a18934c5cc6f8719

Measures

Sixty items were written to measure the different theoretical aspects of Virtue Conscientiousness. Twenty-Six of these items were negatively coded and used as to ensure that participants read the items carefully (Maltby et al., 2017). Importantly, the items were created to measure each of the main aspects of virtue; these included appropriate behaviours, emotions, motivations, practical wisdom, and the vices of excess and deficiency.

The behavioural items were written in accordance with the idea that virtues are human excellences. Two types of behavioural items were created. One set of items is about fulfilling the basic responsibilities and duties of one's roles; these behaviours are required to perform one's roles successfully, however, they are insufficient for behavioural excellence. For this reason, more items were created to measure a person's sense of completing tasks excellently. Having items measuring a person's fulfilment of responsibilities and their perceived performance of excellent behaviours, more closely captures the Aristotelian idea that virtuous people function excellently according to the situation (Aristotle, ca. 350 B.C.E./2020).

The reasoning items were created to assess four different aspects of virtuous reasoning; this was to capture the Aristotelian idea that virtuous people are motivated by good reasons and that virtuous individuals understand what roles to prioritise and how to fulfil them (practical wisdom) (Aristotle, ca. 350 B.C.E./2020). As there are various praiseworthy reasons for performing any given behaviour, the motivation questions were reduced to three broad categories: motives about promoting the welfare of others, motives about promoting the welfare of the self, and motives about striving for excellence as a goal in itself. These categories of motivations were designed to be broad enough to capture each desirable motive that virtuous people may have, and they specifically relate to the

Aristotelian idea that virtues are human excellences that benefit their possessor and the people around them (Aristotle, ca. 350 B.C.E./2020).

The emotion-based items were created specifically to measure the extent to which a person experiences appropriate emotion more generally. The emotions facet measures a person's propensity to experience emotions that cohere with and promote their role-specific behaviour, which is an important aspect of Aristotelian theory (Aristotle, ca. 350 B.C.E./2020). For example, virtuous people will be happy to complete role-specific tasks because they know they are important and necessary.

Another key feature of Aristotelian virtues is that they correspond to vices, one of deficiency and the other of excess. The vice of deficiency is represented by low scores on the various items on the scale. However, the vice of excess is harder to measure, as it represents an extreme on the high end of the trait continuum. For this reason, a group of items were created specifically to measure the vice of excess. These items represent Aristotle's idea that going too far in expressing behaviours and experiencing emotions can be a vice. These items, though representative of excessive tendencies, still represent an aspect of the general theory proposed by Aristotle (Aristotle, ca. 350 B.C.E./2020).

The distinction between vice and virtue is important, and in terms of the AVCS, the scale is supposed to measure the full continuum from deficiency to the point of excess. However, this does not mean that someone can have too much virtue; virtue more accurately refers to the mean between deficiency and excess (Aristotle, ca. 350 B.C.E./2020). Thus, the scale is designed to measure where people sit on the total continuum. The name AVCS rather highlights the theory the scale is based on and the ideal standard that people ought to strive for.

The response scale for the AVCS consists of five Likert-style response categories labelled “Disagree” (1), “Very slightly agree” (2), “Moderately agree” (3), “Strongly agree” (4) and “Completely agree” (5). The items from the AVCS were accompanied by a set of instructions explaining how to think about and interpret each question (Appendix A). These instructions were intended to prime the participant to think about their current roles and to reduce the abstractness of the questions (Strack & Martin, 1987). Each item and the instructions were written in English and were created to measure Virtue Conscientiousness in general Western adult populations; therefore, technical terms were avoided when creating the items. The AVCS was then examined by two experts in neo-Aristotelian virtue theory to confirm the construct validity of the scale. A cross-sectional research design was chosen as the most appropriate method for validating this scale. This was primarily due to funding limitations; however, it is also sensible to determine the adequate functioning of the scale, according Rasch analysis and the fundamental principles of measurement, before investing more resources in more expensive longitudinal or experience sampling methods.

The 10-item IPIP Conscientiousness scale from the revised NEO Personality Inventory (Big Five Conscientiousness) was used as it measures a related construct of Conscientiousness (Costa & McCrae, 1992). This scale consists of one facet that measures the six dimensions of the personality trait of Conscientiousness, including Competence, Order, Dutifulness, Achievement-striving, Self-discipline and Deliberation (Maltby et al., 2017). The scale included five Likert-style response options labelled “Very inaccurate” (1), “Moderately inaccurate” (2), “Neither accurate nor inaccurate” (3), “Moderately accurate” (4) and “Very accurate” (5). The scale displayed good reliability ($\alpha = 0.81$, $\omega = 0.78$).

Life Satisfaction data was collected using the 5-item Satisfaction with Life Scale (SWLS) (Pavot et al., 1991). This scale measures people’s subjective judgments about the quality of their lives. The scale consists of one dimension and displayed good reliability ($\alpha =$

0.91, $\omega = 0.91$). The scale included seven Likert-style response options labelled, “Strongly disagree” (1), “Disagree” (2), “Slightly disagree”, (3) “Neither agree nor disagree” (4), “Slightly agree” (5), “Agree” (6) and “Strongly agree” (7).

Psychological distress data was collected with the 21-item Depression, Anxiety and Stress Scale (DASS) (Lovibond & Lovibond, 1995). This scale measures three dimensions of distress (i.e., labelled Depression, Anxiety and Stress) and each displayed good reliability, Depression ($\alpha = 0.92$, $\omega = 0.92$), Anxiety ($\alpha = 0.94$, $\omega = 0.94$) and Stress ($\alpha = 0.91$, $\omega = 0.91$). The scale includes four Likert-style response options labelled, “Never” (1), “Sometimes” (2), “Often” (3) and “Almost always” (4).

Data Analyses

Following the data collection, descriptive statistics, including the mean, median and standard deviation, were acquired using IBM SPSS Statistics v.27. Next, the internal consistency of the total scale was assessed using McDonalds Omega model (Stenson & Lydersen, 2022). Based on the results, all 26 of the negatively coded items were removed to attain an adequate Omega score of above 0.70. Item-to-total correlations were also assessed to ensure that all items displayed adequate coefficients above the 0.30 criterion (Field, 2018, p. 826). Then, a further four items with lower item-to-total correlations or with less conceptual relevance were removed from the Excessive Conscientiousness category to achieve a balance of 3-4 items for each aspect of the virtue. Removing these items did not affect the construct validity, as many items were written to assess the construct, and the remaining items measured each aspect of virtue adequately in a positive direction. After removing these items, a total of 28 items remained for further analysis.

After checking the internal consistency of the scale, the data were converted to an ASCII file and uploaded to RUMM2030 software for Rash Analysis (Andrich et al., 2009).

As conducting Rasch analysis is an iterative process, multiple sequential steps were taken to analyse the data. First, a likelihood ratio test was performed to determine which polytomous model to use; the test was significant ($\chi^2(80) = 172.17, p < 0.001$), meaning there were inconsistent distances between thresholds of response categories. For this reason, the unrestricted Partial Credit Model was the most appropriate (Masters, 1982).

Next, a chi-square goodness of fit statistic was attained to assess the item-trait interaction. A non-significant p -value ($p > 0.05$, Bonferroni adjusted) is required to achieve an acceptable fit to the Rasch model. A non-significant result confirms that the scale works consistently across different levels of the latent trait, in line with expectations for an interval-level scale (Tennant & Conaghan, 2007). The fit of individual items to the Rasch model were also assessed; individual item fit-residuals should be between +2.50 and -2.50 (Lundgren- Nilsson & Tennant, 2011).

After gaining these initial statistics, item bias and local dependencies were checked. Local dependencies occur when items share variance that deviates from the latent trait (Medvedev & Krägeloh, 2022). To meet the Rasch model assumptions, there should be no local dependencies between items because local dependency issues can influence both the chi square statistic and the reliability of the scale (Little et al., 2002; Wainer & Kiely, 1987). Local dependencies between the AVCS items were examined based on a residual correlation matrix. Local dependency is suspected when correlation coefficients exceed 0.20 compared to the mean of all residual correlations (Marais & Andrich, 2008). When local dependencies occur between items, they can be merged together into testlets to address local dependency and improve the overall fit to the Rasch model (Lundgren- Nilsson et al., 2013; Wainer & Kiely, 1987). These modifications occur with subsequent rechecks of the goodness of fit chi square statistics.

The AVCS items invariance, which refers to Differential Item Functioning (DIF), was also checked during the Rasch Analysis of the data. Items should not be functioning differently for different groups of people with the same level of the latent trait (Andrich & Hagquist, 2013). That is, for an item to reflect meaningful and comparable differences across groups, it must function the same way regardless of which group it assesses (e.g., in this case, age and gender groups). There are two forms of DIF: uniform and nonuniform. Uniform DIF occurs when there are consistent deviations in mean scores across class intervals, whereas nonuniform DIF does not involve consistent deviations (Andrich & Hagquist, 2013). Uniform DIF can be resolved by splitting an affected item into categories that assess each group independently or by other scale modifications, including creating testlets or removing an affected item (Wainer & Kiely, 1987).

According to Rasch, the core assumption of the Rasch model is that the scale is unidimensional; because unidimensionality is a fundamental principle of measurement in exact sciences (Rasch, 1960; Rasch, 1961). Unidimensionality is assessed in the RUMM2030 software by comparing the person locations for two groups of items (Smith, 2002). These groups are the items with the highest positive and highest negative loadings on the first principal component of residuals, after the latent factor is removed. This is done by comparing the person locations for each group using a series of independent sample *t*-tests. If fewer than five percent of *t*-tests are significant, according to the lower band of a binominal confidence interval (CI), adjusted by sample size, then the scale is considered unidimensional.

Rasch analysis reliability is assessed by establishing how well the scale items can delineate groups of person abilities on a latent trait continuum. This is referred to as the Person Separation Index (PSI), and is numerically similar to Cronbach's Alpha; however, there are advantages to using PSI. Unlike Cronbach's Alpha, PSI can be calculated with

missing and random data and focuses on accuracy of assessment rather than on correlations between items (Andrich et al., 2009; Medvedev et al., 2018).

Data was also collected using several additional scales to confirm validity. To establish convergent validity, each measure was expected to correlate to a predicted degree. For instance, the correlation between the AVCS and Conscientiousness should only be weak to moderate, as the AVCS measures virtue, which is conceptually distinct from general personality. Moreover, as being virtuous constitutes and contributes to flourishing (Snow, 2020), it is expected that the AVCS positively correlates with the SWLS and negatively correlates with the DASS facets. However, because the AVCS contains items that measure the extreme end of Conscientiousness (i.e., Excessive Conscientiousness), correlation coefficients based on total scores from the AVCS might be affected, as a non-linear relationship is predicted between the AVCS and well-being outcomes.

Results

The total AVCS displayed excellent internal consistency estimates ($\alpha = 0.93$, $\omega = 0.92$), with the initial Rasch analysis also showing good reliability (PSI = 0.92). However, the chi-square goodness of fit statistic was unsatisfactory, with a significant p -value ($\chi^2(108) = 276.65$, $p < 0.001$; Table 2, Initial Analysis), meaning the original scale misfit to the Rasch model. Individual item fit statistics are displayed in Table 3, which shows that items 3, 7, 8 and 28 fit poorly to the model. The initial analysis also did not confirm unidimensionality, with 19.8% of multiple t -test comparisons for high and low loadings on an additional factor being significant.

Table 2

Summary of fit statistics for the model fit Rasch analyses of the AVCS

Analysis	Person mean		Goodness of fit		PSI	Significant t -tests (Unidimensionality)	
	Value	SD	χ^2 (df)	p		%	Lower bound
Initial	0.84	0.84	276.65 (108)	<0.001	0.92	22.3	19.8 (No)
Final	0.55	0.57	56.98 (42)	0.06	0.88	6.3	3.9 (Yes)

Note. These results were obtained using RUMM2030 Software

Table 3*Individual AVSC items location, fit residual (FitResid) and Chi Square (ChiSq)*

No	Item Content	Location	FitResid	ChiSq
1	I perform my roles excellently.	-0.33	-2.04	18.49
2	I fulfil my role-specific responsibilities.	-0.46	0.73	3.46
3	I prioritise my personal responsibilities over the needs of others.	0.66	7.69*	48.47
4	I complete role-specific tasks to an excellent standard.	-0.18	-2.43	19.47
5	I finish my work on time.	-0.54	0.07	5.31
6	I fulfil my duties.	-0.68	-1.02	3.97
7	I prioritise role-specific responsibilities over my health.	1.00	6.15*	39.96
8	People tell me that I work too much.	0.95	4.21*	5.79
9	I'm good at prioritising my responsibilities.	-0.04	-0.98	7.09
10	I fulfil my commitments to others.	-0.16	1.03	4.84
11	My concern for my own well-being motivates me to do my work.	0.29	2.48	10.90
12	Concern for my future influences how I prioritise my responsibilities.	0.19	2.38	7.75
13	An appreciation of excellence motivates me to do my work.	0.29	-1.77	3.61
14	Consideration of others motivates me to fulfil my responsibilities.	0.38	1.70	11.50
15	My DTP important roles to an ES influences how I P my Rs	0.42	-0.90	15.07
16	Caring about others influences how I prioritise my responsibilities.	0.47	1.77	13.09
17	Concern for my own WB motivates me to complete work to a HS.	0.07	-0.82	3.82
18	My A of a JWD motivates me to perform roles to the BOMA.	0.21	-0.97	6.03
19	My concern for others motivates me to perform roles well.	0.35	0.71	9.73
20	I have the skills needed to perform my roles excellently.	-0.60	-1.34	12.66
21	I know how to fulfil my role-specific responsibilities.	-0.78	-0.43	6.57
22	I have thought about what my important roles are.	-0.38	-1.41	4.14
23	I understand what my important roles require of me.	-0.62	-0.28	3.28
24	I am happy to fulfil role-specific duties.	-0.23	-1.56	10.63
25	I enjoy completing important tasks to a high standard.	-0.46	-0.46	5.27
26	I find it rewarding to fulfil my duties.	-0.17	-1.29	11.73
27	I feel the need to make everything perfect.	0.51	2.45	4.69
28	I feel good when I P important R over things that are less important.	-0.17	5.27*	4.70

Note. * Significant misfit to the Rasch model ($p > 0.05$); Where necessary, items have been abbreviated to fit the table; DTP = desire to perform; ES = excellent standard; P = Prioritise; R = Responsibilities; WB = well-being; HS = high standard; JWD = job well done; BOMA = best of my ability; A = appreciation. Also note that these results were obtained using RUMM2030 Software.

Removing items to achieve Rasch model fit was considered as the last resort because it would compromise the construct validity of the measure. Therefore, a residual correlation matrix was analysed as residual correlations between individual items may result in local dependency, which affects the overall and individual items fit to the model. Overall, there were high residual correlations observed between items representing different aspects of the scale, which exceeded 0.20, indicating local dependency. To address this issue, locally dependant items were combined into testlets using methodology of Lundgren-Nilsson et al. (2013), as follows: testlet 1 (Excellent Behaviours, items 1, 4, 9), testlet 2 (Responsible Behaviours, items 2, 5, 6, 10), testlet 3 (Concerns for Others, items 14, 16, 19), testlet 4 (Self-Concern, items 11, 12, 17) testlet 5 (Appreciation of Excellence, items 13, 15, 18) testlet 6 (Practical Wisdom, items 20, 21, 22, 23), testlet 7 (Emotions, items 24, 25, 26, 28) testlet 8 (Excessive Conscientiousness, items 3, 7, 8, 27).

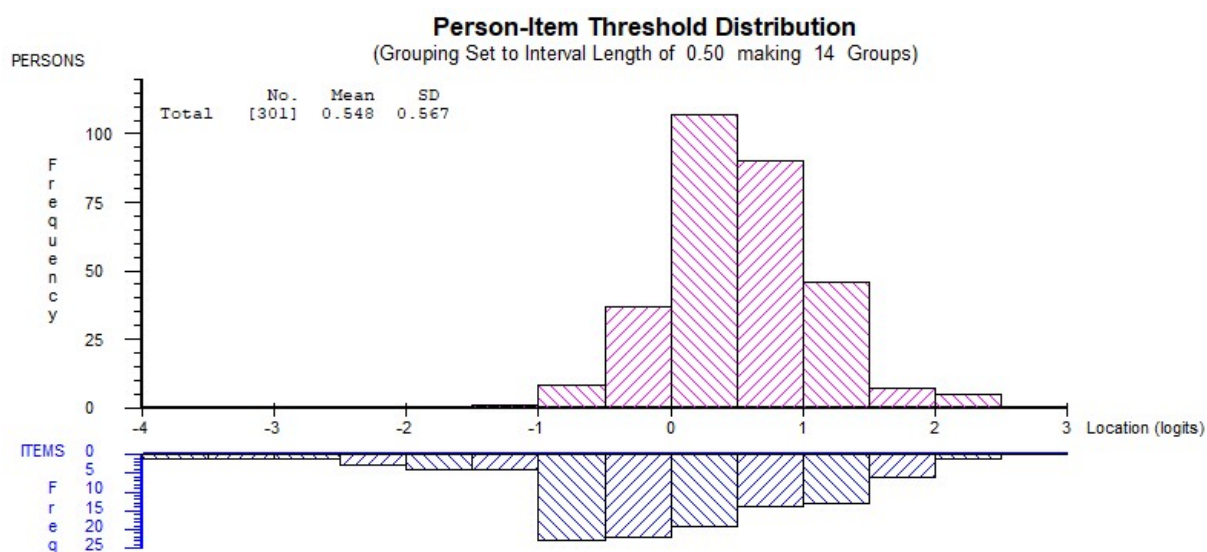
After creating testlets, the overall model fit improved, but the goodness of fit chi-square was still significant, indicating that the scale deviates from expectations of an interval scale, defined by the Rasch model ($\chi^2(56) = 161.94, p < 0.001$). However, the scale displayed good reliability (PSI = 0.87). As testlets behave in the Rasch model the same way as regular items do, they can also have local dependency (Medvedev et al., 2020). Examination of the residual correlation matrix for this analysis indicated high residual correlations (i.e., greater than the 0.20 cut-off point with reference to the mean) between testlets 2 and 8, and testlets 3 and 6. To resolve these local dependencies, testlet 8 was merged with testlet 2 and testlet 6 with testlet 3, resulting in the best Rasch model fit, with a non-significant chi-square (Table 2, Final Analysis). The final analysis demonstrated unidimensionality of the scale, with the lower bound of the binominal confidence interval around significant *t*-tests overlapping the 5% cut-off point (Table 2, Final Analysis). The scale also retained good reliability for both

individual and group assessment ($PSI = 0.88$) and was invariant, displaying no DIF across personal factors of age and gender.

The distribution of person and item thresholds for the final analysis of the best fit can be seen in Figure 1. The distribution shows that the item threshold distribution of the modified scale adequately covers the different levels of virtue people possess in the sample, with no significant floor or ceiling effects. The scale has good targeting with a person mean of 0.55, which suggests an overall higher level of virtue in the current sample. It can be seen that there are no individual scores distributed below -1.5 logits, suggesting that the scale has the capacity to measure Virtue Conscientiousness in populations that lack or are deprived of virtuous qualities due to cultural or social restraints. The modified AVCS satisfied the parameters of an interval scale, described by the Rasch criteria, that enabled the transformation of the ordinal scores into interval scores to improve the precision of the measurement. These ordinal to interval conversions for the AVCS are presented in Table 4.

Figure 1

Distribution of person and item thresholds in logit units (final analysis).



Note. This figure was made using RUMM2030 software.

Table 4*Conversion of AVCS ordinal scores into interval-level data based on Rasch model estimate*

Ordinal Scores	Interval		Ordinal Scores	Interval		Ordinal Scores	Interval	
	Logits	Scale		Logits	Scale		Logits	Scale
28	-4.36	28.00	66	-0.50	80.14	104	0.50	93.64
29	-3.70	36.97	67	-0.48	80.49	105	0.53	94.04
30	-3.23	43.25	68	-0.45	80.86	106	0.56	94.46
31	-2.91	47.67	69	-0.42	81.21	107	0.59	94.88
32	-2.65	51.15	70	-0.40	81.56	108	0.62	95.30
33	-2.43	54.04	71	-0.37	81.90	109	0.65	95.73
34	-2.25	56.49	72	-0.35	82.25	110	0.69	96.18
35	-2.10	58.57	73	-0.32	82.59	111	0.72	96.62
36	-1.97	60.38	74	-0.30	82.94	112	0.75	97.08
37	-1.85	61.97	75	-0.27	83.28	113	0.79	97.56
38	-1.74	63.39	76	-0.25	83.62	114	0.82	98.04
39	-1.65	64.66	77	-0.22	83.97	115	0.86	98.54
40	-1.56	65.82	78	-0.19	84.30	116	0.90	99.06
41	-1.49	66.86	79	-0.17	84.64	117	0.94	99.58
42	-1.41	67.84	80	-0.14	84.98	118	0.98	100.12
43	-1.35	68.71	81	-0.12	85.32	119	1.02	100.68
44	-1.29	69.54	82	-0.09	85.67	120	1.06	101.26
45	-1.23	70.30	83	-0.07	86.01	121	1.11	101.85
46	-1.18	71.00	84	-0.04	86.34	122	1.15	102.47
47	-1.13	71.66	85	-0.02	86.69	123	1.20	103.12
48	-1.08	72.28	86	0.01	87.03	124	1.25	103.80
49	-1.04	72.86	87	0.03	87.38	125	1.30	104.51
50	-1.00	73.42	88	0.06	87.74	126	1.36	105.26
51	-0.96	73.94	89	0.09	88.07	127	1.42	106.05
52	-0.92	74.44	90	0.11	88.42	128	1.48	106.89
53	-0.89	74.93	91	0.14	88.78	129	1.55	107.80
54	-0.85	75.39	92	0.16	89.14	130	1.62	108.78
55	-0.82	75.83	93	0.19	89.49	131	1.70	109.85
56	-0.79	76.27	94	0.22	89.86	132	1.78	111.02
57	-0.76	76.70	95	0.24	90.22	133	1.88	112.35
58	-0.73	77.10	96	0.27	90.59	134	2.00	113.87
59	-0.70	77.51	97	0.30	90.95	135	2.13	115.64
60	-0.67	77.90	98	0.33	91.31	136	2.29	117.82
61	-0.64	78.29	99	0.35	91.69	137	2.49	120.57
62	-0.61	78.67	100	0.38	92.07	138	2.77	124.38
63	-0.58	79.05	101	0.41	92.46	139	3.22	130.42
64	-0.56	79.41	102	0.44	92.84	140	3.93	140.00
65	-0.53	79.78	103	0.47	93.25			

Note. Ordinal to interval conversions can be calculated by computing each individual's total ordinal score on the AVCS and by finding their corresponding interval scores displayed on the right-hand side, displayed as scores in logits or the equivalent scale range. The ordinal scale can be replaced by these interval scores. These transformations cannot be used for participants missing data. Also note that these results were obtained using RUMM2030 Software.

Correlations

After performing the Rasch Analysis, the ordinal to interval conversion table was used to make a syntax file in SPSS v.27 to convert the AVCS raw scores to an interval-level of data. An additional syntax file was created to convert the DASS raw scores into interval data, using conversion tables developed by Medvedev et al. (2020). After these conversions were made, the total scores of the various scales were compared using bivariate correlations, both with and without controlling for age and gender (Table 5).

Table 5

Pearson correlations between the Aristotelian Virtue Conscientiousness Scale (AVCS), Satisfaction with Life Scale (SWLS), Conscientiousness, age, gender and Depression, Anxiety and Stress

	SWLS	Conscientiousness	AVCS	Depression	Anxiety	Stress	Gender
Conscientiousness	0.06						
AVCS	0.54*	0.26*					
Depression	0.06	-0.61*	0.10				
Anxiety	0.36*	-0.57*	0.26*	0.78*			
Stress	0.28*	-0.61*	0.21*	0.82*	0.84*		
Gender	0.10	0.04	0.03	0.00	0.03	0.03	
Age	0.01	0.05	-0.02	-0.09	-0.08	0.03	0.18
Partial Correlations after controlling for Age and Gender							
Conscientiousness	0.05						
AVCS	0.53*	0.23*					
Depression	0.10	-0.61*	0.10				
Anxiety	0.40*	-0.57*	0.30*	0.78*			
Stress	0.21*	-0.61*	0.21*	0.82*	0.84*		

*Note.** Correlation is significant at the 0.01 level (2- tailed).

Discussion

The aim of this study was to develop and validate a new measure to assess the Aristotelian virtue of conscientiousness using Rasch methodology. Positive psychologists and philosophers agree that virtues are important for well-being; however, the most dominant and popular virtue theory (Aristotelian virtue theory) has been neglected in the psychological literature. Using Rasch analysis, this study has demonstrated that the 28-item AVCS has strong psychometric properties such as excellent reliability, unidimensionality and invariance across gender and age. Thus, the AVCS met the expectations of an interval-level scale defined by the unidimensional Rasch measurement model. This study opens further research opportunities, with the potential to help people improve their character and, in turn, their well-being. Further research in this area may also help determine the effectiveness of interventions designed to improve moral character, such as in leadership and education.

The Rasch model assumptions were met after merging some of the subsets together; testlet 8 (Excessive Conscientiousness) with testlet 2 (Responsible Behaviours), and testlet 6 (Practical Wisdom) with testlet 3 (Concern for Others). Such subsets showed local dependencies, perhaps due to a method effect, shared meaning, and/or similar wording amongst items (Medvedev & Krägeloh, 2022). For instance, both Excessive Conscientiousness and Responsible Behaviours relate to fulfilling responsibilities, but to different degrees. Alternatively, Practical Wisdom might relate strongly to Concerns for Others because practical wisdom involves understanding what is valuable and worth prioritising; wise people, therefore, might believe that social bonds have great value. It is important to note that in some cases, local dependencies indicate local trait dependency (Medvedev & Krägeloh, 2022). This is when local dependencies are caused by an additional latent trait (i.e., multidimensionality). However, if after merging items together, the scale conforms to the Rasch model assumptions, then local dependencies are better understood as

being caused by local response dependency (i.e., when the ordering and response to one item affects the response to another) or method effect (i.e., an effect due to negatively worded items). Merging these testlets solved the local dependency issue, providing evidence of unidimensionality, while also improving the precision of the scale (Medvedev & Krägeloh, 2022).

The confirmation that a virtue scale, based on Aristotelian virtue theory, has met the Rasch model assumption of unidimensionality has implications for virtue theory in general. For instance, it means that Virtue Conscientiousness is trait-like, as opposed to being an assortment of typically unrelated psychological variables. Thus, it is possible that other Aristotelian virtues are also descriptively observable and measurable. This study, therefore, provides some evidence suggesting that Aristotelian virtue theorists' assumptions about the nature of virtue, including the assumption that virtue involves manifestations of appropriate behaviours, reasoning, and emotions, may be accurate. Importantly, this contributes to debates about virtue, particularly in philosophy, where Aristotelian virtue theory has been critiqued in various ways on grounds of empirical inadequacy. This study contributes to the start of a growing empirical foundation for Aristotelian virtue theory that can be used to counter claim made by virtue sceptics. However, more work needs to be done, especially in establishing the stability of virtue manifestation across time and the consistency of virtue manifestation across different types of situations.

The AVCS also showed excellent reliability ($PSI = 0.88$), meaning it is effective at differentiating the various degrees of virtue people possess with 88% accuracy. During the analysis, an ordinal to interval conversion table was produced, which can be used to convert the ordinal scores into interval-level data, improving the precision of measurement (Table 3). This conversion table is suitable for further research into the AVCS. Making these transformations will be useful for further research because, as seen in Table 3, the distance

between ordinal scores varies at different points of the scale; consequently, these transformations will result in more precise data and more reliable and valid comparisons across measures and people (Stucki et al., 1996).

As seen in Figure 1, data representing degrees of virtue and item difficulty, shows that the current sample has a person mean of 0.55. This suggests that the sample has relatively high degrees of Virtue Conscientiousness. This may have been due to a social desirability effect, or that there is a difference in perceived vs actual levels of virtue (Grimm, 2010; Miller, 2017). Alternatively, it could be the case that people who take MTurk surveys without breaking the stipulated survey instructions (e.g., the attention check), take their role seriously, and subsequently, have high degrees of Virtue Conscientiousness. Overall, the findings presented in Figure 1 show that there are no floor or ceiling affects, as the item difficulty distribution covers the full range of person abilities in the sample. This means that the scale can affectedly declinate the different level or amounts of virtue people possess in the population. Moreover, although levels of virtue are high in this sample, Figure 1, displaying the item difficulty distribution, shows the scale has the capacity to measure lower degrees of virtue that may be due to social and/or cultural restraints.

Comparisons between the AVCS and the Big Five Conscientiousness scale demonstrated good discriminant validity between the two constructs. As predicted, the two scales weakly correlated with each other indicating that although they are related, Virtue Conscientiousness is a distinctive trait. Moreover, the AVCS shows a strong correlation with life satisfaction, an outcome that Big Five Conscientiousness did not predict.

Regarding distress, the AVCS showed weak correlations with Anxiety and Stress. These results are not altogether surprising, as the AVCS attempts to measure extreme scores across the trait spectrum, as seen by the Excessive Conscientiousness items. Extremely high

scores on AVCS are indicative of the vice of excess. People who score highly on the total AVCS are therefore likely to act and feel in extreme ways that are inappropriate; for instance, they may prioritise certain responsibilities too much, like their work over other important well-being factors like friendship and social bond. Having such extreme concerns for some roles over others may likely cause stress and anxiety, as people who are excessively high in conscientiousness may have extremely high expectations for themselves and their performance, which may cause anxiety and stress. Indeed, similar findings suggest certain types of perfectionists also experience heightened stress and anxiety.

Other studies have also reported similar findings relating to extreme scores. For example, Oishi et al. (2009) found that people who experienced the highest levels of happiness also reported lower income and educational and political participation compared to people who experienced slightly less happiness. Moreover, Niemiec (2019) found that overuse of VIA-IS traits is related to higher levels of Depression and lower life satisfaction compared to optimal use. In terms of the AVCS, it is likely that people who score slightly under the highest scores also have more desirable scores across well-being outcomes, especially as the Excessive Conscientiousness items represent the hardest items in the scale. This complex relationship between the AVCS and well-being may offer new insights about how different levels of traits can have differing effects on diverse health and well-being outcomes. Advanced correlational research, perhaps by using network analysis (Chalmers et al., 2022) and latent profile analysis (Spurk et al., 2020), are promising areas for further research.

One unexpected correlation was the positive correlation between anxiety and life satisfaction. This result is inconsistent with previous reports about the relationship between anxiety and satisfaction with life (e.g., Ghazwin et al., 2016). However, this result was likely due to an ordering effect between the items (Strack & Martin, 1987). For example, based on

the results, Virtue Conscientiousness is related to satisfaction with life, presumably because people who perform their roles excellently are satisfied with their accomplishments. However, based on the positive correlation between the AVCS and Anxiety, it seems that there may be a subset of people who prioritise their role-specific responsibilities so strongly that they also experience anxiety (i.e., they are excessively conscientious). Based on the ordering of the items, it is likely that, because the AVCS items were presented first, the participants were primed to think about their role-specific accomplishments (Strack & Martin, 1987). This may explain why some participants judged themselves high in life satisfaction, even though they experience some anxiety.

Overall, the findings from the study indicate that the AVCS is useful psychometric tool. The findings that the scale relates to well-being in complex ways could have implications for education and clinical practice, as it indicates that interventions should focus not only on developing traits in a linear fashion, but they should also teach people to manifest their traits in appropriate way. Indeed, this study indicates that focusing on helping people to develop virtue and avoid the vices, may be an affective way of enhancing well-being.

Limitations and Direction for Future Research

Since the AVCS is a new measure, replication is needed to establish the robustness of the results. Evidence of convergent validity for this scale is also lacking, as there are no other virtue scales of conscientiousness to compare the AVCS with. Additionally, although the analysis has demonstrated overarching validity for the general construct, additional research should investigate the factor structure using CFA. Future research can also establish more reliability evidence by assess the rest-retest reliability for the AVCS; this will help in determining the applicability of the AVCS for predicting the stability of people's scores over time.

Participants for this study consisted of mainly males from the USA recruited via MTurk. Goodman et al. (2013) found that MTurk participants are generally lower in self-esteem and higher in neuroticism, introversion and materialism and have lower cognitive capacities. Further research into the AVCS is needed with a more diverse sample, perhaps by utilising multiple crowdsourcing platforms, such as Prolific and CrowdFlower, that attract participants from different demographics (Litman et al., 2017).

Another limitation regarding the AVCS is that the items relate to people's roles generally. Although individuals may have consistent degrees of Virtue Conscientiousness across roles, it is also plausible that people's degree of Virtue Conscientiousness is role-specific. It could be the case, for example, that some people strive for excellence in only particular areas of life, such as work, but not at home. Other studies have found such trait differentiation in similar constructs, such as with Big Five Conscientiousness and perfectionism (Sutton, 2018; Mitchell-Parker, 2018). Both empirical and theoretical work is needed to determine whether trait differentiation occurs with virtues, and if so, how this affects personal well-being.

This study indicates that a neo-Aristotelian theory of virtue offers a unique way of understanding certain traits studied by psychologists; this theory-based model of virtue offers different and extremely relevant implications for well-being compared to standard psychological approaches. In particular, with the inclusion of items measuring the vice of excess, it may offer a fuller representation of the construct in that it can measure extreme scores at either end of the continuum, potentially enabling future research to identify which aspects of the traits are psychologically adaptive and which ones cause distress. However, although this model is promising, it is not yet clear whether a similar formula for measuring virtue will extend to the more traditional virtues, like honesty, justice, courage, and

temperance (Hursthouse, 2001). Therefore, more research is needed to see whether these other virtues are measurable and how they are related to flourishing.

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Chapter 5: Validation of the Aristotelian Virtue of Conscientiousness Scale using Confirmatory Factor Analysis

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Chapter Introduction

This paper is under review in *Current Psychology*, and continues the validation of the Aristotelian Virtue of Conscientiousness Scale (AVCS) by testing an eight-factor hierarchical structure with a single second-order latent trait. The facets were derived from a theory-driven approach, treating each aspect of virtue as a distinct yet related psychological component. In this paper, we found that the hierarchical model fit the data well, which is consistent with the earlier Rasch results. This suggests that while the facets are distinguishable, they are unified by an overarching general factor of virtuous conscientiousness. These findings indicate that the virtue can be meaningfully assessed at both the global and facet levels, with the latter allowing for more fine-grained correlational analyses.

Note that after submission of this thesis, the CFA models were re-estimated using DWLS estimation and additional checks, including a Monte Carlo simulation. These analyses indicated that the correlated facet model provided a better representation of the data than the hierarchical model, further supporting the interpretation that the facets of the AVCS are best understood as correlated components rather than indicators of a second-order latent trait.

Abstract

Aristotelian virtue theory conceptualises virtues as enduring dispositions to behave, reason, and feel in appropriate ways, integrating cognitive, affective, and behavioural components that contribute to well-being. Despite the emphasis on these distinct yet interrelated components, no prior research has validated a comprehensive virtue model incorporating all essential elements outlined by Aristotle. This study aimed to validate the Aristotelian Virtue of Conscientiousness Scale (AVCS) using a structural equation modelling (SEM) framework. A sample ($n = 301$) completed the 28-item AVCS alongside measures of distress, life satisfaction, and Big Five Conscientiousness. The AVCS items were structured into eight theory-driven, reliable facets and analysed using confirmatory factor analysis (CFA) within a hierarchical SEM model. The eight-factor model demonstrated good fit indices, supporting a higher-order structure with one second-order latent trait comprising eight facets. The AVCS total scale and its facets exhibited strong reliability ($\alpha = 0.71\text{--}0.93$, $\omega = 0.73\text{--}0.92$) and correlated as expected with life satisfaction, Big Five Conscientiousness, and distress. These findings establish the validity and reliability of the AVCS as an eight-facet measure of Virtue Conscientiousness, offering a theoretically grounded alternative to existing conscientiousness measures. The AVCS provides a valuable tool for well-being research, enabling a more nuanced investigation of Aristotelian virtues within psychological and personality research.

Keywords: Aristotelian virtues; confirmatory factor analysis, conscientiousness; character assessment; reliability; validity; Aristotelian Virtue Conscientiousness Scale.

Virtuous dispositions encompass appropriate cognitions, affect and behaviour that are central to well-being (Peterson & Seligman, 2004; Van Zyl et al., 2023). Scholars across multiple disciplines believe that virtues are connected to desirable individual and societal functioning. Measures of virtue employed by psychologists have faced some criticism for being “poorly conceptualised” and uninformed by recent work in philosophy (Van Zyl et al., 2023; Snow, 2022). Virtue theory is a well-established area in philosophy, offering a rich theoretical framework that can inform these measures (e.g., Swanton, 2021; Hursthouse, 2001; Slote, 2001).

Recently, the value of interdisciplinary work has gained attention across the field of virtue measurement, with scholars realising the importance of combining philosophical and psychological approaches to virtue (McManus et al., 2024a; McManus et al., 2024b; Darnell et al., 2022; Snow, 2022; Wright et al., 2020; Fowers et al., 2021; Morgan et al., 2017). Aristotelianism, as the dominant philosophical theory of virtue, has been the focus for most interdisciplinary scholars investigating virtue (e.g., Wright et al., 2020; Fowers et al., 2021; Swanton, 2021). However, there remains a lack of assessment tools for measuring virtue, and recent research addressing character and well-being is limited. Current studies either utilise character assessments that are conceptually weak (e.g., Casali et al., 2024) or do not employ virtue-based assessment of flourishing (e.g., Izzo et al., 2024; Henkens et al., 2024; Guo et al., 2024). This hinders scholars' ability to research virtues effectively, stifling important insights about the science of well-being and happiness (McManus et al., 2024b).

Aristotelian Virtue Theory

In Aristotle's view, virtues are human excellences that are necessary for *eudaimonia*. *Eudaimonia* is a Greek term that can be translated as a good or happy life (Aristotle, ca. 350 B.C.E./2020; Hursthouse, 2001). Although acting virtuously often benefits others, virtue

theorists believe that living virtuously benefits the individual, making it possible for them to live a good life. A good life is thought to be good or admirable, while at the same time being characterised by positive psychological states, such as feelings of happiness, well-being, satisfaction, and a deep sense of meaning (Aristotle, ca. 350 B.C.E./2020; Hursthouse, 2001; Snow; 2020; Badhwar, 2014).

The Aristotelian list of character traits includes virtues such as courage, honesty, moderation, and kindness, as well as vices such as cowardice, dishonesty, greed, and cruelty (Aristotle, ca. 350 B.C.E./2020; Hursthouse, 2001). Like standard personality traits, character traits (virtues and vices) involve complex patterns of and interactions between affect, behaviours, and cognition. But they differ from personality traits in that they are evaluative terms. To claim that a trait is a virtue is to say that it is an admirable trait, one that people ought to possess and exercise. Virtue theorists emphasise that character traits are “deep features” of a person—they represent a person's core attitudes, beliefs and desires. A virtuous person's actions will align with these inner states. In particular, they will experience affective states that are appropriate in the circumstances (Aristotle, ca. 350 B.C.E./2020). For example, they will be motivated by affective states such as care or compassion to donate to a charity, and feel happy or satisfied about being in a position to do so. By contrast, someone who does not possess the virtue of generosity might perform an apparently virtuous action but do so with regret or from a selfish motive. (Snow, 2020; Maltby et al., 2017; Hursthouse, 2001).

In addition to emphasising the importance of appropriate affective experiences, Aristotelians also claim that cognition plays a vital function in forming virtuous motivations and guiding desirable behaviours. The cognitive element of virtue is commonly referred to as practical wisdom (*phronesis*) and involves two things: (1) an understanding of which goals are worth pursuing and preserving, and (2) the ability to effectively achieve these ends. The

first allows one to weigh competing demands and correctly prioritise them, and the second consists of practical skills and knowledge gained through experience (Russell, 2009).

In short, then, the affective experiences of virtuous people cohere with their beliefs about which goals are valuable, and motivate appropriate behavioural responses. A final point worth noting is that Aristotle conceived of the virtues as a “golden mean.” In this view, any given virtue lies on a midpoint between two extremes, a deficiency and an excess, with respect to affective states and behaviours. For instance, courage involves experiencing appropriate amounts of fear and acting appropriately in the situation and is a mean between cowardice (experiencing too much fear, or fearing the wrong things, and behaving inappropriately) and rashness (experiencing too little fear, or not fearing what ought to be feared, and therefore taking unnecessary risks) (Aristotle, ca. 350 B.C.E./2020).

Although conscientiousness does not appear in the Aristotelian list of virtues, we can use Aristotle’s theory to reconceptualise conscientiousness as a virtue or character trait (as opposed to a personality trait). The form of conscientiousness that we are interested in is the virtue that allows people to be successful in performing their various roles (e.g. as employee, student, teacher, etc.). The affective component of the virtue involves having appropriate attitudes and feelings towards role-specific duties or responsibilities (e.g. taking them seriously, feeling satisfied about doing a job well, etc.). The cognitive component involves possessing the knowledge and skills needed to perform these duties and to prioritise when needed. As a virtue, conscientiousness is a golden mean between a deficiency (lack of conscientiousness) and an excess (“hyperconscientiousness” or perfectionism). In what follows, we refer to “Virtue Conscientiousness,” to distinguish it from Conscientiousness as a personality trait (Big Five Conscientiousness).

Before outlining an Aristotelian Virtue of Conscientiousness Scale (AVCS), we give a brief overview of existing measures of virtue.

Psychometric Virtue Measures

In psychology, there have been several attempts to measure virtues; however, few of them closely conform to Aristotelian theory. In positive psychology, the most popular tool for researching virtues and human strengths is the Values in Action Inventory of Strengths (VIA-IS) (Peterson & Seligman, 2004). The VIA-IS is a classification of 24 human strengths arranged under six broad virtue categories; each one of these strengths is supposed to offer a unique path to one of the virtues. For instance, the strength of fairness, teamwork and leadership are all supposed to represent ways of exercising the virtue of justice. Various studies have found that VIA-IS strengths are positively correlated with desirable outcomes related to well-being (Green, 2022; Wagner et al., 2020; Bruna et al., 2019; Wagner & Ruch, 2015; Boiman-Meshita & Littman-Ovadia, 2021).

Despite promising results, the VIA-IS scale falls short of measuring the virtues, where “virtues” are understood in the Aristotelian sense, that is, as complex dispositions involving appropriate affective and cognitive states as well as behaviour, that are connected to happiness or well-being (henceforth, “Aristotelian virtues”). The VIA-IS has been criticised for focusing too much on behaviour (Van Zyl et al., 2023), and not accurately measuring the relationships between behaviour and motivation (Peterson & Seligman, 2004). A further problem is that the VIA-IS does not distinguish between appropriate and inappropriate forms of motivation and behaviour, thus not testing the Aristotelian idea that virtue is a golden mean between corresponding vices. These shortcomings render the VIA-IS scale incapable of investigating the accuracy of an Aristotelian theory of virtue, including its claims about the link between virtue and happiness or well-being.

Various other scales have been created to measure virtues (Ames et al., 2022). Examples include the Virtues Scale (Cawley et al., 2000), the Virtue of Thrift Questionnaire (TQ21) (Ratchford et al., 2021), the Gratitude Questionnaire–20 Items (G20) (Bernabe-Valero et al., 2020), the Temperance Scale (Shahab & Adil, 2020), the Professional Moral Courage Scale (Sekerka et al., 2009), the Engagement with Beauty Scale (Diessner et al., 2013), the Status Attainment Scale (Bai et al., 2020), the Enright Self-Forgiveness Inventory (Kim et al., 2021), the Self-Regarding and Other-Regarding Virtue Scale (Grappi et al., 2013), the Good and Evil Character Traits Scale (Jiao et al., 2020), and the Deontic Justice Scale (Beugre, 2012). None of these scales were explicitly designed to measure Aristotelian virtues, and, as such, they all lack at least one item required for measuring the essential aspects or components of Aristotelian virtue. Most of the scales do not contain items for measuring praiseworthy motives, and none of them incorporate the doctrine of the golden mean. The Virtues Scale developed by Cawley and colleagues (2000) uses the lexical method and factor analysis to investigate virtues, and found that, compared to Big Five personality traits, virtues appear to represent distinctive sets of traits. However, their data-driven approach comes apart from theory, as the development of their scale did not include a careful construction of items designed to measure the different components of Aristotelian virtues, thus rendering their scale inadequate in this regard.

The other scales also fall short of capturing all aspects of Aristotelian virtue. The Temperance Scale was based on the positive psychological understanding of Temperance, which consists of four different facets: self-regulation, humility, forgiveness, and prudence. This model doesn't correspond with an Aristotelian theory of temperance as targeted at regulating bodily desires and pleasures (Shahab & Adil, 2020; Curzer, 1997). Similarly, although the Virtue of Thrift Scale measures motives, it only captures religious-based motives that are not tied to specific behaviours (Ratchford et al., 2021).

Recent research on virtue measurement has criticised existing scales for being overly behaviour-focused and neglecting other components of virtue (Fowers et al., 2020; Morgan et al., 2017). In response, Morgan et al. (2017) developed the Multi-Component Gratitude Measure, assessing gratitude across attitudes, emotions, behaviours, and expressions. However, it does not account for the vice of excess (e.g., “overgratefulness”; Manela, 2019) and lacks items on practical wisdom and foundational motivations.

Similarly, the Neo-Aristotelian Phronesis Model (APM) (Darnell et al., 2022) conceptualises practical wisdom through four interrelated functions: constitutive, integrative, blueprint, and emotion regulation. Using self-report and ability-based measures, the study provided initial empirical support for a hierarchical model of phronesis. While promising, the research remains exploratory and serves as a foundation for future refinements in virtue assessment.

There are many other scales that are worth considering as measures of virtue, including humility scales (Krumrei-Mancuso, 2016; Krause, 2010; Qin et al., 2021), a three-item kindness questionnaire (Otake et al., 2006), the Justice Sensitivity Scale (Schmitt et al., 2010), the Tendency to Forgive Scale (Brown, 2003) and the Interpersonal Fairness Scale (Fowers et al., 2020). Although they are useful, none of these scales measure the motivational aspect of virtue, and neither do they capture Aristotle's idea of the golden mean.

The Aristotelian Virtue of Conscientiousness Scale

Conscientiousness is a popular topic of study in psychology, with several studies demonstrating that it positively correlates with health-related behaviours, well-being and accomplishment (Anglim et al., 2020; MacCrann et al., 2020; Bogg & Roberts, 2004). The most popular model of conscientiousness in psychology, the Big Five Model of Conscientiousness, was created with a data-driven approach. By contrast, Virtue

Conscientiousness is a theory-driven model that is based on a deep understanding of Aristotelian virtue theory. Whereas Big Five Conscientiousness consists of a group of related behaviours (behaviours that conscientious people are more likely to exhibit), Virtue Conscientiousness is a good trait, that is, a trait that people ought to develop and exercise, and that consists of a set of psychological qualities and behavioural dispositions that are required for performing roles excellently. Measures of Virtue Conscientiousness, therefore, need to include items measuring appropriate behaviours, cognitions, affect, motivations and practical wisdom, as well as the vices of deficiency and excess. The items from the Big Five Model of Conscientiousness are not an accurate measure of Virtue Conscientiousness. Thus, while we expect that the virtue will include some form of self-control or self-discipline, whether a skill such as orderliness or tidiness is required for virtue will depend on the role in question (McManus et al., 2024a).

The Aristotelian Virtue of Conscientiousness scale (AVCS) is designed to measure the virtue of conscientiousness. To date, it is the most suitable extant tool for measuring Aristotelian virtue, as it contains items designed to measure appropriate behaviours, cognitions, affect, motivations, and practical wisdom. In particular, what sets it apart from the scales discussed in the previous section is that it contains items measuring the vice of excess, which means that the scale can be used to measure a more complete distribution of different degrees of virtue and vice in a given population. (McManus et al., 2024a). The overarching construct for this scale was validated using Rasch analysis, an innovative and rigorous technique that assesses the adherence of a scale to the fundamental principles of measurement (Rasch, 1960, 1961). During this study, a person-item threshold distribution was produced, showing that the items effectively discriminate between different people according to their degree of virtuousness. The researchers found that the AVCS strongly correlated with life satisfaction and weakly with anxiety and stress. These weak correlations between the AVCS

and distress variables are partly explained by the inclusion of vice items, which are expected to correlate with poor life quality (McManus et al. 2024a).

Although a Rasch analysis is useful for validating general constructs and enhancing the overall reliability of a scale, it is unable to verify the underlying factor structure of the AVCS, and it cannot test whether a specific 8-facet model fits the observed data. This is a major limitation of the Rasch Validation of the AVCS (McManus et al., 2024a). For this reason, CFA is required for independently assessing the different components of the virtue. This is important, as virtues are multifaceted constructs, and it is expected that people will display some facets more than others. Being able to differentiate the various facets of virtue is not only important for establishing a theoretically accurate model of virtue, it will also enable further research into the unique roles of each facet, including how each of them relate to different outcomes.

A central claim made by Aristotelian theorists is that possessing and exercising the virtues is necessary for happiness or flourishing. However, given the lack of adequate assessment tools for testing and measuring virtues as multifaceted traits, scholars' understanding of the connection between virtue and happiness is similarly limited. For this reason, the aim of the present study was to validate an eight-faceted model of Virtue Conscientiousness using confirmatory factor analysis and to compare these facets to Big Five Conscientiousness, life satisfaction, and distress variables.

The Aristotelian concept of *eudaimonia* (happiness or flourishing) is a complex and contested term. However, it is reasonable to claim that life satisfaction forms a significant part of any conception of flourishing. Virtue theorists generally agree that exercising virtue leads to positive affective states, such as pleasure, feelings of satisfaction, or a sense of meaningfulness (Badhwar, 2014; Hursthouse, 1999; Snow, 2020). Further, we expect that

there will be a positive correlation between life satisfaction and all the Virtue Conscientiousness facets, as well as the total scale. However, it is expected that the Excessive Conscientiousness facet will significantly correlate with depression, anxiety, and stress, as it represents the vice of excess. For this reason, a weak correlation between the total AVCS and distress variables is anticipated. In addition, discriminant validity is expected to be found between (the total scale and subfaces of) the AVCS, and Big Five Conscientiousness, given that the latter is a descriptive account of conscientiousness based on a data first approach, whereas the AVCS is a normative construct based on philosophical theory. The AVCS scale was created for research purposes, with scale items written in English and aimed at adult participants from a Western culture.

Method

Participants

Based on the traditional recommendation of ten participants per item, which has been used to guide sample size in earlier CFA studies, and Kline's more contemporary recommendation of a minimum sample size of 200 participants for CFA to yield stable parameter estimates, 334 individuals residing in the United States were recruited for this study (Schumacker & Lomax, 2016; Kline, 2023). This sample size ensures sufficient power for model fit and stability given the complexity of the 28-item scale and 8-facet hierarchical structure. These participants were enlisted through Amazon Mechanical Turk (MTurk), an online crowdsourcing platform. The survey was administered via Qualtrics. Participants accessed the survey by clicking on a provided link. Participants were paid a living wage (based on the average completion time of the pilot survey) of US\$8.00 unless they failed an attention test or completed the survey in under five minutes. If participant either failed the attention test or finished the survey in less than five minutes, their data were excluded from the final analysis. The attention test was a survey item that requested that participants select a particular unusual response option for one of the items. Prior to commencing the survey, all participants provided informed consent to partake in the study (McManus et al., 2024a).

A total of 33 participants were excluded from the dataset for failing the attention test, not answering all the questions, or finishing the survey too quickly (McManus et al., 2024a). At the conclusion of the survey, participants were asked to disclose their age and gender. Although multiple gender options were available, participants identified as either male ($n = 206$) or female ($n = 95$). The age range of participants spanned from 21 to 78, with a mean age of 37.84 ($SD = 10.29$); however, one participant's age data was missing. The study received approval from the author's institutional ethics committee and adhered to the ethical

principles outlined in the 7th edition of the American Psychological Association (APA) guidelines (American Psychological Association, 2022). The data used for the study is publicly accessible on the Open Science Framework (OSF) platform, accessible through the following link: https://osf.io/rvfx4/?view_only=5e1c712f89cd40f1a18934c5cc6f8719

Measures

The 28 AVCS items developed by McManus et al. (2024a) were organised into eight separate facets, labelled: Excellent Behaviour, Responsible Behaviour, Concern for Others, Self-Concern, Appreciation of Excellence, Practical Wisdom, Appropriate Affect, and Excessive Conscientiousness. These facets were derived from the different theoretical components of virtue (see Table 6). Importantly, multiple facets were created to measure the different types of appropriate motivation: Concern for Others, Self-Concern, and Appreciation of Excellence (McManus et al., 2024a). These categories are intended to represent and subsume the various commendable motives any person might have.

Table 6

Components of Virtue, Facets of the Aristotelian Virtue of Conscientiousness Scale (AVCS), and Example Items

Components of Virtue	Facets of the AVCS	Example Items
Appropriate Behaviours	Responsible Behaviours,	- I fulfil my role-specific responsibilities.
	Excellent Behaviours	- I perform my roles excellently.
Appropriate Affect	Appropriate Affect	- I enjoy completing important tasks to a high standard.
Appropriate Cognitions	Practical Wisdom	- I have the skills needed to perform my roles excellently.
		-I have thought about what my important roles are.
Appropriate Motivations	Concerns for Others, Self-Concern, Appreciation of Excellence	- My concern for others motivates me to perform roles well.
		- An appreciation of excellence motivates me to do my work.
		- Concern for my future influences how I prioritize my responsibilities.
Vices		
The Vice of Deficiency	Low Scores on General Scale	- I finish my work on time (i.e., not finishing work on time).
The Vice of Excess	Excessive Conscientiousness	- I prioritise role-specific responsibilities over my health.

Note. Components of Virtue were derived from major works in virtue ethics, including *Nicomachean Ethics* (Aristotle, ca. 350 B.C.E./2020) and *On Virtue Ethics* (Hursthouse, 2001). The corresponding facets were developed by McManus et al. (2024a).

The behavioural items were divided into two categories, labelled Responsible Behaviours and Excellent Behaviours. The reason for this is that virtue and vice are scalar concepts; they come in degrees, such that a character trait can be more or less commendable (McManus et al., 2024a). In the case of Virtue Conscientiousness, for example, a teacher who fulfils the responsibilities associated with their role, such as coming to work on time and marking course work, but does not strive for excellence is less conscientious (and commendable) than the teacher who goes beyond the minimum required by actively encouraging students, carefully planning course work and providing students with useful feedback. For this reason, there is a theoretical distinction corresponding to the difference

between averageness and excellence, and items have been dedicated to measuring each separately (McManus et al., 2024a).

Although the differences between virtue and both forms of vice are important in Aristotle's account of character, the vice of excess is particularly difficult to measure psychometrically (Fowers et al., 2021). This is because excess involves valuing things too much, and thus exhibiting inappropriately excessive affective states and behaviours. For this reason, we separated items measuring vice, so that the vice of excess would have its own dimension of conscientiousness, making it possible to use correlational analyses to analyse it independently of the other facets. The items intended to measure the vice of excessive conscientiousness were labelled Excessive Conscientiousness, representing going too far in prioritising roles and role-specific responsibilities over other things of importance, such as personal well-being and the welfare of others (McManus et al., 2024a). Although a separate facet for the vice of excess was created, an independent facet for measuring the vice of deficiency was not required, as low scores on the scale items can already be considered as a deficiency that excludes virtue.

The scale items were administered to the participants along with five Likert-style response options, labelled: “Disagree” (1), “Very slightly agree” (2), “Moderately agree” (3), “Strongly agree” (4) and “Completely agree” (5). Alongside the AVCS items, a comprehensive set of instructions was provided to guide participants on how to contemplate and interpret each question effectively (McManus et al., 2024a). These instructions were designed to prime the participants to consider their current roles, reducing the abstractness of the questions (Strack & Martin, 1987; McManus et al., 2024a):

Many statements below refer to personal responsibilities and duties. When answering these questions, please focus on both duties and responsibilities in relation to the roles

you have. These roles may include things like your role as a family member, friend, worker, or citizen. Some of the statements also ask about work. Work in this survey can relate to any work associated with a particular role. Please respond by clicking how much you agree with each statement.

The 28-item AVCS contains only positively worded items. Negatively worded items were initially included to mitigate response biases, such as acquiescence, but were removed during the Rasch validation of the scale (McManus et al., 2024a). These items demonstrated low item-total correlations, suggesting weaker associations with the overall construct. This was likely due to method effects, which can introduce unintended variance and distort the factor structure rather than improve construct validity (Suárez-Álvarez et al., 2018). Consequently, negatively worded items were removed to optimise the scale's psychometric properties (McManus et al., 2024a).

The Excessive Conscientiousness facet was retained as positively scored rather than reverse-coded, even though vices are conceptually opposed to virtue. This decision was based on both practical and conceptual considerations. While it is relatively straightforward to contrast virtue with deficiency (i.e., by comparing high vs. low scores), distinguishing between excessive and virtuous tendencies within a single scale is more complex. Conceptually, this distinction is important, as individuals exhibiting true virtue do not display excessive tendencies. To delineate the vice of excess from virtue, we specifically developed the Excessive Conscientiousness items to capture this distinction. The decision not to reverse-score these items was ultimately driven by empirical findings. Since Excessive Conscientiousness correlated positively with the general scale items, this suggests that excessive tendencies represent an extreme within the same broad construct rather than an entirely separate construct or a deficiency of virtue.

It is important to note that although the AVCS refers to virtue, in order to possess a virtue, one must possess each component of virtue to an appropriate degree. This study undertakes a general investigation of the Aristotelian virtue of Conscientiousness, and aims to determine whether the different aspects of virtue relate together as theorists predict. In the Aristotelian view, full possession of a virtue is extremely rare; instead, the virtues are viewed as ideal standards that people should strive towards (Aristotle, ca. 350 B.C.E./2020). For the full list of AVCS items, see Appendix A.

Big Five Conscientiousness was assessed using the 10-item IPIP Conscientiousness scale from the revised NEO Personality Inventory (Costa & McCrae, 1992). Each item from this inventory was accompanied by five Likert-style response options: “Very inaccurate” (1), “Moderately inaccurate” (2), “Neither accurate nor inaccurate” (3), “Moderately accurate” (4) and “Very accurate” (5). The purpose of using this scale was to demonstrate that, although there is some relationship between Virtue Conscientiousness and Big Five conscientiousness, they display discriminant validity, indicating that they are measuring two distinctive constructs. This measure of Big Five Conscientiousness consists of a single facet measuring multiple sub-facets, including Dutifulness, Deliberation, Order, Achievement-striving, Competence and Self-discipline (Maltby et al., 2017). The total scale displayed good reliability coefficients ($\alpha = 0.81$, $\omega = 0.78$).

As virtue is supposed to be related to, and partly constitutive of, a desirable life for the individual, life satisfaction was selected to assess the convergent validity of the AVCS (Aristotle, ca. 350 B.C.E./2020), and was measured using the Satisfaction with Life Scale (SWLS) (Pavot et al., 1991). This scale consists of one facet and five items measuring people's subjective judgments about their satisfaction with life. The items were administered together with seven Likert-style response categories labelled: “Strongly disagree” (1), “Disagree” (2), “Slightly disagree”, (3) “Neither agree nor disagree” (4), “Slightly agree” (5),

“Agree” (6) and “Strongly agree” (7). The scale showed good reliability coefficients ($\alpha = 0.91$, $\omega = 0.91$).

Measures of psychological distress were taken from the 21-item Depression, Anxiety and Stress Scale (DASS) and used as further tests of convergent validity with the AVCS (Lovibond & Lovibond, 1995). The DASS consists of three facets, measuring each dimension of distress. The scale was administered with five Likert-style response options labelled: “Never” (1), “Sometimes” (2), “Often” (3) and “Almost always” (4). Each facet displayed excellent reliability: Depression ($\alpha = 0.92$, $\omega = 0.92$), Anxiety ($\alpha = 0.94$, $\omega = 0.94$) and Stress ($\alpha = 0.91$, $\omega = 0.91$).

Data Analyses

Upon completion of data collection, descriptive statistics were computed using IBM SPSS Statistics v.27 to obtain the mean, median, and standard deviation. The internal consistency of each individual facet was also assessed using McDonald's Omega scores (Stensen & Lydersen, 2022). The reliability of each facet was assessed in order to ensure satisfactory Omega scores above 0.70. To ensure the relevance of each remaining item, the item-to-total correlations were examined for each facet according to a cutoff value of above 0.30 (Field, 2018, p. 826).

To ensure the quality of the data and address potential inattentiveness, a scale variance analysis was conducted. Variance scores were calculated for each participant across the relevant scale items, which included the 28-item AVCS, Big Five Conscientiousness, SWLS, and DASS items. Variance scores were examined to identify potential inattentive respondents, as excessively low variance (indicating uniform responses) or excessively high variance (indicating random responses) could compromise data quality.

The 28 AVCS items were sorted into the eight theory-driven facets: Excellent Behaviours, Responsible Behaviours, Concern for others, Self-Concern, Appreciation of Excellence, Practical Wisdom, Appropriate Affect and Excessive Conscientiousness. This model was then subjected to CFA using a SEM module in Jamovi software (2022). The items were assessed according to both a correlational eight-factor model and a hierarchical eight-factor model with one overarching second-order factor. Both models were analysed according to a Diagonally Weighted Least Squares Method (DWLSM), as this was suitable for ordinal data and the sample size (Li, 2016). Each model was compared and evaluated according to various goodness of fit statistics, including the Chi-square degrees of freedom ratio (χ^2/df), Root Mean Square Error Approximation (RMSEA), the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), and the Standardised Root Mean Square Residual (SRMR). Each goodness of fit statistic was assessed for both models according to thresholds of greater than 0.95 for the CFI and TLI, and less than 0.08 for RMSEA and SRMR (Hair et al., 2021). Following the CFA, a series of bivariate correlations were performed comparing each facet of the AVCS with Big Five Conscientiousness, the SWLS and the DASS.

To test the theoretical distinction between the Responsible Behaviours and Excellent Behaviours facets, discrepancy scores were calculated for each participant by subtracting their Responsible Behaviours scores from their Excellent Behaviours scores. This discrepancy score reflects the extent to which participants go beyond fulfilling minimal responsibilities. Participants were then grouped based on their scores: those with high scores in both facets (i.e., above the median) were categorised as Group 1 ($n = 91$, high in both), while those with high scores in Responsible Behaviours but low scores in Excellent Behaviours were categorised as Group 2 ($n = 56$, high in Responsible Behaviours only). An independent-samples *t*-test was conducted to compare life satisfaction between these two

groups. Levene's Test for Equality of Variances was used to assess homogeneity of variance, and effect sizes were calculated using Cohen's *d*.

As a further test, differences in motivational facets of the AVCS were also investigated. Individuals with high and low scores on the AVCS were divided into two groups using a median split (Median = 104). Those scoring above the median were classified as the high conscientiousness group ($n = 148$), while those scoring at or below the median were classified as the low conscientiousness group ($n = 153$). Independent samples *t*-tests were then conducted to compare scores on the three motivational facets: Appreciation of Excellence, Concern for Others, and Self-Concern.

To assess the distinctiveness and incremental validity of the AVCS facets relative to Big Five Conscientiousness, a series of hierarchical regression analyses were also conducted comparing the AVCS facets to depression, anxiety, stress and life satisfaction. In the first steps, Big Five Conscientiousness was entered as the predictor variable. In the second steps, the AVCS facets were added to the model. Incremental validity was assessed by examining the change in R^2 and *F*-statistics. Collinearity diagnostics were also performed to check for multicollinearity between predictors.

Next, to further examine how different groups of AVCS facets incrementally contribute to life satisfaction, another regression analysis was conducted. The facets were grouped into theoretically meaningful categories and entered into the model in a stepwise fashion. Excellent Behaviours and Responsible Behaviours were entered in step 1, followed by motivational facets (i.e., Concern for Others, Self-Concern, and Appreciation of Excellence) in step 2, Practical Wisdom was entered in step 3, and Appropriate Affect in step 4. Excessive Conscientiousness was entered last in step 5. This approach allowed for the assessment of incremental variance explained by each category after controlling for prior

categories, aligning with the Aristotelian idea that each component is necessary for full virtue which leads to improved well-being.

Results

The scale variance analysis revealed scores ranging from 0.62 to 4.71 ($M = 2.03$, $SD = 0.91$). Participants with variance scores below the 5th percentile (< 0.91) or above the 95th percentile (> 3.76) were flagged for detailed examination. For these cases, we conducted a comprehensive review that included: Examining response patterns for straightlining (selecting the same response option repeatedly); Checking completion times against the mean completion time; Cross-validating with attention check responses.

Among the flagged cases, high-variance responses ($n = 15$) showed consistent performance on attention checks suggesting thoughtful rather than random responding. Similarly, low-variance responses ($n = 15$) passed attention checks, indicating stable response patterns rather than inattentiveness. This aligns with research suggesting that consistent response patterns can reflect genuine, stable attitudes, particularly for well-defined constructs (Curran, 2016). Therefore, after this detailed examination, no additional data were excluded based on variance analysis alone.

Each facet of the AVCS displayed excellent to adequate reliability estimates: Excellent Behaviours ($\omega = 0.81$, $\alpha = 0.89$), Responsible Behaviours ($\omega = 0.78$, $\alpha = 0.77$), Concern for others ($\omega = 0.83$, $\alpha = 0.83$), Self-Concern ($\omega = 0.73$, $\alpha = 0.71$), Appreciation of Excellence ($\omega = 0.81$, $\alpha = 0.80$), Practical Wisdom ($\omega = 0.80$, $\alpha = 0.80$), Appropriate Affect ($\omega = 0.80$, $\alpha = 0.79$) and Excessive Conscientiousness ($\omega = 0.80$, $\alpha = 0.79$).

The initial 8-factor correlational model displayed an adequate chi-square goodness of fit statistic, with a significant p -value ($\chi^2(311) = 1.76$, $p < 0.001$; Table 2, 8-Factor correlated). However, the CFI and TLI were slightly under the recommended thresholds of above 0.95 (CFI = 0.94, TLI = 0.93), indicating a less-than-optimal fit. Overall, the 8-facet hierarchical model with one overarching second-order facet (shown in Figure 2 displayed a better fit to

the data ($\chi^2(342) = 1.54, p < 0.001$; Table 2, 8-Factor hierarchical), with all fit indices above the recommended thresholds (Table 7, 8-Factor hierarchical). The higher CFI and TLI values reflect a better overall model fit, while the lower RMSEA suggests the hierarchical model captures the data structure more precisely with fewer residual errors. These results indicate that the hierarchical model provides a more accurate representation of the AVCS.

Table 7

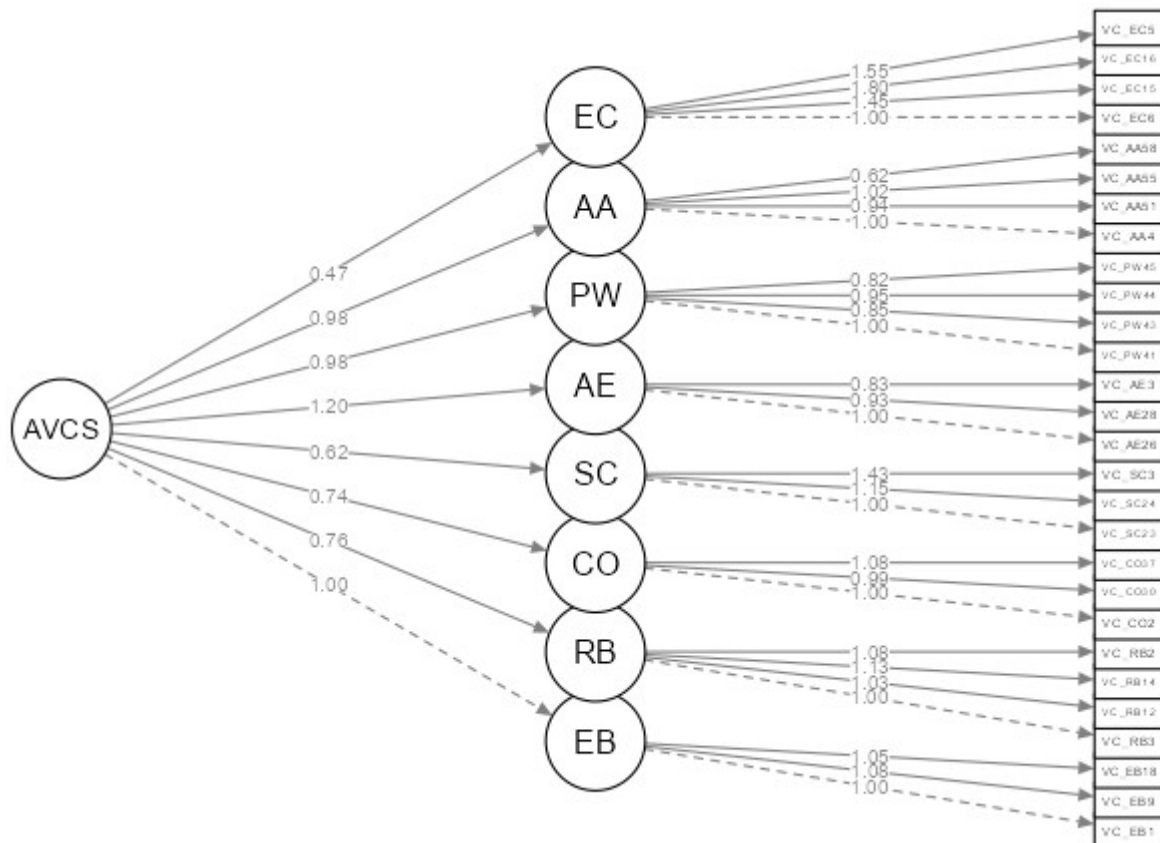
Summary of fit statistics for Confirmatory Factor Analysis models for the AVCS

Models / Fit indices	CFI	TLI	SRMR	RMSEA	$\chi^2/df (p)$
8-Factors correlated	0.94	0.93	0.05	0.05	1.76 (<0.001)
8-Factors hierarchical	0.98	0.98	0.067	0.043	1.54 (<0.001)

Note. CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Square Residual; χ^2 = Chi-Square Test of Model Fit; df = Degrees of Freedom; *p* = significance.

Figure 2

Path diagram displaying Virtue Conscientiousness as an 8-factor hierarchical model with one second order variable.



Note. EB =Excellent Behaviour, RB = Responsible Behaviour, CO = Concern for Other, CS = Self-Concern, AE = Appreciation of Excellence, PW = Practical Wisdom, AA = Appropriate Affect and EC = Excessive Conscientiousness.

The 8-facet hierarchical structure aligns closely with Aristotelian virtue theory, which conceptualises virtues as encompassing multiple interrelated facets, including behaviours, motivations, affective states, and practical wisdom. Because this scale was explicitly designed to empirically investigate Aristotelian theory, retaining the eight-facet model is ideal. This structure enables researchers to explore the unique contributions of each facet to important outcomes, such as health and well-being, while also capturing the overarching construct of Virtue Conscientiousness. Additionally, the hierarchical model offers practical advantages, as it allows researchers to assess either the overall construct or its specific facets,

depending on the context. Taken together—strong fit statistics, theoretical alignment, and practical applicability—provide robust support for retaining the 8-facet hierarchical model. Note that the data for this study were also analysed by McManus et al. (2024a) using Rasch analysis. However, the findings presented here differ because this study employed Confirmatory Factor Analysis (CFA), which is grounded in classical test theory.

Bias-corrected and accelerated bivariate correlational analyses were performed. Significant strong to moderate positive correlations were found between each of the AVCS facets and the SWLS, while the Excessive Conscientiousness exhibited a significant positive correlation with Depression, Anxiety and Stress, while negatively correlating with Big Five Conscientiousness (Table 8).

Table 8

Correlations between the Aristotelian Virtue of Conscientiousness Scale (AVCS) facets and total scores with Life Satisfaction (SWLS), Conscientiousness and Depression, Anxiety and Stress

	SWLS	Conscientiousness	AVCS (Total)	EB	RB	CO	CS	AE	PW	AA	EC	Depression	Anxiety	Stress	Age
<i>Correlations</i>															
Conscientiousness	0.06														
AVCS (Total)	0.57**	0.23**													
Excellent Behaviour	0.55**	0.38**	0.82**												
Responsible Behaviour	0.34**	0.45**	0.74**	0.74**											
Concern for Others	0.36**	-0.05	0.62**	0.39**	0.34**										
Self-Concern	0.32**	0.09	0.67**	0.45**	0.40**	0.31**									
Appreciation of Excellence	0.42**	0.22**	0.80**	0.58**	0.47**	0.42**	0.54**								
Practical Wisdom	0.40**	0.43**	0.78**	0.70**	0.68**	0.36**	0.41**	0.56**							
Appropriate Affect	0.53**	0.40**	0.77**	0.64**	0.61**	0.33*	0.40**	0.61**	0.68**						
Excessive Conscientiousness	0.40**	-0.35**	0.62**	0.35**	0.17**	0.40**	0.40**	0.47**	0.22**	0.26**					
Depression	0.07	-0.61**	0.15**	-0.02	-0.01	0.15**	0.07	-0.09	-0.05	-0.05	0.54**				
Anxiety	0.36**	-0.57**	0.32**	0.15*	-0.01	0.33**	0.24**	0.20**	0.04	0.06	0.65**	0.79**			
Stress	0.21**	-0.61**	0.25**	0.08	-0.07	0.30**	0.21**	0.15**	0.01	0.00	0.62**	0.82**	0.85**		
Age	0.01	0.05	-0.04	-0.08	-0.04	0.05	0.05	-0.01	-0.04	-0.03	-0.11	-0.09	-0.08	-0.07	
Gender	0.01	0.02	0.05	0.02	0.05	0.08	0.08	-0.02	0.01	0.07	0.00	0.00	0.03	0.03	0.18**

Note. EB =Excellent Behaviour, RB = Responsible Behaviour, CO = Concern for Other, CS = Self-Concern, AE = Appreciation of Excellence, PW = Practical Wisdom, AA = Appropriate Affect and EC = Excessive Conscientiousness. ** = Correlation is significant at the 0.01 level (2- tailed), and * = Correlation is significant at the 0.05 level (2- tailed)

The first *t*-test revealed a significant difference in life satisfaction between Group 1 (high in both Responsible Behaviour and Excellent Behaviour) and Group 2 (high in Responsible Behaviour only). Participants in Group 1 ($M = 28.57$, $SD = 5.62$) reported significantly higher life satisfaction than those in Group 2 ($M = 23.41$, $SD = 8.27$), $t(145) = 4.50$, $p < 0.001$. Levene's Test for Equality of Variances was significant ($p < 0.001$), indicating unequal variances; however, the *t*-test without assuming equal variances also showed a significant difference ($t(86.40) = 4.12$, $p < 0.001$). The effect size was moderate, $d = 0.765$ (95% CI [0.419, 1.108]).

The next series of *t*-tests revealed significant differences in motivational facets between participants with high and low AVCS scores. For Appreciation of Excellence, the high AVCS group ($M = 12.63$, $SD = 1.60$) scored significantly higher than the low AVCS group ($M = 8.82$, $SD = 2.56$), $t(253.99) = -15.49$, $p < 0.001$, with a large effect size ($d = 2.15$, 95% CI [1.77, 2.52]). Similarly, for Concern for Others, the high AVCS group ($M = 11.83$, $SD = 2.44$) scored significantly higher than the low AVCS group ($M = 9.03$, $SD = 2.72$), $t(297.44) = -9.41$, $p < 0.001$, with a large effect size ($d = 2.58$, 95% CI [2.07, 3.10]). Finally, for Self-Concern, the high AVCS group ($M = 13.05$, $SD = 1.37$) also scored significantly higher than the low AVCS group ($M = 9.92$, $SD = 2.23$), $t(253.98) = -14.76$, $p < 0.001$, with a large effect size ($d = 1.86$, 95% CI [1.53, 2.19]). These results demonstrate substantial differences in motivational facets across levels of conscientiousness.

The results of the first hierarchical regression analyses are presented in Table 9. For all three distress outcomes—depression, anxiety, and stress—Model 2, which added the AVCS subscales, significantly improved upon Model 1, which included only Big Five Conscientiousness. Excessive Conscientiousness was the only significant AVCS subscale predictor for all outcomes, positively predicting depression, anxiety. For life satisfaction,

Model 2 also showed a significant improvement over Model 1, with Excellent Behaviours, Responsible Behaviour, and Appropriate Affect emerging as significant predictors. Collinearity diagnostics indicated no multicollinearity issues, with all VIF values below 5.

Table 9

Hierarchical Regression Results for Depression, Anxiety, Stress, Life Satisfaction and the AVCS

Outcome	Model	Predictors	R Square	Adjusted R Square	Standardised Beta
Depression	1	BC	0.37	0.37	-0.61**
	2	BC, EC	0.5	0.49	BC: -0.54**, EC: 0.34**
Anxiety	1	BC	0.33	0.32	-0.57**
	2	BC, EC	0.6	0.58	BC: -0.52**, EC: 0.36**
Stress	1	BC	0.37	0.37	-0.61**
	2	BC, EC	0.58	0.57	BC: -0.54**, EC: 0.36**
Life Satisfaction	1	BC	0.00	0	BC: 0.057
	2	EB, RB, AA	0.40	0.38	EB: 0.48**, RB: -0.15*, EM: 0.20**

Note. EC = Excessive Conscientiousness, BC = Big Five Conscientiousness, EB = Excellent Behaviours, RB = Responsible Behaviour, AA = Appropriate Affect. ** = significant at the 0.01 level (2- tailed), and * = Correlation is significant at the 0.05 level (2- tailed). Nonsignificant predictors have been removed.

The results of the second hierarchical regression analysis are presented in Table 10. Model 1, which included the behavioural facets, accounted for 31.6% of the variance in life satisfaction. Model 2, adding the motivational facets, significantly improved the model, explaining 35.6% of the variance. Model 3 further increased the explained variance to 37.0% by adding Appropriate Affect. Model 4, which included Practical Wisdom, did not significantly improve the model. Finally, Model 5 added the vice of Excessive Conscientiousness, which significantly increased the explained variance to 39.0%.

Table 10*Hierarchical Regression Analysis Predicting Life Satisfaction from AVCS Facets*

Outcome	Model	Predictors	R Square	Adjusted R Square	Standardised Beta
Life Satisfaction	1	RB, EB	0.32	0.31	RB: -0.14* EB: 0.66**
	2	RB, EB, CO	0.36	0.35	RB: -0.17* EB: 0.58** CO: 0.16**
	3	RB, EB, CO, AA	0.37	0.36	RB: -0.18* EB: 0.56** CO: 0.16** EC: 0.17**
	4	RB, EB, CO, AA	0.37	0.36	RB: -0.18* EB: 0.56** CO: 0.15** EC: 0.16**
	5	RB, EB, CO, AA, CE	0.39	0.37	RB: -0.17* EB: 0.46** CO: 0.12** AA: 0.18** CE: 0.17**

Note. EB =Excellent Behaviour, RB = Responsible Behaviour, CO = Concern for Other, AA = Appropriate Affect and EC = Excessive Conscientiousness. ** = Correlation is significant at the 0.01 level (2- tailed), and * = Correlation is significant at the 0.05 level (2- tailed). Nonsignificant predictors have been removed.

Discussion

This study aimed to validate an eight-facet model of the virtue of conscientiousness using the AVCS. Measuring this virtue required separating items into eight theory-driven facets suitable for independently measuring each component of virtue (i.e., appropriate behaviours, affect, practical wisdom, motivation, and the vices of excess and deficiency). Despite its popularity, there is currently a lack of assessment tools for investigating the accuracy of Aristotelian virtue theory, as most tools do not measure all the components of virtue. This lack of assessment tools is limiting scholars' understanding of well-being and individual difference. In this study, a multidimensional model of the virtue of conscientiousness was validated using the AVCS measure (McManus et al., 2024a). Based on Aristotelian theory and psychometric criteria, the 28 items were arranged into an eight-factor model of Virtue Conscientiousness, demonstrating good fit statistics according to the CFA. Overall, the 8-factor hierarchical model displayed a better fit to the observed data compared to the 8-factor correlated model, indicating that there is an underlying latent trait of Virtue Conscientiousness that explains the variation in the first-order facets. These factors were labelled: Excellent Behaviour, Responsible Behaviour, Concern for Others, Self-Concern, Appreciation of Excellence, Practical Wisdom, Appropriate Affect, and Excessive Conscientiousness. Each factor, and the total scale, displayed excellent to adequate reliability estimates, representing strong internal consistency among the items.

This study's findings complement and extend those of McManus et al. (2024a), which used a different analytical framework to validate the AVCS. The Rasch analysis in McManus, et al. (2024) provides insight into item-level functioning, while CFA allows for the testing of hierarchical theoretical models, offering complementary perspectives on the AVCS's psychometric properties. Rasch analysis, grounded in item response theory (IRT), evaluates whether individual items function as unidimensional measures of a latent trait,

adhering to strict measurement principles (Medvedev & Krägeloh, 2022). This approach emphasises scale invariance across groups and equal distancing of measurement units. In contrast, CFA assesses the relationships between observed variables and latent constructs, allowing for the validation of theoretical models such as the hierarchical structure of virtues. Together, these approaches contribute to a comprehensive evaluation of the Aristotelian Virtue of Conscientiousness Scale (AVCS), addressing both its theoretical structure and its psychometric rigor.

In addition to the goodness-of-fit statistics, the high factor loadings displayed on the path diagram (Figure 2) demonstrate the importance of each facet to the model, matching expectations. Notably, the facets relating to excellence show the strongest factor loading on the model, which is consistent with the view that virtues are excellent traits of character. Excessive Conscientiousness displayed a weaker factor loading compared to the other facets, likely because it represents an extreme form of the trait and not everyone who scores highly on the other items will necessarily score highly on Excessive Conscientiousness items. Overall, this indicates that the vice of excess is more independent than the other facets.

Convergent validity for the AVCS was successfully established, with a strong correlation between the total scale and life satisfaction. Each individual facet displayed strong to moderate correlations with life satisfaction, consistent with our expectations and with previous studies on the positive connection between virtue and well-being (Green, 2022; Wagner et al., 2020). Although Aristotle's conception of eudaimonia is complex and extends beyond psychological states such as satisfaction, happiness, and pleasure, the SWLS serves as an appropriate convergent measure, as it assesses one's subjective judgment of life quality. This aligns with the Aristotelian perspective that eudaimonia involves living well according to reason, by exercising human capacities excellently. In this sense, virtuous individuals are likely to be satisfied with their life because they have lived in accordance with reason and

virtue. The finding that those who score higher in Aristotelian Conscientiousness also report greater life satisfaction provides further support for the claim that virtues contribute to a good human life.

Beyond simple correlations, the hierarchical regression analyses further establish the incremental validity of the AVCS, demonstrating that Aristotelian Conscientiousness predicts life satisfaction above and beyond Big Five Conscientiousness. Specifically, Excellent Behaviour emerged as the strongest predictor of life satisfaction, followed by Responsible Behaviour and Appropriate Affect. Notably, individuals who scored highly on both Excellent and Responsible Behaviours reported significantly greater life satisfaction than people who only scored highly on Responsible Behaviour.

Furthermore, when controlling for Excellent Behaviour, Responsible Behaviour showed a negative relationship with life satisfaction. This supports our theoretical distinction between the two aspects of behaviour, indicating that while Responsible Behaviours are necessary to Virtue Conscientiousness, people who perform to the minimum standards required without striving for excellence are more likely to have lower well-being. This is plausibly because responsibilities that are not accompanied by passion may be associated with a sense of burden. Overall, these findings about virtuous behaviours align with Aristotle's view that a good life involves excellent functioning (Aristotle, ca. 350 B.C.E./2020).

Additionally, people who scored highly on the general AVCS scale also scored highly on all motivation facets, indicating that all three motives (i.e., Concern for Others, Self-concern, and Appreciation of Excellence) are features of a virtuous character. Importantly, results from the regression analyses show that Concern for Others, in particular, contributes to life satisfaction beyond mere behaviour. These findings reinforce the theoretical claim that

virtuous individuals are driven by internalised values and rational commitments. This supports the construct validity of the AVCS, as it captures the deep motivational structure of virtue, consistent with Aristotelian ethics. The strong associations between virtue facets and motivation further suggest that the AVCS does not merely measure outward behaviours but also the underlying rational and emotional dispositions essential to virtue.

In contrast, when controlling for both behavioural and motivational facets, Practical Wisdom no longer significantly correlated with life satisfaction. This finding may indicate that Practical Wisdom is indirectly related to well-being, only enhancing life satisfaction when it leads to both virtuous actions and motivations. This result aligns with Aristotelian theory, as knowing what is right but failing to act accordingly is characteristic of incontinence, which Aristotle describes as a deficient character state (Aristotle, ca. 350 B.C.E./2020).

The regression analyses also revealed a distinct pattern in relation to mental health outcomes, particularly Depression, Anxiety, and Stress. Big Five Conscientiousness negatively predicted all three distress variables, consistent with prior research linking conscientiousness to lower emotional distress (Roberts et al., 2014). However, when Excessive Conscientiousness was included in the model, it emerged as a significant positive predictor of all three distress outcomes, suggesting that overly rigid or perfectionistic conscientiousness is associated with greater psychological strain.

This finding further strengthens the incremental validity of the AVCS. In addition to being a stronger predictor of life satisfaction than Big Five Conscientiousness, the inclusion of Excessive Conscientiousness allows the AVCS to predict unique variance in distress variables. Notably, when controlling for Excessive Conscientiousness, the other AVCS facets were not significantly linked to distress, indicating that excessive tendencies are the sole

driver of distress within the AVCS. These results support Aristotle's view that virtue lies in the mean—when conscientiousness is exercised in excess, it may cease to be beneficial and instead compromise one's well-being.

Discriminant validity between the AVCS and Big Five Conscientiousness was observed through a weak correlation between their total scores. Notably, the AVCS facets related to behaviour, affect, and practical wisdom exhibited the strongest positive correlations with Big Five Conscientiousness. Conversely, the Excessive Conscientiousness facet displayed a moderate negative correlation with Big Five Conscientiousness. This finding suggests that individuals high in Excessive Conscientiousness may prioritise roles such as work or study to an excessive degree, potentially neglecting other responsibilities. For instance, statements like "People tell me that I work too much" and "I prioritise role-specific responsibilities over my health" exemplify the tendency to prioritise work or study over other important aspects of life. Such a strong focus on particular roles may diminish a person's sense of being well-prepared or capable in ways described by Big Five Conscientiousness, such as "Am always prepared," "Carry out my plans," and "Get chores done right away" (Costa & McCrae, 1992). As a result, individuals who prioritise their roles over their health may feel less prepared overall, which could partly explain why they place such a strong emphasis on these roles in the first place.

Taken together, these findings suggest that although Big Five Conscientiousness exhibits some correlation with specific facets of the AVCS, it represents a distinctive construct of conscientiousness. This matches theoretical expectations, as Virtue Conscientiousness is different from the typical model of Big Five Conscientiousness popular in psychology. The primary reason for this is that the Big Five researchers took a descriptive and data-driven approach to traits, primarily using factor analysis to uncover the main dimensions of personality (Saucier & Goldberg, 2001; Maltby et al., 2017).

Life satisfaction showed an unexpected correlation with both Excessive Conscientiousness and Anxiety. The correlation between life satisfaction and anxiety is inconsistent with previous studies (e.g., Ghazwin et al., 2016). One explanation is that there is a subset of people within the sample who are both anxious and highly conscientious; these are the people who score high on the Excessive Conscientiousness facet (McManus et al., 2024a). The people high in Excessive Conscientiousness, though more likely to experience distress, may also achieve various accomplishments. Therefore, when reflecting on their lives, they may focus on their accomplishments and feel a sense of satisfaction. In the case of this study, the AVCS items were presented before the Satisfaction with Life Scale questions, and questions about distress were displayed at the end. This might have caused an ordering effect which primed excessively conscientious people to focus on their achievements and rate themselves as satisfied, even though they experienced some anxiety (Strack & Martin, 1987).

Limitations and Future Directions

Though the results from this study are promising, there are several limitations. For one, the AVCS is a self-report assessment, and there could be some degree of error regarding people's self-evaluation of their actual character (Grimm, 2010; Miller, 2017). Some scepticism about self-report studies is reasonable, especially with regards to virtue scales. Virtues are socially desirable traits, and people may rate themselves as more virtuous than they are. Moreover, although other studies report weak correlations between virtue scales and social desirability, the AVCS may be more prone to social desirability than other scales because it includes several items about praiseworthy motives (Fowers et al., 2021). For these reasons, it is recommended that future studies investigate the ability of the AVCS to predict behaviours, and include more objective measures of success, such as GPA. One study investigating fairness found that individuals who scored higher on the Interpersonal Fairness Scale were less likely to be influenced by a situational stimulus prompting unfair behaviours

during a game (Fowers et al., 2022). Such research is crucial for ensuring the usefulness and predictive validity of virtue scales such as the AVCS.

Another important direction for future research is examining how the AVCS relates to other constructs, particularly perfectionism. The present study found that Excessive Conscientiousness was positively associated with depression, anxiety, and stress, suggesting that certain overcontrolled or rigid tendencies may contribute to psychological distress. Since perfectionism has been linked to similar maladaptive conscientious tendencies and mental health outcomes (Stoeber & Otto, 2006), future research should investigate the degree to which Excessive Conscientiousness overlaps with or diverges from perfectionism-related traits. This could clarify whether Excessive Conscientiousness is conceptually distinct from perfectionism or whether it captures similar maladaptive tendencies within an Aristotelian virtue framework.

Another limitation of the present study is that, although good internal consistency scores were attained, further data is needed to assess the test-retest reliability. This is important because virtuous individuals do not manifest virtues only occasionally; virtue is an integral part of their identity is consistently demonstrated over time. To determine whether the AVCS reliably measures character, test-retest data is needed. Furthermore, further validity testing is needed, such as by comparing the AVCS to scales that measure other virtues. For these reasons, future research should replicate the study while addressing these limitations.

In addition to replicating this study, it is important to note that findings about conscientiousness may not generalise to other Aristotelian virtues. For this reason, we recommend that future studies use the same framework to develop multi-faceted scales to measure other virtues, such as courage and honesty. This is important because different

virtues may have different factor structures, and testing this will provide more evidence to assess the Aristotelian theory of virtue.

Another limitation of the present study is that the Practical Wisdom facet only covers the two broad functions of practical wisdom. This broad approach may limit the scale's ability to capture more fine-grained abilities, such as recognising the appropriateness of goals in specific contexts (Lerner, 2019). However, the AVCS is designed to subsume these nuances through the broadness of its items. For example, the capacity to identify worthwhile ends inherently involves contextual sensitivity, as the worthiness of a goal depends on situational factors. Similarly, the ability to achieve these ends effectively requires an understanding of how to act given contextual constraints. While this broad approach enhances the practical applicability of the scale by reducing the number of items, future research could investigate its validity alongside specialised measures of practical wisdom. For instance, studies could examine how the AVCS compares with the Neo-Aristotelian Phronesis Model (APM), which provides a more detailed account of phronesis (Darnell et al., 2022).

Constraints on Generality

The findings of this study should be interpreted within the context of the sample and methodology used. The AVCS was validated using a general U.S. population sample recruited through Amazon Mechanical Turk (MTurk). While MTurk provides access to a broad and diverse participant pool, it is not fully representative of the U.S. population, as MTurk workers tend to be more educated, technologically proficient (Chandler & Shapiro, 2016), and may differ in conscientiousness-related traits compared to the general public. Although the core structure of Aristotelian Conscientiousness is expected to generalise

beyond this sample, further research is needed to assess its applicability across different populations.

Additionally, the scale was developed according to an Aristotelian theory, which may not fully align with alternative conceptualisations of conscientiousness across different philosophical or psychological traditions. The findings may also reflect cultural factors specific to the U.S., and further research is needed to determine whether the structure and interpretation of the AVCS hold across different cultural contexts.

Future studies should examine the AVCS in non-Western populations and non-MTurk samples to establish the extent to which the observed factor structure and relationships generalise beyond this specific demographic. Further research could also investigate how the AVCS relates to individual differences in personality traits, moral beliefs, and socio-cultural background. This will help in confirming the robustness of the scale.

Overall, this study suggests that the AVCS is a valid and psychometrically sound measure of Aristotelian virtue. While further research is needed to test Aristotelian virtue theory more broadly, these findings provide evidence that virtue encompasses appropriate cognitions, affect, and behaviours, spanning a continuum from deficiency to excess. Compared to Big Five Conscientiousness, Virtue Conscientiousness exhibited a more nuanced relationship with well-being, with each facet showing stronger correlations with life satisfaction, while Excessive Conscientiousness was uniquely associated with depression, anxiety, and stress. These findings highlight the potential of Aristotelian virtue theory to deepen our understanding of complex traits, offering new insights into how character strengths can contribute to or undermine psychological well-being.

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Chapter 6: The Virtue of Conscientiousness: A Bayesian Network Approach

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Chapter Introduction

This paper has been accepted for publication in *The Humanistic Psychologist*. It used a Bayesian network analysis to investigate the internal structure of the virtue of conscientiousness. Network models are useful as they visually represent how sets of variables are correlated, improving interpretability. In this paper, we present two network models. First, we apply an undirected Bayesian Gaussian graphical model; second, we present a directed acyclic graph model. Both models suggest that *Excellent Behaviours* play the most influential role in the development of the virtue, a finding that could have practical significance for generating hypotheses about interventions aimed at strengthening the trait. The discussion explores how these network results align with both Aristotelian virtue theory and Bandura's social learning theory, highlighting points of convergence between philosophical and psychological perspectives.

Abstract

The Aristotelian Virtue of Conscientiousness Scale (AVCS) is one of the most comprehensive self-report measures of virtue, based on Aristotelian theory. With eight separate facets, the AVCS captures each component of virtue considered to be essential by Aristotelian theorists. However, little is known about how the different components of this virtue relate to each other. This study aimed to investigate the internal structure of the virtue of conscientiousness using network analysis. The 28-item AVCS was administered to a representative sample from the general population of New Zealand ($n = 662$), and analysed according to two separate network models: the (undirected) Bayesian Gaussian graphical model, and the directed acyclic graph model. Visual plots were produced to demonstrate the relational structure of the AVCS facets and the strengths of these relationships. The results suggest that excellent behaviours play a pivotal role in the cultivation of conscientiousness. Overall, the results support the claim made by virtue theorists, namely that the virtues are developed by practicing virtuous behaviours. These results can be used to guide future hypotheses in virtue development research and create ties between Aristotelian theory in philosophy and behavioural science in psychology.

Keywords: Aristotelian virtue theory; network analysis; conscientiousness; Aristotelian Virtue of Conscientiousness Scale; character assessment

An increasing number of scholars are investigating the virtues and their role in human flourishing and well-being (e.g., McManus et al., 2024a; Darnell et al., 2022; Morgan et al., 2017). Interdisciplinary scholars in philosophy and psychology have criticised existing instruments in psychology (particularly positive psychology) for lacking a strong conceptual basis, which has resulted in a failure to measure aspects thought to be essential components of virtue (Van Zyl et al., 2023; Bright et al., 2014; Fowers et al., 2021; Kristjánsson, 2012; Kristjánsson, 2013). To address this weakness, a few interdisciplinary scholars have proposed using an Aristotelian theory to guide virtue research (Fowers et al., 2021; Wright et al., 2021; McManus et al., 2024a). Some of these scholars have constructed their own scales, proposing different development and measurement strategies to advance virtue science (Darnell et al., 2022; Morgan et al., 2017; McManus et al., 2024a). A recent paper on virtue measurement suggests utilising network analysis, a complex correlational technique, to uncover the underlying structure of virtues, measured as complex multidimensional constructs (McManus et al., 2024a). McLoughlin et al. (2025) has used network analysis to uncover the underlying structure of the Short Phronesis Measure. However, researchers have yet to apply it to other virtues. To date, very little is known about the interactions and causal pathways between individual components of these virtues.

Aristotelian Virtue Theory

Aristotelian virtue theory is the most popular philosophical theory of character traits (virtues and vices). The virtues are defined as excellences of character, the exercise of which allow the individual to achieve the ultimate end of human life—*eudaimonia* (flourishing or true happiness) (Hursthouse, 2001; Van Zyl, 2018). Aristotelian virtue theorists do not draw a sharp distinction between morality, as concerned with the rights and interests of others, and self-interest. The virtues are traits that allow the individual to function well in society, and

therefore include traits that are mainly concerned with the good of others, such as generosity and compassion. However, the standard Aristotelian list of virtues also includes traits that are mainly concerned with the good of the individual, such as temperance and perseverance. Following McManus et al. (2024), we want to add conscientiousness to this list.

Although they deny that pleasure is the ultimate aim of a good life, Aristotelian virtue theorists claim that a virtuous life includes pleasurable affective states, including a subjective sense of meaning, fulfilment and satisfaction (Badhwar, 2014), states that have been investigated by positive psychologists. So far, interdisciplinary research demonstrates that the virtues are uniquely indicative of life satisfaction, subjective happiness, positive emotions and prosocial behaviour (Morgan et al., 2017; Darnell et al., 2022; McManus et al., 2024b). By conducting research with new tools designed to measure virtues, scholars can test Aristotelian claims regarding the link between virtue and positive states.

However, scales to measure virtue have been criticised as inadequate, given their lack of a strong conceptual basis, and their focus on behaviour (Van Zyl et al., 2023). Aristotelians offer a more complex account of virtue, one that requires the measurement of all its components, including appropriate behaviours as well as appropriate inner states—cognitions, affects, and motivations (Fowers et al., 2021; Hursthouse, 2001). A probable reason for the behavioural focus in psychology is that we can directly observe behavioural expressions. The basic assumption is that virtuous behaviour come from virtuous inner states. For instance, if someone is truly generous, they will make sure to donate an appropriate amount of time and resources to worthwhile causes. However, Aristotelians warn that virtuous acts do not always manifest virtuous character. Being virtuous also involves having good internal states, including attitudes, motives, and feelings. For instance, an act of

donating to charity would only count as truly generous if it is motivated by a concern for the well-being of other people and a genuine desire to satisfy their needs (Hursthouse, 2001).

Affective states also play into virtuous motivation. For instance, helping an injured bystander *begudgingly*, experiencing pangs of annoyance and irritation, is not consistent with kindness as a virtue. Rather, virtuous people's emotions both align with and motivate virtuous actions (Hursthouse, 2001). That is, a kind person will experience a desire to help someone in need, and will subsequently feel satisfied or happy about doing so. Of course, this does not mean virtue always translates to "positive" emotions; quite often, "negative" emotions are quite appropriate in response to the loss of genuine value or when confronting genuinely challenging situations. The key point is that the affective states of virtuous people are consistent with their values and reasoning, with the result that virtuous people typically do not have to use self-control to resist contrary desires—their emotions facilitate the virtuous course of action (Hursthouse, 2001).

The cognitive component of virtues is mediated by practical wisdom (*phronesis*), which is an intellectual virtue needed for the possession of every other virtue. Practical wisdom is a complex virtue that serves many functions, but for our purposes it is sufficient to mention two broad functions. Firstly, practical wisdom enables agents to appreciate the value or importance of things, such as material wealth, health, pleasure, knowledge, the happiness of others, and so on. The second function is more instrumental, and involves identifying the means to achieve valued goals and developing the practical skills needed to do so successfully. It also includes the ability to weigh and balance the competing demands of different virtues in particular contexts in order to determine the most appropriate course of action (Russell, 2009).

A final point worth noting is that the virtues are viewed as excellences, constituting a golden mean between corresponding vices, one of excess and the other of deficiency (Aristotle, ca. 350 B.C.E./2020). For instance, generosity falls between the vices of wastefulness, where one gives away too much in the wrong ways or the wrong reasons, and the deficiency of stinginess, where one fails to give away resources even when it is warranted and appropriate. Someone who is generous will fall in between these extremes with a willingness to donate time and resources to value and worthwhile causes.

Recent Interdisciplinary Work on Virtue

Psychological research on the virtues is often criticised for its lack of conceptual grounding, and for ignoring philosophical research on character. (Van Zyl et al., 2023). However, in recent years a small number of assessments have been developed according to an Aristotelian theory of virtue, including the Multi-Component Gratitude Measure (Morgan et al., 2017), the Aristotelian Phronesis Model (Darnell et al., 2022), and the Aristotelian Virtue of Conscientiousness Scale (McManus et al., 2024), with promising results.

The Multi-Component Gratitude Measure (MCGM) is a multidimensional psychometric assessment tool used to measure an Aristotelian conceptualisation of gratitude (Morgan et al., 2017). This scale was developed by an interdisciplinary research team as an alternative to previous virtue assessments, such as the Values in Action (VIA) Survey (Peterson & Seligman, 2004), which they critiqued as being too limited and superficial. The MCGM was designed to capture additional aspects of virtues required for assessing the overall importance of the construct in well-being research (Morgan et al., 2017). Their assessment measures four distinctive components of gratitude, including grateful behaviours, grateful emotions, grateful attitudes and conceptual understandings of gratitude. Interestingly, this scale contains a mix of standard psychometric self-report items as well as vignettes used

to assess participants' understanding of gratitude. The scholars made an important contribution, finding that each separate aspect of virtue independently contributes to life satisfaction, subjective happiness, and positive affect after controlling for the other facets (Morgan et al., 2017).

The Aristotelian Phronesis Model (APM) is another example of an interdisciplinary approach to measuring virtues (Darnell et al., 2022). The APM divides practical wisdom into four separate functions: the blueprint function, the constitutive function, the integration function and the emotional regulation function. The model is based on an Aristotelian theory of practical wisdom, with each function being important for exercising virtue (Darnell et al., 2022). The constitutive function, for example, is about identifying the situational stimuli that are relevant to virtue, enabling people to determine whether a particular virtue is called for. The blueprint function involves knowing how to actually accomplish or reach a given virtuous end, and the integration function is about weighing and balancing competing demands of different virtues and knowing which ones to prioritise. Lastly, the emotional regulation function involves regulating one's emotions, so they are appropriate in the situation and consistent with one's cognition (Darnell et al., 2022).

McLoughlin et al. (2025) validated a short scale based on the APM and found that a ten-factor model (covering the four functions) offered the best fit for the observed variance. The researchers also performed a network analysis, finding that the facets labelled Moral Self Relevance, Negative Moral Emotion, Aspired Moral Identity, Moral Deliberation, and Moral Integration were more important in explaining the variance than the others. Additionally, the study indicated that the components of the scale collectively predicted flourishing outcomes, particularly in relation to character strengths and meaning and purpose. However, certain facets, such as Virtue Identification and Situational Moral Relevance, did not show

significant correlations with flourishing, unlike the more central components. Overall, this research highlights the value of a network approach in identifying the most influential components of virtues, which has important implications for virtue development in education and well-being research.

The Aristotelian Virtue of Conscientiousness Scale (AVCS), which we employ in this study, is the third comprehensive virtue assessment tool. The AVCS uses an Aristotelian framework to conceptualise and measure conscientiousness as a virtue (McManus et al., 2024b). It is important to distinguish the virtue of conscientiousness from moral conscientiousness, which involves being motivated by a sense of moral duty and forms a central part of Kantian ethics. Virtue theorists agree that moral conscientiousness is not a virtue, in part because they reject the idea that a good person adheres to a set of moral principles (Angle, 2013; Govier, 1972). Instead, and as we will explain below, McManus et al. (2024b) develop a theory of the virtue of conscientiousness that is informed by an Aristotelian theory of virtue, such as the one provided by Hursthouse (2001).

The virtue of conscientiousness should also be distinguished from conscientiousness as a personality trait—the tendency to be organised, meticulous, and diligent. In the Five-Factor Model conscientiousness consists of six facets: Dutifulness, Achievement-Striving, Self-Control or Self-discipline, Deliberation, Orderliness, and Competence or Self-Efficacy (Costa et al., 1991). While this trait is linked to desirable outcomes (Anglim et al., 2020) it is not a virtue because it is not necessarily aimed at a valuable goal or target. As Kristjánsson (2015) notes, a thief can be conscientious. Finally, some theorists include conscientiousness (or closely related traits such as perseverance and self-regulation) in the VIA Classification as a virtue or strength. However, this framework does not provide a detailed theory or a

measurement instrument that captures all the features considered to be essential by Aristotelian theorists (McManus et al., 2024a).

Recognising the conceptual differences between virtues and personality traits, Cawley et al. (1999) called for a reconceptualization of conscientiousness as a virtue, partly inspiring the development of the AVCS (McManus et al., 2024b). The AVCS measures conscientiousness as a virtue compatible with an Aristotelian framework, defining it as a character trait—a reliable disposition to think, act, and feel in ways that are appropriate—that is conducive to flourishing. Unlike both moral conscientiousness and the Big Five operationalisation, the virtue of conscientiousness is defined in terms of its characteristic target, which is to achieve excellence in a given role or task by carrying out role-specific duties and responsibilities. For example, a conscientious police officer will protect the public by performing a set of role-specific duties stipulated in an employment contract or code of conduct.

There are important differences between conscientiousness as a virtue and as a personality trait. For example, certain facets or sub-facets of Big Five conscientiousness, such as Order (which includes tidiness and cleanliness) and Self-Control, are not necessary or central aspects of the virtue. Some people can perform their roles well without being very orderly. Similarly, self-control may be instrumental to performing one's role well, but it is not sufficient for virtue, as it can be put to ill ends. In many cases, a virtuously conscientious person need not rely on self-control, as their desires will tend to be in line with their reason, that is, their understanding of which goals are worth pursuing. Guided by practical wisdom, a person with the virtue of conscientiousness will not only perform their roles well, but they will also commit themselves to worthwhile roles and be able to prioritise based on their assessment of the relative importance of different roles and duties. Finally, and from a purely

conceptual perspective, the virtue of conscientiousness cannot be possessed in excess. As a virtue (an excellence), it lies in the “golden mean” between corresponding vices, namely vices of deficiency (e.g. irresponsibility and carelessness) and the vices of excess (e.g. perfectionism and excessive conscientiousness).

Based on these theoretical considerations, the AVCS, like the MCGM, was designed to measure multiple components of a virtue (McManus et al., 2024b). The AVCS measures eight facets: Excellent Behaviours, Responsible Behaviours, Concern for Others, Self-concern, Appreciation of Excellence, Practical Wisdom, Affect and Excessive Conscientiousness (McManus et al., 2024b). Each behavioural facet represents an important, but distinctive, aspect of virtuous conscientiousness. Responsible Behaviours captures the idea that people with the virtue will meet the basic behavioural requirements that come with their roles. For instance, this might involve showing up to work on time and accurately logging one’s hours. However, merely fulfilling the minimum requirements of one’s role is not an excellence (and in the Aristotelian view, all virtues involve excellent functioning). For this reason, people with the virtue go beyond minimal expectations, seeking to perform their role excellently—a conscientious student does not only submit assignments on time, they actively try to do their best—this might involve starting their work early, asking questions, and paying attention to detail. Accordingly, the Excellent Behaviours facet of the AVCS assesses the participants’ self-perception of excellence, and whether they believe they perform their roles excellently, thereby establishing whether the behaviour aligns with their own view of excellent role performance. Importantly, research by McManus, et al. (Under Review). indicates that the Excellent Behaviours facet shows incremental validity over Responsible Behaviours in predicting life-satisfaction.

Practical Wisdom and Affect are two other important aspects of the AVCS. Practical wisdom can be understood as both a general construct, such as the type measured by the Short Phronesis Measure (McLoughlin et al., 2025), and as an important aspect of each individual virtue (Schwartz & Sharpe, 2006). The AVCS focuses on the two broad functions of practical wisdom (mentioned earlier) in relation to conscientiousness. This involves asking participants whether they have the necessary practical knowledge and skills to perform their roles well and whether they have considered which of their roles are the most important. Practical wisdom is a crucial aspect of virtuous conscientiousness—if someone does not understand what their role requires and lacks the skills to perform it well, they cannot fully possess conscientiousness as an excellence.

The Affect facet assesses whether participants' affective states align with having the virtue of conscientiousness. In the Aristotelian tradition, virtuous people experience affective states that are consistent with their values and behaviour. In the case of conscientiousness, this involves an emotional willingness to fulfil one's own responsibilities, while also feeling satisfied or content about doing so. The inclusion of three distinctive motivational aspects can help researchers assess which types of motivations are the most central and important in a virtuous person's character. While there are many types of acceptable motivations, the AVCS reduces them to three broad categories for the sake of parsimony: Concern for Others, Self-Concern, and Appreciation of Excellence. These three broad forms of motivation will subsume the more specific types of motivations that are consistent with a secular, Aristotelian theory of virtue. While these facets are assessed independently, they also expand on the Practical Wisdom and Affect facets. This is because motivation can involve both reasoning and beliefs about what is important as well as emotions (attitudes and feelings).

The AVCS includes an independent facet for measuring the vice of excess. This vice can manifest as an inclination to place too much value on achieving unrealistically high standards when carrying out role-specific duties, and a tendency to prioritise these duties over other important values, such as one's health or well-being. This is a useful facet, as it can allow researchers to better distinguish between adaptive and maladaptive tendencies, enabling the investigation of virtue as a golden mean. Including measurement of the vices is appropriate and important in virtue measurement, given that Aristotelian virtue theorists define virtue with reference to associated vices (Van Zyl, 2018).

To date, the AVCS has been validated using Rasch analysis and confirmatory factor analysis (McManus et al., 2024b; McManus et al., Under Review). Together, these analyses show that the AVCS has strong psychometric properties with good reliability estimates for both the total scale and individual facets. These have been found to correlate with life satisfaction, with the exception of the Excessive Conscientiousness facet, which positively correlated with increased depression, anxiety and stress scores. The AVCS displayed discriminant validity when compared to Big Five Conscientiousness, with only a weak correlation between the constructs. It also displayed incremental validity over Big Five Conscientiousness in predicting life satisfaction, while the Excessive Conscientiousness facet explained unique variance in psychological distress (McManus et al., Under Review). These findings indicate that Excessive Conscientiousness is the main driver of distress among the subscales, indicating that although conceptually distinct from virtue, excessive conscientious tendencies can become more likely when one strives for excellence.

Network Analysis

Despite these promising results from various interdisciplinary investigations of virtues, not much is known about the internal structure of virtues and whether some

components are more important to the structure than others. Applying network analysis is a novel approach to virtues that can reveal new information about how the different components of virtues are related. Specifically, directional network analyses can illuminate possible causal pathways (Heeren et al., 2021), guiding hypotheses about virtue development research and aiding the construction of interventions intended to improve the virtue of conscientiousness based on Aristotelian theory.

Network analysis is a correlational technique that can visually map out complex nomological networks (Epskamp et al., 2012). It does this by displaying how variables in a network hang together, depicting a series of controlled and independent relationships. These network images display direct relationships as well as indirect relationships that might not otherwise be seen using other correlational techniques (Åkerblom et al., 2021; Costantini et al., 2015). For this reason, network analysis aids in interpreting relationships between variables, providing a more precise and detailed picture of the complex ways in which variables relate. Two common models employed for conducting network analysis are the Bayesian Gaussian graphical model (BGGM) and the directed acyclic graph model (DAG). BGGM is a non-directional method that estimates *bidirectional* relationships, meaning it identifies associations between variables without assuming a specific causal direction. By contrast, DAG is a *directional* method, where the relationships between variables are unidirectional, suggesting potential causal links through probability estimates (Heeren et al., 2021). These directional networks provide additional information about possible ways networks are formed and sustained over time, which, when applied in the present study, can greatly improve scholars' understanding of the internal structure of the virtue of conscientiousness.

It is important to note that while conscientiousness is conceptualised within an Aristotelian framework, the DAG approach does not adhere to Aristotelian views of causation. Instead, it aligns with a contemporary scientific understanding of causality, which seeks to identify antecedents to particular occurrences. This directional network model examines patterns of dependency between variables to estimate the likely direction of causal influence. Although this differs from Aristotelian forms of causation, it offers distinct practical advantages—most notably, helping scholars understand how virtues may develop over time.

Exercising and developing virtuous traits is seen to both partly constitute and improve well-being (Snow, 2020). Despite the significance of virtues, not much is known about the internal structure of virtues as multidimensional traits. Uncovering how the different aspects of virtues relate together can improve people's general understanding of virtues, leading to better interventions aimed at improving character and well-being. The aim of this study was to investigate the internal structure of the virtue of conscientiousness using network analysis. This was done by analysing data collected using the AVCS, a comprehensive virtue assessment. This study employs a cross-sectional design, targeting participants from a Western context, as this is the target population the AVCS was developed to assess. As virtue theorists suggest that practicing virtuous behaviours is the best way to develop virtues (e.g., Annas, 2011), we predicted that the behavioural facets of the AVCS will be the most important in the network and the most likely facet to influence the other components in the network.

Method

Participants

A representative sample of seven hundred participants was recruited from New Zealand (a culturally diverse, predominately Western country). Recruitment was facilitated by Qualtrics. During recruitment, Qualtrics staff monitored the data collection and excluded low-quality responses, including data from participants who finished the survey too quickly or who failed an attention check included as a survey item. Additionally, thirty-five participants were excluded to meet representative data quotas, and a further three participants were removed for missing data. This left a total sample of 662 participants for analysis. Overall, 284 participants identified as male, while 378 participants identified as female. Participants' ages ranged from 18 to 90, with a mean age of 46.92 ($SD = 17.94$). Participants resided throughout various regions of New Zealand, including Auckland (34.2%), Waikato (10.3%), Canterbury (13.6%), Wellington (11.2%) and Other (30.6%). Ethics permission was granted for this study by the authors' institutional ethics committee. This committee follows the ethical principles of the American Psychological Association, 7th edition (American Psychological Association, 2022). The data used in this study are accessible through the following OSF link: https://osf.io/a4tng/?view_only=21f92a928df14428999a609266bb2948.

Measures

The 28-item AVCS was used to assess the virtue of conscientiousness, as this is one of the most comprehensive extant non-intellectual virtue scales (McManus et al., 2024b). The AVCS contains eight facets, labelled Excellent Behaviours, Responsible Behaviours, Concern for Others, Self-concern, Appreciation of Excellence, Practical Wisdom, Appropriate Affect and Excessive Conscientiousness. The total scale displayed excellent reliability estimates ($\alpha = 0.93$, $\omega = 0.92$). Most of the individual facets were within an

acceptable range of above 0.70, but one facet, Excessive Conscientiousness, displayed a slightly lower reliability estimate of ($\alpha = 0.60$, $\omega = 0.61$). The rest of the eight facets displayed reliabilities ranging from ($\alpha = 0.83-0.72$, $\omega = 0.83-0.74$).

Data Analyses

After data collection, initial descriptive statistics, including the mean, median, and mode, were calculated for the AVCS and its eight facets using IBM SPSS Statistics v.29. The data were uploaded to RStudio (RStudio Team, 2023) before being analysed according to an undirected BGGM.

As part of the network analysis, a BGGM was used to obtain a correlational map of variables within the network. The BGGM allows researchers to gain an overview of the network, including which variables are most central, but without suggesting the direction of causality, thereby guiding the formation of hypotheses for more specific direction approaches (Williams & Mulder, 2020). The BGGM also produces a visual representation of the network, depicting independent relationships, which aids in the interpretation of the structure of the network.

BGGM was conducted using packages in RStudio, which were used to calculate posterior means, standard deviation and credible intervals for the AVCS facets. These posterior estimates provide robust, credible estimates that provide the likely range in which parameters will fall (Chiang et al., 2024). The *qgraph* package was used to create a visual display of the partial correlations between the facets, depicting the AVCS facets as nodes (circles) in a network connected by edges (lines); the colours of edges were coded in RStudio to depict positive relationships as blue and negative relationships as red. Darker and thicker edges depict stronger relationships, whereas thinner and lighter edges depict weaker relationships.

The BGGM was conducted using bootstrapping with 5000 iterations to provide robust confidence intervals clarifying the uncertainty around network edge estimates (Chiang et al., 2024). Additionally, the *explore* function in RStudio was used to calculate the partial correlations represented in the network image. Each controlled relationship accounted for the variance explained by every other variable and the relationships between the variables represented in that network (Yan et al., 2024). Each edge in the network was estimated using a semiparametric copula model with ranked likelihood. This approach allows for the modelling of complex dependencies between variables. The network model also excluded relationships for which the 95% credible intervals of the partial correlations included zero, ensuring that only statistically significant relationships were retained (Chiang et al., 2024).

A Bayesian approach is applied in BGGM, using regularisation techniques by incorporating assumptions to prevent producing models that are too complex and unable to generalise (Chiang et al., 2024). In our study, priors were set to assume that relationships in the data would normally be distributed with a standard deviation of 0.25. This setting is recommended for psychological data, which typically has many weak or non-existent relationships and rarely occurring strong relationships (Chiang et al., 2024). Setting the standard deviation to 0.25 also helps deal with multicollinearity issues, which occur when variables are highly related to each other, making it hard to determine the unique contribution of each variable. Pushing the partial correlations towards zero limits the number of weak correlations, which simplifies the model, improving interpretability by retaining the main correlations.

Our study used BGGM predictability estimates rather than centrality to determine the most important nodes in the network. Centrality is considered to be less relevant in BGGM, as it concerns the position of a node within the network, whereas BGGM emphasises the

strength and significance of particular relationships (Chiang et al., 2024). Predictability estimates how much of the variability in a particular node is explained by its direct connection to other nodes within the network; however, it does this without suggesting the direction of the causal relationships between nodes within the network. In our study, predictability is important, as it will provide information about which aspect of the virtue of conscientiousness is the most predictable when considering variations in the other aspects of the virtue. This has practical implications in terms of designing interventions to target the most important components of the virtue (Chalmers et al., 2022).

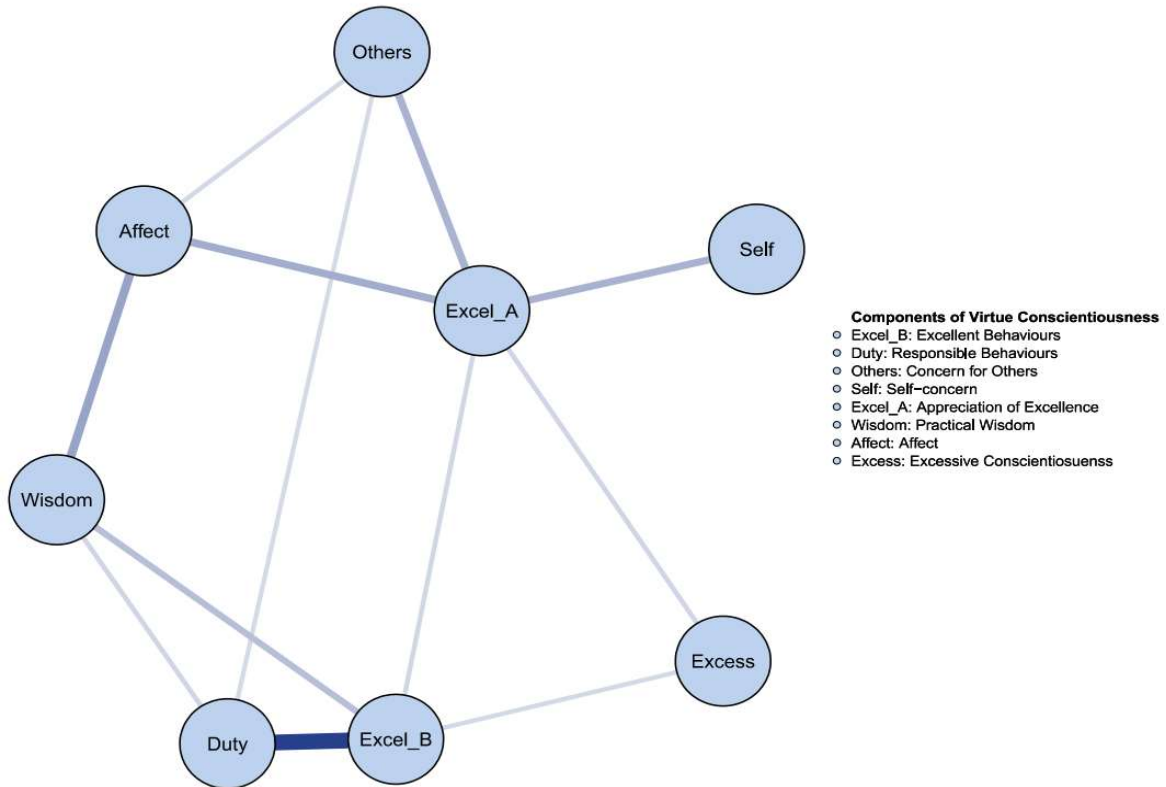
After attaining this initial network, the data were subjected to a DAG to attain a directional network. Unlike BGGM, this method assumes a direction of causality, displaying a probabilistic representation of the direction of dependency between the variables (Chiang et al., 2024). DAG was performed using RStudio with the *deal* package. Ten thousand iterations were performed to establish robust results. A visual display of the directed network was acquired using *Rgraphviz*. A node represents each variable, and directions of probable causality are displayed by arrows between variables pointing in the direction in which the causality is predicted to occur. In addition to the network image, the directional strength of these relationships, along with the probability of specific directions of causality, were produced.

Results

Figure 3 shows the BGGM network displaying the partial (nondirectional) regularised correlations between the AVCS facets. The correlation matrix depicting the magnitude of these relationships can be viewed in Appendix B. By examining Figure 3, we can see that there are only positive correlations between the facets of the AVCS. We can also see that Excellent Behaviours and Duty are strongly related ($r = 0.68$) and that Excellent Behaviours are also linked to Practical Wisdom ($r = 0.23$), Appreciation of Excellence ($r = 0.14$) and Excessive Conscientiousness ($r = 0.13$). Responsible Behaviours is related to Practical Wisdom ($r = 0.14$) and Concern for Others ($r = 0.13$). Appreciation of Excellence, a motivational facet, is linked to the other two motivational facets: Concern for Others ($r = 0.27$) and Self-Concern ($r = 0.27$); however, it also connects with the vice of Excessive Conscientiousness ($r = 0.15$). Affect is related to Concern for Others ($r = 0.14$), Appreciation of Excellence ($r = 0.29$) and Practical Wisdom ($r = 0.32$).

Figure 3

A Graphical Gaussian Model Depicting Partial Correlations Between the Facets of The Aristotelian Virtue of Conscientiousness Scale.



Note. Darker and thicker edges represent stronger correlations, while thinner and lighter edges represent weaker correlations. Blue edges represent positive correlations.

Table 11 displays the posterior estimates, including means, standard deviations, and 95% credible intervals for each facet in the AVCS. Higher means indicate a greater degree of influence exerted over the total model. The posterior means range from 0.224 (Excessive Conscientiousness) to 0.684 (Excellent Behaviours), indicating variability in the overall importance of each facet included in the network. Standard deviations are consistently low, ranging from 0.024 (Excessive Conscientiousness) to 0.029 (Excellent Behaviours), suggesting precise estimates across facets.

Table 11

AVCS Posterior Estimates, Including Means, Standard Deviations and Credible Upper and Lower Bounds

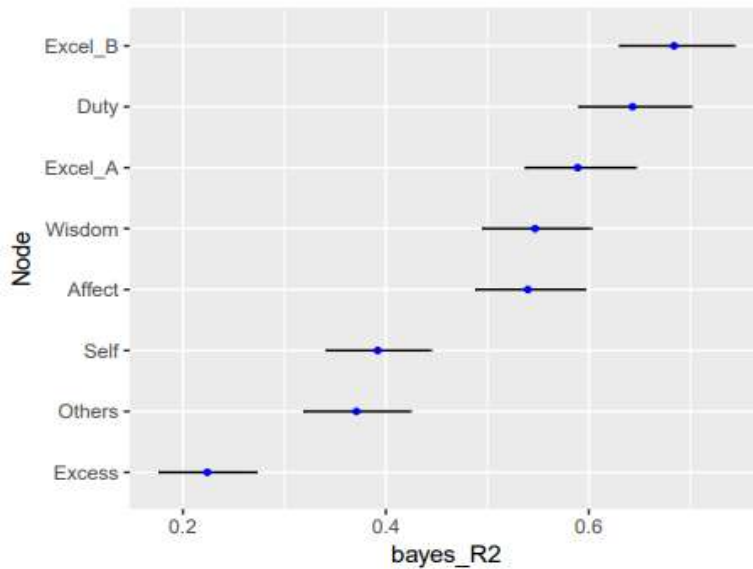
Node	Post.mean	Post.sd	Cred.lb	Cred.ub
Excel_B	0.684	0.029	0.63	0.743
Duty	0.643	0.028	0.59	0.701
Others	0.371	0.026	0.319	0.424
Self	0.392	0.026	0.341	0.444
Excel_A	0.589	0.028	0.537	0.646
Wisdom	0.547	0.027	0.495	0.602
Affect	0.54	0.028	0.488	0.596
Excess	0.224	0.024	0.176	0.272

Note. Excel_B = Excellent Behaviours, Duty = Responsible Behaviours, Others = Concern for Others, Self = Self-Concern, Excel_A = Appreciation of Excellence. Wisdom = Practical Wisdom, Excess = Excessive Conscientiousness.

Figure 4 indicates the overall importance of each variable in the total network model by displaying a predictability plot representing the amount of variance explained by each facet in the network. Overall, Excellent Behaviours explains the most variance in the network, suggesting that it is the most important facet and the most predictive of overall scores in the AVCS. On the other hand, Excess explains the least variance, making it less predictive of the other facets and the total model.

Figure 4

Probability Plot Depicting Posterior Means and Standard Deviations of the Aristotelian Virtue of Conscientiousness Scale.



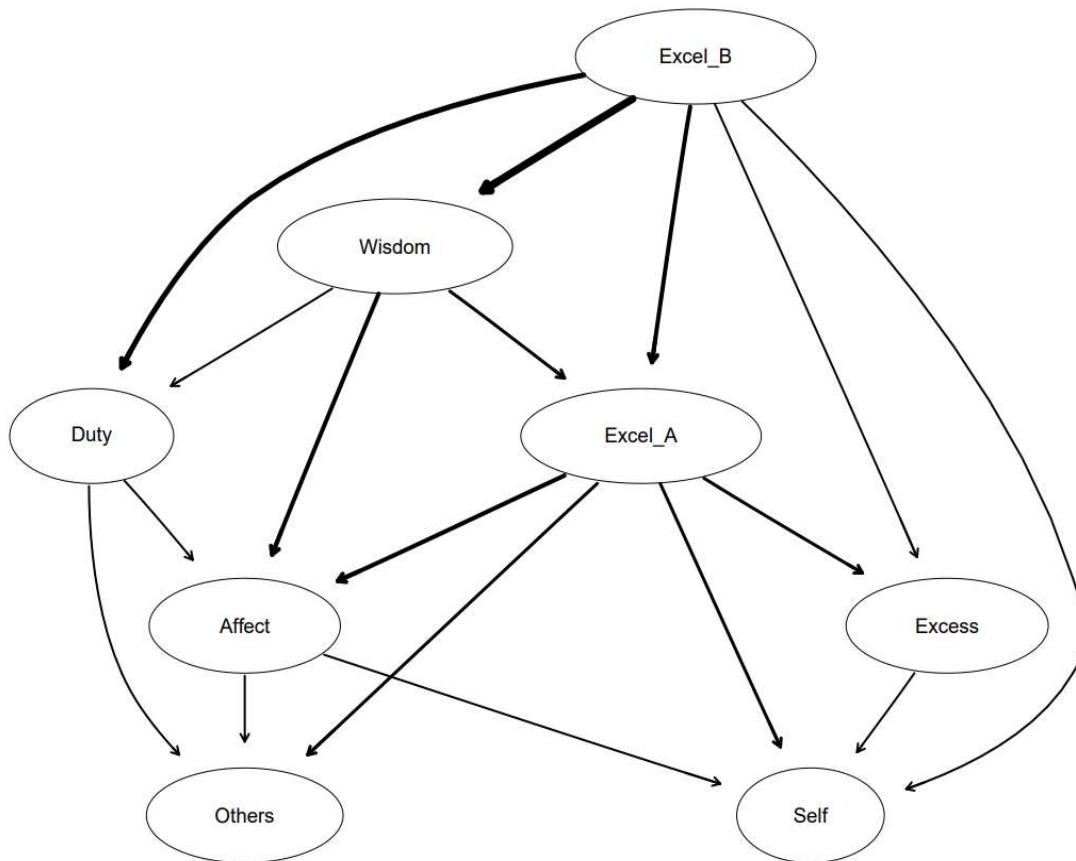
Note. Excel_B = Excellent Behaviours, Duty = Responsible Behaviours, Others = Concern for Others, Self = Self-Concern, Excel_A = Appreciation of Excellence. Wisdom = Practical Wisdom, Excess = Excessive Conscientiousness.

Figure 5. Shows the DAG network, which displays the partial and independent dependency relationships between each facet of the AVCS. In this instance, Excellent Behaviours is depicted at the beginning of a causal chain of variables. This makes Excellent Behaviours an ancestor and parental node as it either directly (parental) or indirectly (ancestor) influences all other variables in the network. For this reason, Excellent Behaviours may be the most important facet in the network. At the other end of the network, Concern of for Others and Self-Concern seems to be the outcome variables, and the ones that results from changes in the higher parental and ancestor nodes. Excellent Behaviours and Practical Wisdom share the thickest arrow, which, as seen in Table 12. shows a strong relationship of 0.9996 and a directional probability of (i.e., Practical Wisdom being dependent on Excellent

Behaviour) 0.56, meaning that 5600 out of 10,000 bootstrapped networks displayed Excellent Behaviours as being more likely to cause Practical Wisdom.

Figure 5

AVCS Facets Displayed According to a Directed Acyclic Graph Model.



Note. Arrows depict the predicted direction of dependencies; the darker and thicker arrows depict stronger relationships, whereas lighter and thinner arrows depict weaker relationships.

Table 12

Correlational Strength and Directional Probability of the Main Relationships Between AVCS Facets as Depicted in the Directed Acyclic Graph Model

Arrow		Value determining arrow thickness	
From	To	Strength	Directional Probability
Excel_B	Duty	1.000	0.62
Excel_B	Others	0.0282	0.61
Excel_B	Self	0.6942	0.78
Excel_B	Excel_A	0.9947	0.62
Excel_B	Wisdom	0.9996	0.56
Excel B	Affect	0.4592	0.55

Note. Excel_B = Excellent Behaviours, Duty = Responsible Behaviours, Others = Concern for Others, Self = Self-Concern, Excel_A = Appreciation of Excellence. Wisdom = Practical Wisdom.

Discussion

This study explored the internal structure of the virtue of conscientiousness, based on Aristotelian theory, using network analysis, a novel approach that applies advanced statistical techniques to reveal the relationships between different aspects of the virtue. The central finding was the prominent role of Excellent Behaviours in explaining the network models in both the Bayesian Gaussian graphical model (BGGM) and the directed acyclic graph model (DAG) frameworks. Both the BGGM and predictability plots highlight Excellent Behaviours as a key node, connected to others such as Appreciation of Excellence, Responsible Behaviour, and Practical Wisdom. Moreover, in the directional network, Excellent Behaviours serves as both an ancestral and parental node, directly and indirectly influencing other nodes. Specifically, Excellent Behaviours is predicted to impact the network through causal pathways leading to Practical Wisdom, Responsible Behaviours, Appreciation of Excellence, Excessive Conscientiousness, and Self-Concern. This research can advance our understanding of virtues, particularly how they are best developed and sustained. This analysis indicates that conscientiousness operates as a self-sustaining network of interrelated facets, largely driven by excellent behaviours.

The directional network shows that Excellent Behaviours is the most likely facet to influence the others, displaying probabilistic causal relationships to other key facets, such as Practical Wisdom and Appreciation of Excellence. The predicted directional relationships between the nodes are also represented in Table 12, which shows mostly strong relationships between Excellent Behaviours and the other variables, with the exception of a weak relationship between Excellent Behaviours and Concern for Others and a moderate relationship between Excellent Behaviours and Affect. The probability strengths are mostly moderate; however, the causal probabilities between Excellent Behaviours and Practical

Wisdom and between Excellent Behaviours and Affect are weaker, with Table 12 displaying a 56% and 55% chance, respectively, of these facets being dependent on Excellent Behaviours. Alternatively, Excellent Behaviours have a higher chance of causing Self-Concern, with a probability estimate of 78%. These findings suggest that developing virtuous conscientiousness is primarily driven by behaviours rather than motivations or reasoning alone, which could have implication regarding the development of new virtue-based interventions designed to improve character and well-being.

At first glance, it may seem unexpected that Excellent Behaviours emerged as the most influential facet, given the common assumption that reasons, emotions and motivations drive behaviours, particularly in the case of virtuous individuals. However, in the context of virtue development, these results are consistent with an Aristotelian theory of virtue cultivation, which holds that, at least initially, most people lack the wisdom and motivation required for virtuous activity. Instead, they acquire virtue by practising virtuous activities, often by mimicking the behaviours of virtuous role models (Kamtekar, 2004; DePaul, 1999). By habitually performing virtuous actions, they acquire the knowledge and experience needed to consistently achieve virtuous ends in a range of different circumstances. They also come to grasp the value of virtuous activity, and learn to care about the right things. In this way they gradually progress from acting virtuously under the guidance of a role model, to being motivated to do so by a genuine or authentic desire to achieve good ends (Annas, 2011). In short, although it is true that we would expect the behaviour of the fully virtuous to be driven by appropriate motivations, a developmental account of virtue suggests that full virtue is rare, and that in most people, virtuous actions do not (yet) stem from fully virtuous motives, feelings, and reasons.

Although behaviours and motivations are important, the Affect and Practical Wisdom facets also play vital roles. Interestingly, however, the Excellent Behaviours facet is not directly related to Affect in the DAG network. Rather, Affect seems more likely dependent on Responsible Behaviours, Practical Wisdom and Appreciation of Excellence. These findings support the Aristotelian view that most often, virtuous behaviour is not accompanied by virtuous affect, a character state referred to as continence (*enkrateia*). A continent person knows what is right, but does the right thing reluctantly or begrudgingly, because they experience contrary affective states. This impairs their well-being, because they have to work at overcoming these contrary desires. For the continent person to attain full virtue, to enjoy working hard, they must gain an appreciation of the value of their work—an Appreciation of Excellence.

Finally, the DAG indicates that Excessive Conscientiousness is dependent on Appreciation of Excellence and Excellent Behaviour. These relationships are in line with the view that Excessive Conscientiousness is an extreme that involves taking one's roles too seriously, often at the expense of one's own well-being and the needs of others. It is expected that people who value excellence and exhibit Excellent Behaviours to a high degree are also more likely to develop extreme tendencies towards an excessive concern with one's roles. For this reason, it is important that future research looks at how to develop the virtue of conscientiousness while minimising the likelihood of also developing excessive tendencies.

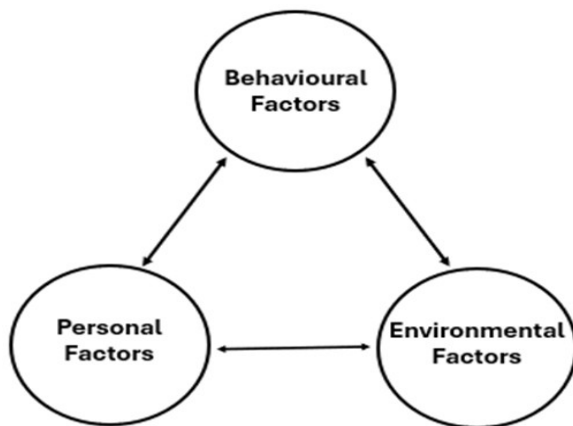
Aristotelianism and Social Learning Theory

From a psychological perspective, Bandura's Social Learning Theory (SLT) offers insights that can help interpret parts of the network from a developmental perspective. Unlike other learning theories, such as behaviourism, SLT accounts for external influences on behaviour without eschewing personal factors like emotions and beliefs. For instance,

Bandura uses the phrase “reciprocal determinism” to describe a dynamic system (see Figure 6) in which behavioural factors, personal factors, and environmental factors interact to drive learning and behaviour (Bandura, 1986).

Figure 6

Depiction of Interactions within Reciprocal Determinism.



Note. Adapted from Bandura’s (1986) theory of reciprocal determinism.

Behavioural factors within SLT help may explain the strong role of Excellent Behaviours in our network and how they may initially develop. According to Bandura, individuals learn behaviours largely through social interactions, where they actively observe and imitate others—particularly when those behaviours are socially reinforced and perceived as adaptive (Bandura, 1977, 1986). This process of modelling and reinforcement, central to SLT, could explain the strong role of Excellent Behaviours in our network, as such actions are often met with social praise and encouragement.

From a social learning perspective, one would expect that repeatedly observing Excellent Behaviours in others, combined with reinforcement mechanisms, strengthens habit formation in the observer. This expectation is consistent with the results of the network, which indicates that Excellent Behaviours may partly originate from sources other than

motivations and beliefs. However, once this initial learning process begins, the likelihood that the learner will internalise a virtuous disposition may increase (Bandura, 1977; Kristjánsson, 2015). This, in turn, may facilitate the development of other aspects of virtue, such as praiseworthy motives and practical wisdom, as reflected in the DAG.

While the behavioural facets were the strongest influences in the network, motivation also played a significant role—particularly Appreciation of Excellence, which was the third strongest predictor of variance after Excellent Behaviours and Responsible Behaviours. A social learning theorist might try to explain this by appealing to personal factors, which refer to internal influences such as beliefs, emotions, and motivations (Bandura, 1989). According to Bandura, these internal factors contribute to learning through forethought, allowing individuals to anticipate the consequences of their actions and guide future behaviour accordingly (Bandura, 2001). In addition, social learning theorists' propose that individuals regulate their actions through self-reinforcement and self-evaluation, engaging in self-regulatory mechanisms that may help sustain motivation and refine virtuous behaviours over time (Zimmerman, 2000). In this way, SLT suggests that motivation not only influences learning but also interacts dynamically with behaviour to reinforce and sustain virtuous dispositions.

The active role of personal factors and autonomy within Bandura's theory is further supported by our network results, which provide evidence of bidirectionality. For instance, our findings indicate that while behaviours exert a strong influence, the probability of Excellent Behaviours causing Appreciation of Excellence is only 61%, suggesting a potentially bidirectional relationship in which behaviours and motivation mutually sustain each other. This aligns with Bandura's SLT, suggesting that external reinforcement theories

alone are insufficient to fully explain the network given the presence of feedback loops between variables (Bandura, 1986).

Overall, SLT is widely compatible with aspects of Aristotelian virtue theory, as both emphasise the role of social contexts, practice, and learning from role models. Aristotelians recognise the role of luck, including the effects of external factors like environment and resources, in shaping character (Hursthouse, 2001). However, while these theories are largely consistent, understanding how aspects of this theory align with psychological theory can help contextualise Aristotelian virtue theory for psychologists, encouraging them to further investigate an Aristotelian developmental approach using contemporary understandings of learning mechanisms, such as modelling and conditioning.

Future research avenues could involve examining modelling in contemporary contexts. For instance, SLT posits that modelling not only facilitates adaptive behaviour but can also reinforce maladaptive and dysfunctional actions (Bandura, 2001). Therefore, it is worth investigating how different sources of external influences, such as social media exposure may contribute to either virtuous character traits or vices, particularly among young people. This is especially relevant given concerns about rising narcissism in modern society, which research suggests has been increasing over recent decades (Twenge et al., 2008).

In addition, it is worth investigating how different external influences affect people's motivational systems. Aristotelians emphasise the importance of motivation in distinguishing between true virtue (*aretē*) and mere semblance of virtue. In the *Nicomachean Ethics*, Aristotle articulates how virtuous actions must not only appear good externally but should also stem from the right internal state—performed knowingly, chosen for their own sake, and proceeding from a firm and unchangeable character (Aristotle, ca. 350 B.C.E./2020). For example, philanthropic acts performed primarily to gain social recognition would, in

Aristotelian terms, lack the essential qualities of virtue because they are not chosen for their own sake but for external rewards. Similarly, displays of excellence motivated by competitive narcissism rather than genuine appreciation of the good would constitute a form of vice rather than virtue. This Aristotelian insight helps explain how the same behavioural patterns can represent either virtue or vice depending on their underlying motivational structure and orientation toward genuine human goods. Making this distinction is especially important for accurately measuring the link between virtue and well-being, given that the appearance of virtue (i.e. superficially virtuous behaviour motivated by motives that are characteristic of vice) is not expected to contribute to happiness.

Our network findings, particularly the central role of Appreciation of Excellence, align with this Aristotelian framework by suggesting that genuine appreciation of excellence (rather than mere desire for recognition) plays a key role in the motivational system of virtuous individuals. Future research could expand on this by examining how different motivational orientations might distinguish between genuine virtue development and the cultivation of the mere appearance of virtue that masks narcissistic aims.

Limitations and Directions for Future Research

One limitation of this study is that it relies on cross-sectional data taken from a single time point. It is important to note that the DAG only provides clues about the direction of dependencies between variables; this means that this research is limited in making causal inferences, and more robust studies of causality could be performed by looking at the development of the virtue over time using repeated measures, such as by applying experience sampling (Heeren et al., 2021). The findings from this study could thus be used for hypothesis generation and other types of causality and development research. Using experience sampling can be useful for investigating the ability of the AVCS to predict

behaviours over time (Fleeson & Gallagher, 2009). No studies have yet investigated whether people manifest virtuous behaviours over time, which is a key requirement for virtue.

Another limitation of the current methodology is that DAG assumes directional acyclic relationships between variables, thereby presupposing a unidirectional causal relationship without feedback loops (Heeren et al., 2021) Relationships are not always acyclic and unidirectional; interactions between psychological variables are often complex and bidirectional. In the case of Excellent behaviour and Practical wisdom, for instance, it seems plausible that practising excellent behaviour can help one develop practical wisdom. However, based on Aristotelian theory we predict that gaining practical wisdom enables one to perform more excellent behaviours. In our study, the direction of the relationship between Excellent Behaviours and Practical Wisdom varied across bootstrapped samples, suggesting a more complex interaction rather than a strictly unidirectional effect. This highlights the need for temporal network analysis to examine how these relationships unfold over time. (Heeren et al., 2021).

Another limitation of the current study is the lower reliability estimates ($\alpha = 0.60$, $\omega = 0.61$) for the Excessive Conscientiousness facet of the AVCS. Although the reliability of this subscale was found to be acceptable in another study (McManus et al., 2024b) the lower reliability of the subscale in this study indicates that the facet may not be a precise measure of the vice of excess. This may be due to the fact that the subscale only contained four measurement items, making it harder to achieve desirable reliability. One potential solution that could be pursued in future research is to investigate whether adding additional items to the facet improves its reliability, providing a more precise and comprehensive measurement instrument. The reliability of the scale can also be tested with additional high-quality data from different samples to assess the scale's precision across populations.

Conclusion

This paper has explored the internal structure of the virtue of conscientiousness, applying network analysis to data collected using the AVCS. Using network analysis to investigate the adequacy of an Aristotelian theory of virtue is a novel approach, which, if extended to other virtues, promises to improve our understanding of character. The network approach represents a distinctive view compared to traditional psychological approaches, which often focus on single underlying traits (Borsboom, 2008). Alternatively, network analyses focus on emergent traits that arise through interactions between different variables. This perspective may also be more consistent with the Aristotelian theory of virtue, which attempts to give a coherent explanation of the function of and relationships between the different components of virtue (Hursthouse, 2001; Annas, 2011). Improving our understanding of the nature of virtue will also allow us to investigate the link between virtue and happiness. However, virtues are complex and multidimensional traits, and not much is known about how the different components of virtues relate to each other. The network approach used in this study suggests that the virtue of conscientiousness is a behaviourally driven trait, which has implications for character development programs. For instance, instead of purely theoretical instruction on the benefits of conscientious behaviour, focusing on instilling conscientious habits may be more effective, with the expectation that individuals will learn to appreciate its value through practice. This interesting finding also suggests interdisciplinary work by behavioural psychologists and virtue theorists may be a promising avenue for future research.

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Chapter 7: A Bayesian Network Approach to Virtues and Well-Being

Paper Reference:

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Chapter Introduction

This paper, currently under review at *Current Psychology*, applied network analysis to examine how the virtue of conscientiousness relates to a range of well-being outcomes. The study draws on two independent samples, each subjected to undirected Bayesian Gaussian graphical models. After establishing a generalisable network structure, the samples were combined and analysed using a directed acyclic graph model. The findings support the hypothesis that virtuous conscientiousness is meaningfully related to well-being outcomes such as life satisfaction, positive emotions, and virtuous gratitude.

Abstract

According to Aristotelian theory, developing and exercising virtue is central to well-being. However, comprehensive virtue assessments aligned with Aristotelian theory have only recently begun to emerge, and few studies have explored the link between virtues and well-being. This study employed network analyses to examine how virtues, grounded in Aristotelian theory, are associated with various health and well-being outcomes. A representative New Zealand sample ($n = 649$) was analysed using an exploratory Bayesian Gaussian graphical model (BGGM), followed by a confirmatory BGGM analysis with a New Zealand student sample ($n = 515$). Both samples were then independently subjected to directed acyclic graph (DAG) analyses. The findings support claims that virtues are positively related to well-being. The BGGM revealed strong positive connections between virtuous conscientiousness and life satisfaction, positive emotions, and virtuous gratitude. Additionally, virtuous gratitude was associated with both life satisfaction and mindfulness. Of the 45 connections identified in the exploratory network, 40 were confirmed in the student sample, reinforcing the generalisability of the results. DAG analyses indicated that distress exerted the strongest ancestor influence and predicted lower immunity. Positive affect, mindfulness, and virtuous conscientiousness showed protective, buffering influences on life satisfaction, virtuous gratitude, and Big Five conscientiousness. These findings highlight the importance of Aristotelian virtues for well-being outcomes, suggesting that cultivating virtue—particularly virtuous conscientiousness—may enhance multiple aspects of well-being. The replication of nearly all network connections across two independent samples strengthens the robustness of the results and supports the development of virtue-based interventions for improving health and well-being.

Keywords: Aristotelian theory; conscientiousness; gratitude; network analysis; character assessment

For centuries, virtues have been regarded as central to human well-being, with Aristotelian virtue theory standing as the most dominant account of virtue within contemporary philosophy (Hursthouse, 2001). However, despite the enduring popularity of virtues, the science of virtues has only recently begun emerging (e.g., Peterson and Seligman, 2004). Furthermore, the development of assessment tools grounded specifically in Aristotelian theory remains in its infancy (Fowers et al., 2024; Wright et al., 2024). As a result, the connection between virtues, understood from an Aristotelian perspective, and well-being is still understudied, limiting our understanding of how virtues relate to different well-being metrics.

Although virtues are a central topic in positive psychology, positive psychological approaches to virtue have been criticised for lacking a strong conceptual foundation and for being overly focused on behaviour (Bright et al., 2014; Fowers et al., 2021; Snow, 2022; Van Zyl et al., 2023). This theoretical gap has led to measurement tools that fail to capture the full complexity of Aristotelian virtues (McManus et al., 2024a). In Aristotelian theory, virtues are not merely praiseworthy behavioural dispositions; they also involve excellence in reasoning, motivation, and emotion (Hursthouse, 2001; Snow, 2020). Moreover, each virtue is defined in relation to a mean, avoiding both excess and deficiency (Gottlieb, 2009). These components make virtues complex traits that require careful measurement. Some scholars within positive psychology have suggested that philosophical theories of virtue are too conceptually broad and abstract to be easily operationalised for empirical assessment (e.g., Shahab et al., 2020), which may explain why few virtue scales are explicitly based on Aristotelian theory.

Despite the relative lack of empirical research on Aristotelian virtues, the theory itself is well-suited for scientific investigation. Aristotle held that virtues are central to *eudaimonia*, which he understood as living and functioning well as a human (i.e. rational and social) being (Aristotle, ca. 350 B.C.E./2020; Snow, 2020; Kraut, 2019). As a functional account of well-

being, some scholars argue that *eudaimonia* is best translated as ‘human flourishing’. This is due to its biological connotations, which align with Aristotle’s naturalistic approach (Hursthouse 2001). In psychological terms, Aristotelians might have described virtues as adaptive traits—characteristics that enhance well-being by promoting effective functioning in social and rational domains of life (American Psychological Association, 2023). This naturalistic approach lends itself well to empirical testing, as the adaptiveness of virtues can be scientifically investigated through their expected correlates. If virtues are, as philosophers suggest, useful to possess, then virtuous individuals should experience more desirable outcomes, such as greater life-satisfaction and positive emotions, while being less prone to distress (Badhwar, 2014; Van Zyl, 2018).

As far as we know, there are only a few psychometric scales that comprehensively measure virtues based on an Aristotelian account. Currently, the most recent virtue assessment to emerge is the Short *Phronesis* Measure (SPM) (McLoughlin et al., 2025). This scale was designed to assess four core functions of practical wisdom: Moral Adjudication, Moral Identity, Moral Perception, and Moral Emotions. This scale is comprehensive, in that it includes a combination of self-report and ability-based items (McLoughlin et al., 2025). However, while the SPM marks a significant advancement in virtue measurement, the scale specifically measures *phronesis*, a broad intellectual virtue. *Phronesis* is often understood as both a component of every character virtue and a virtue in itself, making it conceptually distinct from virtues such as gratitude and conscientiousness.

Another comprehensive scale to emerge is the Multi-Component Gratitude Measure (MCGM), validated by Morgan and colleagues in 2017. This scale is well-suited for assessing virtuous gratitude, as it was intentionally designed to capture multiple components of the virtue in line with Aristotelian theory. Importantly, it includes items addressing emotions, behaviours, beliefs, and attitudes to reflect the key aspects of virtue. Additionally, the scale

incorporates a conceptual component that assesses participants' understanding of gratitude. Overall, the study found that each additional component contributed to well-being, with higher scores predicting increases in life-satisfaction, positive emotions, and subjective happiness (Morgan et al., 2017).

One limitation of the MCGM is that it does not include items capturing the vice of excess, making it less effective at distinguishing between virtue and vice, potentially limiting its sensitivity to extreme scores. Moreover, despite promising results, a recent validation study found that the scale demonstrated low internal consistency in a sample of 205 participants from the U.S. general population, highlighting the need for further research to assess its reliability and generalisability (Tsai, 2024).

Another recent measure is the Aristotelian Virtue of Conscientiousness Scale (AVCS; McManus et al., 2024b). The AVCS was designed to measure conscientiousness according to an Aristotelian perspective. Virtuous conscientiousness differs from Big Five conscientiousness, as it specifically targets role-specific excellence. Alternatively, Big Five conscientiousness is a more general construct, capturing non-essential aspects of virtue, such as orderliness. The AVCS is also distinct from Big Five conscientiousness in its comprehensive design, incorporating dedicated items to assess behaviours, emotions, motivations, and practical wisdom. Additionally, unlike the MCGM, the AVCS includes items specifically designed to capture extreme scores that reflect the vice of excess (McManus et al., 2024b). Recent studies comparing the AVCS to Big Five conscientiousness demonstrate that the total AVCS score predicts greater life-satisfaction, while the excess items uniquely predict variance in depression, anxiety, and stress, supporting the scale's discriminant validity (Author, Under Review). However, one limitation (that also applies to the MGM) is that the scale has not been investigated alongside other Aristotelian-based virtue assessments, partly limiting the convergent validity of both scales.

Network Analyses

One effective way to investigate relationships between virtues and well-being outcomes is to employ network analysis. Network analysis is an advanced correlational technique that produces easily interpretable visual representations of networks of correlations (Åkerblom et al., 2021; Costantini et al., 2015). These network plots assist interpretation by representing all connections at the same time, making it easier to see indirect as well as direct connections. These correlations are also robust, in that they control for the variance explained by other variables in the network, making it easier to separate unique from shared variance, resulting in more helpful and accurate models (Williams, 2021; Åkerblom et al., 2021; Costantini et al., 2015).

Two popular types of network models used in psychological research, include the Bayesian Gaussian Graphical Model (BGGM), and Directed Acyclic Graph (DAG) (Williams, 2021; Williams & Mulder, 2020; Heeren et al., 2021). The BGGM is useful for representing nondirected relationships (e.g., where no direction of dependency is assumed), whereas DAG is directed and used to explore predicted causal pathways. Moreover, the BGGM is effective for gaining a general overview of networks, which can be used to confirm patterns across samples (Charemers et al., 2024; Williams, 2021; Williams & Mulder, 2020). Alternatively, DAGs are useful for generating hypotheses of developmental research looking at the best ways to cultivate certain traits or outcomes (Heeren et al., 2021).

Aristotelian philosophers assert that developing and exercising the virtues is necessary for flourishing (Kraut 2009; Hursthouse 2001). However, few studies have tested how Aristotelian accounts of virtue interact with well-being related outcomes. The aim of the present study is to use network analyses to test how the virtuous conscientiousness and virtuous gratitude relate to each other and health and well-being variables, including

psychological distress and immune health, in both a general and student sample. These results can illuminate specific ways in which virtuous conscientiousness and virtuous gratitude are desirable, while also revealing how they are related and which virtue is the most influential in these networks. These can be used to guide interventions designed to improve character and well-being. Overall, we hypothesise that most network connections will be confirmed between the exploratory and confirmatory networks, and links will be found between virtuous conscientiousness, virtuous gratitude and well-being variables in expected directions.

Method

Participants

Two samples of data were collected from New Zealand. Firstly, a representative sample from the general population was collected from participants residing in various regions of the country. Initially, this sample consisted of seven-hundred participants, however, this number was reduced to 649 to maintain data quality and to meet a roughly even gender quota. During this process, participants' data were removed if they finished the survey too quickly or failed an attention check embedded within the first 10 items. Out of the 649 participants, 274 were males, while the remaining 375 were females. The mean age of the sample was 46.99 (SD = 18.03), with individuals ranging from 18 years to 90 years old.

The student sample initially included 595 participants, but this number was reduced to 515 after similar data cleaning steps, such as removing participants who failed the attention check, completed the survey too quickly (i.e., under five minutes), or had missing data. However, to maintain a larger sample in this case, females were not removed to improve gender balance. Overall, this sample consisted of 403 females and 100 males. A further 12 participants identified as either transgender or as a gender variant/other. The age of the student sample ranged from 17 to 62, with a mean age of 22.97 (SD = 7.90).

Ethics approval for this research, involving both samples, was granted by the researchers' ethics committee, following American Psychological Association guidelines (7th edition; APA, 2022) and the dataset is publicly available on the Open Science Framework: https://osf.io/fczu2/?view_only=3bdbca383d174aeb9e0af7904235ee95

Measures

Virtuous Conscientiousness

The Aristotelian Virtue of Conscientiousness Scale was used to assess participants scores on a conscientiousness scale designed according to an Aristotelian framework. (McManus et al., 2024b). This scale consists of 28 items, and can be used as either a single scale (using total scores) or as a multifaceted assessment tool (McManus et al., 2024b; Author, Under Review). Based on the strong internal consistency statistics of the total scale, and because Rasch analysis supports its unidimensionality, this study sought to explore the associations between the general trait and well-being outcomes. This avoids unnecessarily convoluting the network plots with too many variables, which might hinder interpretation.

The AVCS scale consists of items that measure behavioural, affective, motivational and reasoning-based components of the virtue. The scale also contains items designed to captures extreme scores. While this has been shown to help the scale avoid ceiling effects (McManus et al., 2024b), the existence of extreme scores also needs to be kept in mind when interpreting the results because they can correlate with psychological distress. The response scale for the AVCS consists of a five-point Likert scale, with responses ranging from “Disagree” to “Completely agree.” The AVCS also only includes positively coded items, and no reverse coding was necessary. Moreover, the total scale reliability estimates were excellent for both the general sample ($\alpha = 0.93$, $\omega = 0.92$), and the student sample ($\alpha = 0.90$, $\omega = 0.90$) supporting the accuracy of the assessment tool.

Virtuous Gratitude

Virtuous gratitude was measured using the 36-item MGM (Morgan et al., 2017). The MGM consists of a range of items that measure behaviour, affective, attitudinal and

conceptual-based components. The response options followed a Likert-style format, with the conceptual based items having five options labelled “*Strongly disagree*” to “*Strongly agree*.” The rest of the items consisted of seven response options, with labels also ranging from “*Strongly disagree*” to “*Strongly agree*.” Although this scale can also be investigated on the facet level, only the total scale was used in the present study to make the network easier to interpret. Total scores were calculated by summing participants’ scores across all 37 items, after reverse coding nine items. Overall, the scale showed good reliability estimates across both the general ($\alpha = 0.87$, $\omega = 0.97$) and student ($\alpha = 0.86$, $\omega = 0.98$) samples.

Mindfulness

To investigate mindfulness, the 18-item version of the Five Facet Mindfulness Questionnaire was employed (FFMQ; Medvedev et al., 2018). Mindfulness is understood as a type of nonjudgmental attentive awareness of the present moment (Kabat-Zinn, 1990). Overall, the scale contains items designed to measure five distinct aspects of mindfulness labelled: Not Reacting to Internal Experiences, Acting with Awareness, Not Judging Internal Experiences, Observing, and Describing (Bear et al., 2006). However, as with the AVCS and MGM, these facets were combined to measure the general construct of mindfulness for interpretability. The Response scale for this assessment included a five-point Likert scale, with responses ranging from “*Never or very rarely true*” to “*Very often or always*.” The FFMQ displayed strong reliability estimates across both the general ($\alpha = 0.79$, $\omega = 0.82$) and the student samples ($\alpha = 0.74$, $\omega = 0.93$).

Positive Affect

Positive affect was measured using the ten items from the Positive and Negative Affect Schedule (PNAS; Watson et al., 1988). Positive affects are considered pleasurable states related to general well-being. This scale was accompanied by instructions asking the

participants to indicate to what extent they experienced each positive affect within the last week. The responses scale consisted of a five-point Likert scale ranging from “*Very slightly or not at all*” to “*Extremely*.” All items contained descriptions of single affects, such as “Interested” so no reverse coding was necessary. The scale displayed excellent reliability statistics for both the general ($\alpha = 0.90, \omega = 0.90$) and student ($\alpha = 0.86, \omega = 0.86$) samples.

Life-Satisfaction

Life-satisfaction was measured using the five items Satisfaction with Life Scale (SWLS; Pavot et al., 1991). This scale assesses participants’ subjective judgment about the quality of their lives. Responses were recorded on a seven-point Likert scale, labelled “*Strongly disagree*” to “*Strongly agree*.” This scale also displayed excellent reliability statistics for both the general ($\alpha = 0.88, \omega = 0.88$) and student ($\alpha = 0.86, \omega = 0.86$) samples.

Psychological Distress

Psychological distress was measured using the 21-item Depression, Anxiety, Stress Scale (DASS; Lovibond & Lovibond, 1995). Unlike the other measures, the facet scores were used instead of the total scores. This was to allow for a more nuanced study of how virtuous conscientiousness and virtuous gratitude relate to different aspect of distress. This scale was accompanied by instructions asking the participants to report how often they experienced symptoms of distress over the past week. The response scale consisted of a four-point Likert scale labelled “*Never*” to “*Almost always*.” The reliability estimates were excellent across the general sample for Depression ($\alpha = 0.91, \omega = 0.92$), Anxiety ($\alpha = 0.85, \omega = 0.85$) and Stress ($\alpha = 0.87, \omega = 0.87$). These DASS also showed excellent reliability estimates across the student sample for Depression ($\alpha = 0.91, \omega = 0.91$), Anxiety ($\alpha = 0.84, \omega = 0.85$) and Stress ($\alpha = 0.84, \omega = 0.84$).

Immune Health

Immune health was measured using seven symptom-based self-report items from the Immune Status Questionnaire (ISQ; Wilod Versprille et al., 2019). This scale assesses the extent to which participants experienced certain physical symptoms of illness over the past 12 months. The response scale included a five-point Likert scale measured from “*Never*” to “*Almost always*.” Responses were then summed to make total scores before being recoded to make a scale with scores ranging from one to ten. Scores of one are intended to reflect poor perceived immune health, while ten suggests excellent perceived immune health. The scale displayed acceptable reliability estimates for the general sample ($\alpha = 0.71$, $\omega = 0.70$), with slightly lower, but still acceptable, estimates for the student sample ($\alpha = 0.66$, $\omega = 0.66$).

Big Five Conscientiousness

The personality trait of conscientiousness was measured using the ten-item IPIP Conscientiousness Scale to further investigate how virtues relate to personality traits. This is a revised scale based on the Neo Personality Inventory (Costa & McCrae, 1992). This scale contains items covering six dimensions of conscientiousness: Deliberation, Order, Achievement-striving, Competence, Self-discipline and Dutifulness. The response scale consists of a five-point Likert scale from “*Very inaccurate*” to “*Very accurate*.” The reliability estimates for both the general ($\alpha = 0.74$, $\omega = 0.73$) and student ($\alpha = 0.81$, $\omega = 0.81$) samples were within a good range.

Data Analyses

To prepare for the network analyses, descriptive statistics, including the mean, mode, and median for each scale used in the study, were computed using IBM SPSS Statistics v.29.

The dataset was then transferred to RStudio (RStudioTeam, 2023) for further examination through network analyses.

First, an undirected Bayesian Gaussian graphical model (BGGM) was applied to both datasets. Partial correlations were then used to examine the relationships between variables while controlling for the variance explained by all other variables in the network (Williams & Mulder, 2020). This analysis was conducted first because it provides an overview of variable relationships by representing them as bidirectional, without imposing directional assumptions. This flexibility makes BGGM well-suited for exploratory analyses, particularly in cases where causal relationships may be ambiguous or reciprocal (Heeren et al., 2021).

Two samples (i.e., student and general) were analysed to compare the consistency and differences in network structures. The general sample was used for exploratory analysis to identify initial relationships while accounting for variance (Chalmers et al., 2022). The student sample then served as a confirmatory dataset to test whether these relationships remained consistent in a more homogeneous population. This approach was chosen because general population samples tend to be more demographically diverse; in this study, participants came from various regions of New Zealand and included an approximately equal distribution of males and females. In contrast, the student sample was more homogeneous, with a preponderance of female students. Confirming patterns found in a diverse population within a more homogeneous group strengthens the robustness and replicability of the findings.

Before conducting the analysis, priors were specified to enhance model interpretability and reduce noise. Correlations were assumed to follow a normal distribution centred at 0, with a standard deviation of 0.25—a recommended prior for psychological data (Chiang et al., 2024). This prior selection prevents negligible correlations from appearing and

cluttering the network plot, ensuring that only meaningful relationships are retained. Additionally, this approach mitigates the risk of multicollinearity by limiting redundancy among highly correlated variables (Chiang et al., 2024).

Separate networks were constructed for each dataset using the *qgraph* function in RStudio, with visualisations created to represent each network structure (Epskamp et al., 2012). Variables were represented as circular nodes, with direct connections (edges) visualised as lines. Edge thickness and colour intensity reflected the strength of relationships, with darker, thicker edges representing stronger associations and lighter, thinner edges indicating weaker ones. Additionally, positive relationships were displayed in blue, while negative associations were shown in red.

The *explore* function in the BGGM package within RStudio was used to estimate edges between nodes (Yan et al., 2024). A semi-parametric copula model based on ranked likelihood estimation was employed to generate these estimates (Williams, 2021). To enhance stability, 5000 bootstrapped iterations were used to estimate 95% credible intervals (Chiang et al., 2024). Partial correlations were retained based on their credible intervals, with any interval containing zero excluded from the final network structure.

To further aid in the interpretation of the BGGM network models, predictability plots were generated for both exploratory and confirmatory analyses. These visualisations depict the proportion of variance in each node explained by its direct associations with other variables, without assuming causality (Chalmers et al., 2022; Chiang et al., 2024). This highlights the most interconnected nodes within the network, providing insight into their influence. Such information is particularly useful for identifying key nodes, which can be used in hypothesis development and intervention planning.

Differences between the exploratory and confirmatory samples were examined using 5000 posterior estimates to compare mean differences between directly connected nodes (Chalmers et al., 2025). A key advantage of this approach is that posterior estimates provide greater precision than point estimates by offering a range of likely parameter values rather than a single-point estimate. This range is expressed as a 95% credible interval (Chalmers et al., 2025).

Directed Acyclic Graph Model

Following the undirected analyses, a directed acyclic graph (DAG) model was conducted, combining both the general and student samples, to infer potential causal relationships among variables (Chiang et al., 2024). The DAG model was chosen because it can provide additional insight, beyond undirected networks, by estimating the probable direction of influence between variables (Rohrer, 2018).

To ensure the stability of the model, the Hill-Climbing algorithm from the *bnlearn* package was employed, running 10,000 bootstrapped iterations in RStudio (Scutari, 2010). This algorithm optimises the network structure by iteratively adding, removing, and adjusting edge directions until an optimal fit is achieved according to the Bayesian information criterion (Scutari & Nagarajan, 2013). The final DAG was derived by averaging across the bootstrapped samples to account for variability in the network structure (McNally et al., 2017). Only edges that consistently met a significance threshold during bootstrapping were retained, reducing the likelihood of spurious connections.

The DAG visualisation was generated using the *Rgraphviz* package, enabling clear identification of key nodes within the causal framework. Arrows in the graph represent directed edges, originating from predictor nodes and pointing toward outcome nodes, with the thickness of the edges indicating the relative strength of the estimated influence (Kokou-

Kpolou et al., 2023). Nodes higher in the causal hierarchy were interpreted as having a greater predictive role, while those positioned lower in the structure were understood as more dependent on upstream influences (Hansen et al., 2022).

Results

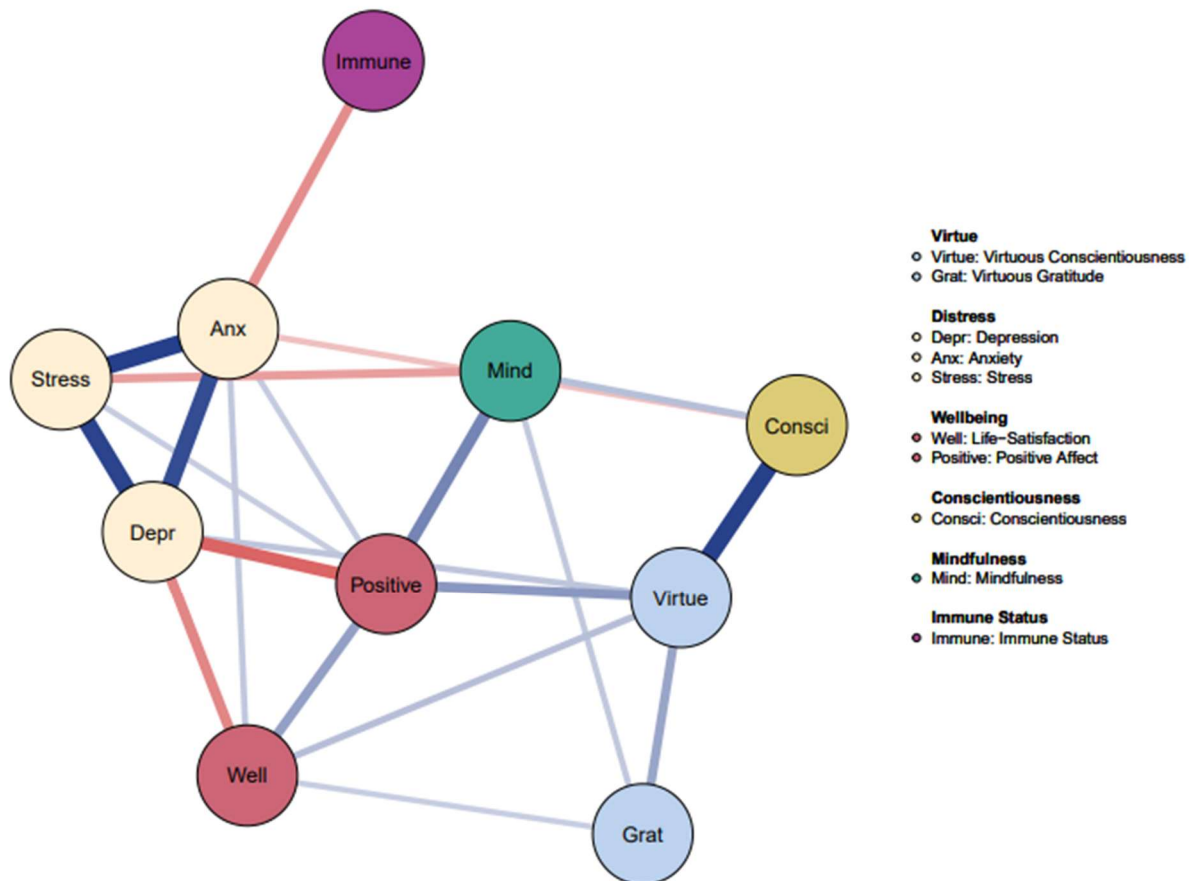
Exploratory Network Analysis

The exploratory network plot, based on general population data, is displayed in Figure 7. This network illustrates how variables are interconnected through partial correlations, depicting key relationships among virtue, well-being, psychological distress, and immune health. Both virtuous conscientiousness and virtuous gratitude exhibited a strong positive association while also demonstrating independent connections to well-being variables. Specifically, both scales were positively associated with life-satisfaction, with virtuous conscientiousness also correlating with positive affect and virtuous gratitude with mindfulness.

The three distress variables—depression, anxiety, and stress—were positively correlated. However, weaker positive associations were also observed between anxiety and both life-satisfaction and positive affect, as well as between virtuous conscientiousness and depression. Additionally, anxiety was negatively associated with immune health. Among all network connections, the strongest partial correlations were found between virtuous conscientiousness and Big Five conscientiousness ($r = 0.42$) and anxiety and stress ($r = 0.42$), while the weakest relationship retained edge was between virtuous gratitude and life-satisfaction ($r = 0.11$). The virtuous conscientiousness displayed weak-moderate correlations with virtuous gratitude ($r = 0.20$), positive affect ($r = 0.21$), and life-satisfaction ($r = 0.14$). The full list of correlation coefficients is available in Appendix C.

Figure 7

An Exploratory Graphical Gaussian Model Illustrating Partial Correlations Between the Aristotelian Virtue of Conscientiousness Scale, the Multi-Component Gratitude Measure, a Big Five Conscientiousness Scale, and other Health and Well-being Related Variables.



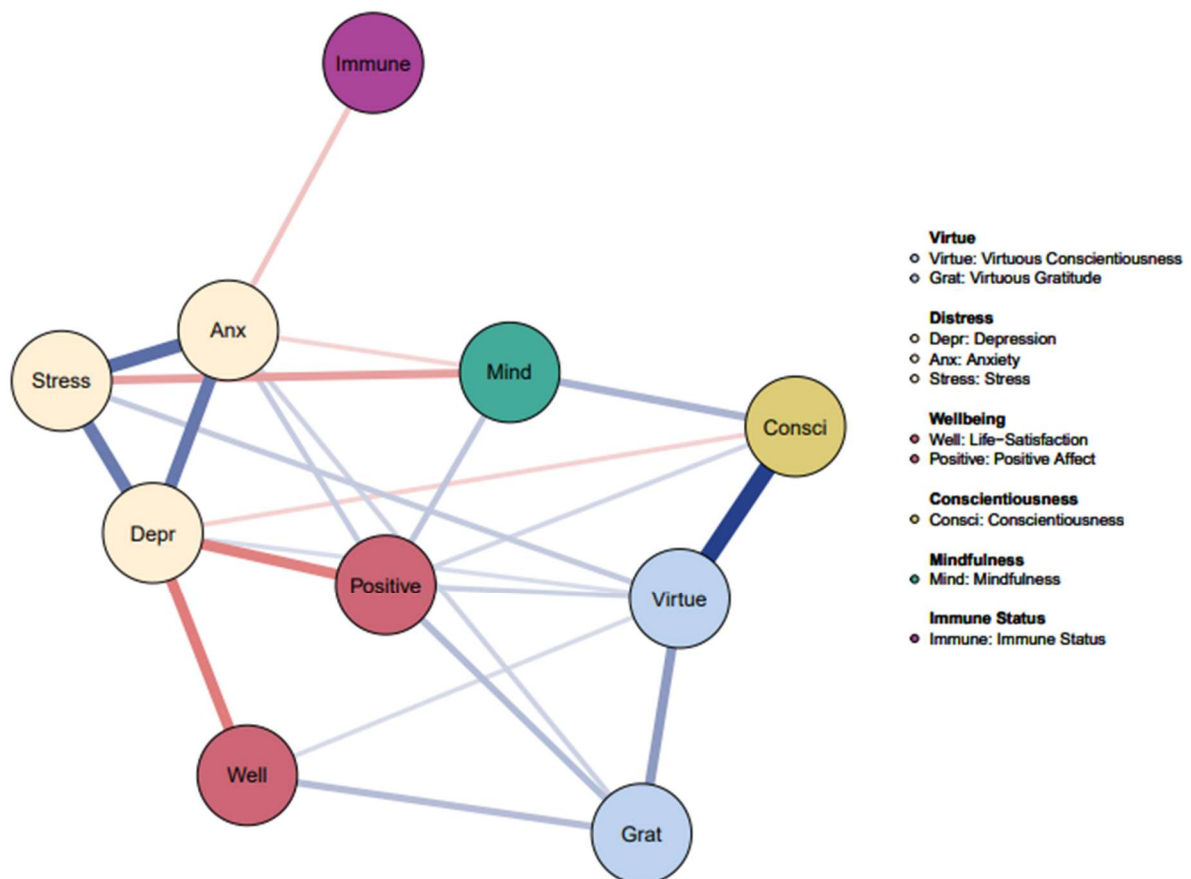
Confirmatory Network Analysis

The confirmatory network plot, displayed in Figure 8, shows that the majority of connections were replicated in the student sample. However, the relationships between virtuous conscientiousness and positive affect ($r = 0.12$) and virtuous conscientiousness and life-satisfaction ($r = 0.09$) were weaker compared to the exploratory model. Overall, in the confirmatory network, the strongest partial correlation was found between virtuous conscientiousness and Big Five conscientiousness ($r = 0.49$), whereas the weakest retained edge was observed between virtuous conscientiousness and depression ($r = 0.09$) and

virtuous conscientiousness and life-satisfaction. The full list of correlation coefficients is provided in Appendix C.

Figure 8

A Confirmatory Graphical Gaussian Model Illustrating Partial Correlations Between the Aristotelian Virtue of Conscientiousness Scale, the Multi-Component Gratitude Measure, a Big Five Conscientiousness Scale, and other Health and Well-being Related Variables.



Posterior Mean Differences

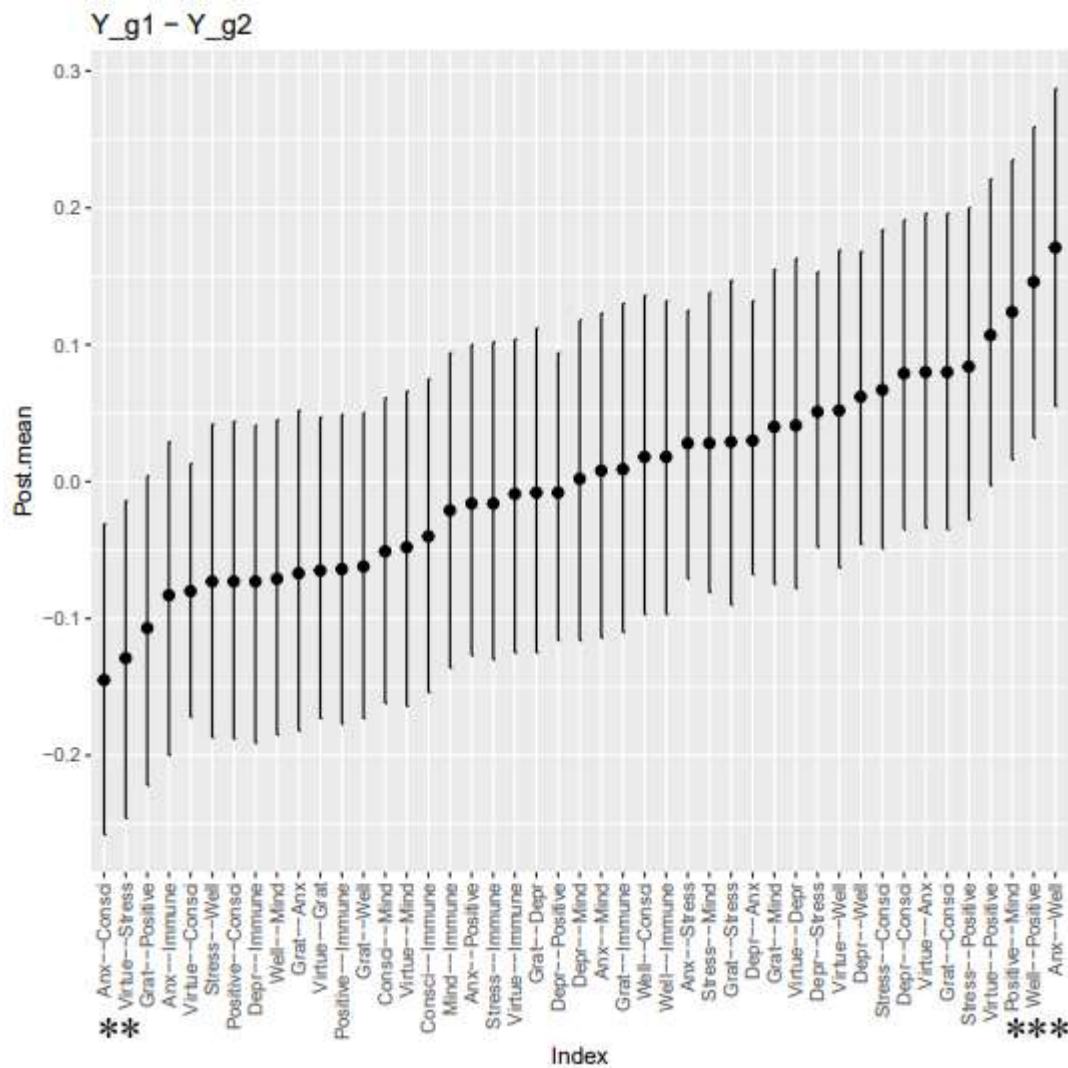
To assess the differences between the exploratory and confirmatory network plots, posterior mean differences were compared for edge weights, which represent the correlational strength between directly related variables (Chalmers et al., 2025; Figure 9). These mean differences are depicted by the black dots connected to error bars showing the 95% credible intervals. Credible intervals that cross zero (i.e., indicating no posterior mean difference)

suggests a similar relationship, confirmed across the exploratory and confirmatory networks (Chalmers et al., 2022). Relationships with credible intervals not crossing zero indicate differences in correlational strength, suggesting group dependant effects.

Overall, Figure 9 displays a majority of confirmed cases across the two samples, suggesting a high degree of network similarity. Notably, the positive connections between virtuous conscientiousness, virtuous gratitude, positive affect and life-satisfaction were confirmed across the samples, as was the inverse connection between anxiety and immune health. However, five unconfirmed edge weights emerged. For example, the connection between anxiety and Big Five conscientiousness differed across samples, as did connections between virtuous conscientiousness and stress, mindfulness and positive affect, life-satisfaction and positive affect, and life-satisfaction and anxiety.

Figure 9

Differences in Edge Weights Between Exploratory (General) and Confirmatory (Students) Network Samples.



Note. * = Unconfirmed Edge Weights, Depr = Depression, Anx = Anxiety, Virtue = Virtuous Conscientiousness, Mind = Mindfulness, Positive = Positive Affect, Consci = Big Five Conscientiousness, Well = Life-Satisfaction, Immune = Immune Health, Grat = Virtuous Gratitude.

Predictability

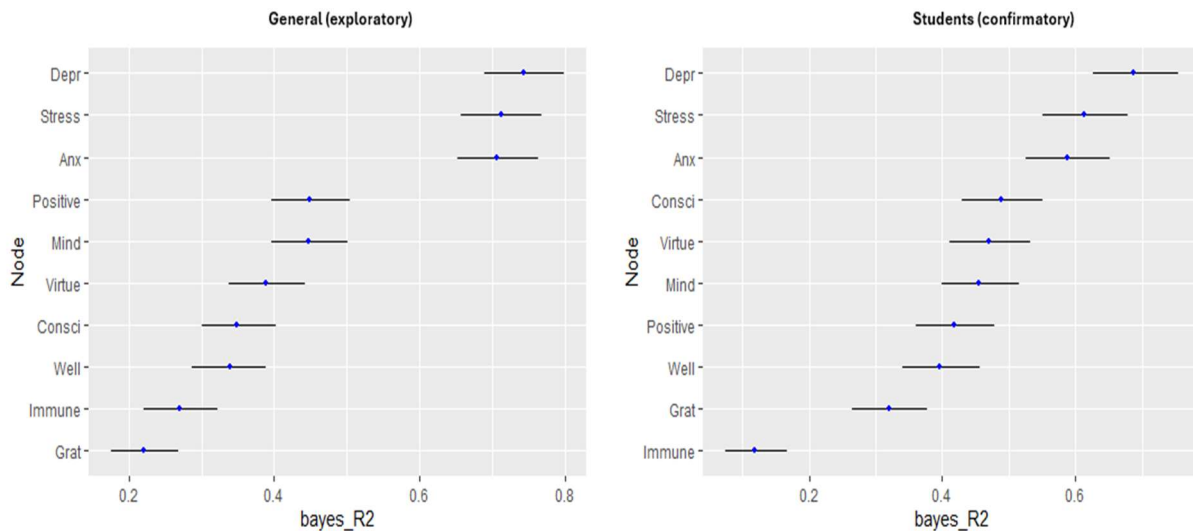
Accompanying the network plots, Figure 10 presents the predictability estimates for both the general and student network samples. These predictability estimates reflect the

predicted importance of each variable within the network, with higher Bayesian R^2 values indicating a stronger degree of influence, explaining more total variance within the network (Chalmers et al., 2022).

Overall, Figure 10 demonstrates a similar pattern across the samples, with both indicating that the distress variables (i.e., depression, anxiety, and stress) exert a large influence ($R^2 > 0.50$). In contrast, virtuous gratitude and immune health were indicated to be the least predictable target variables across both samples, indicating a small impact across network models ($R^2 = 0.12\text{--}0.32$). Moreover, virtuous conscientiousness displayed a moderate influence in both the general and student sample ($R^2 = 0.39\text{--}0.47$). The main sample difference occurs between Big Five conscientiousness and positive affect, with positive affect being more influential in the general sample and Big Five conscientiousness being more important in the student sample. Each estimate was also accompanied by a small 95% credible intervals, indicating high precision, which can be seen with the exact posterior means in Appendix C.

Figure 10

Probability Plot Showing Bayesian R² values and Standard Deviations for The Aristotelian Virtue of Conscientiousness Scale, The Multi-Component Gratitude Measure, a Big Five Conscientiousness Scale, and other Health and Well-being Related Variables.



Note. To improve interpretability, the graph excludes relationships with strength values below 0.10. Depr = Depression, Anx = Anxiety, Virtue = Virtuous Conscientiousness, Mind = Mindfulness, Positive = Positive Affect, Consci = Big Five Conscientiousness, Well = Life-Satisfaction, Immune = Immune Health, Grat = Virtuous Gratitude.

Directed Acyclic Graph Model Analyses

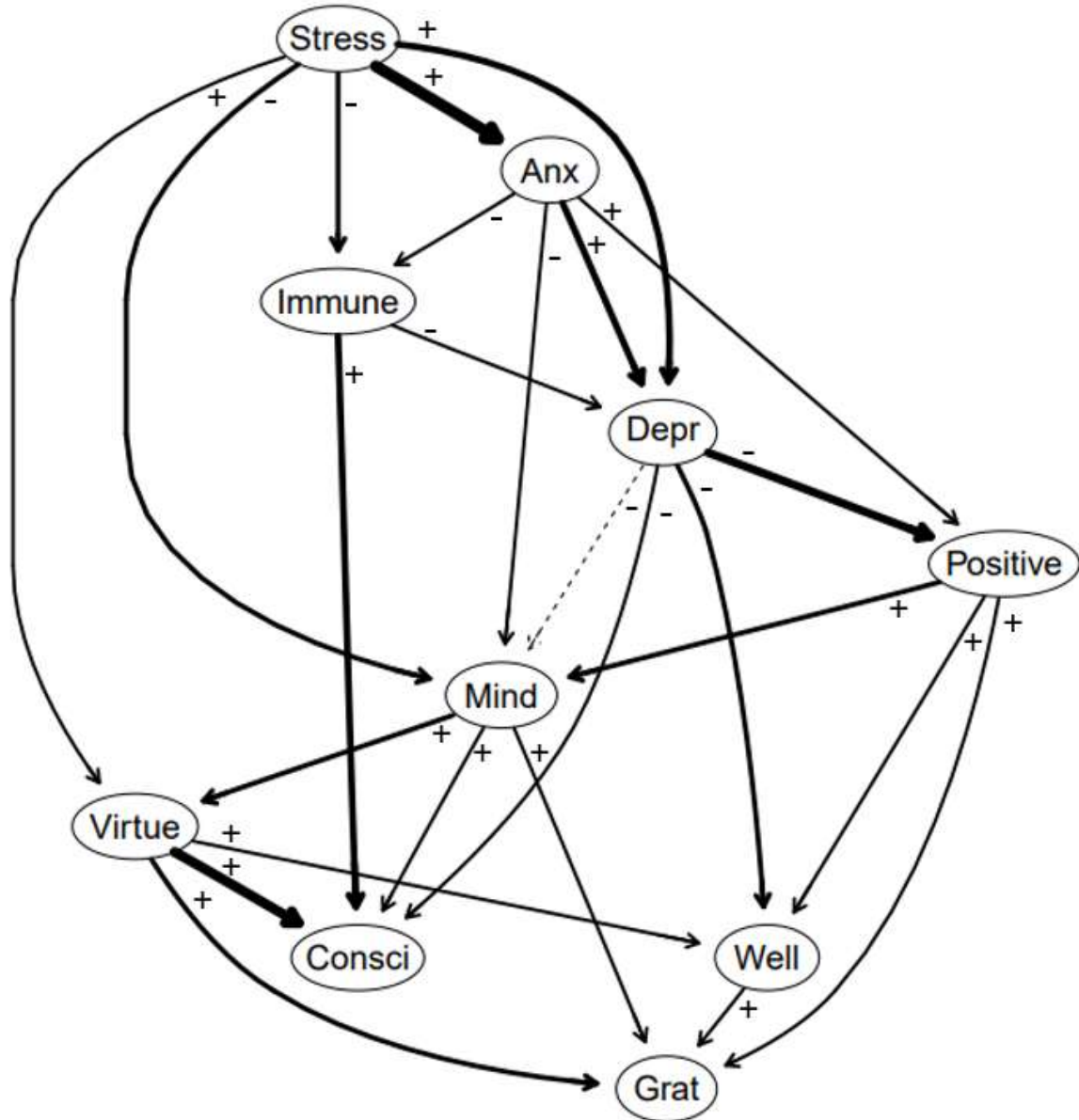
Based on the majority of confirmed cases across the exploratory (general) and confirmatory (student) samples, indicating high generalisability across target populations, the two samples were combined ($n = 1164$) to conduct a more robust directional analysis. This directional model differs from the BGGM in that it depicts probabilities of directional pathways between the variables (Heeren et al., 2021).

According to this DAG model (Figure 11), stress is estimated to be the most important ancestral node, exerting either direct or indirect influence on all other variables (Pearl, 2009). The DAG suggests that stress negatively influences health and well-being through both a direct and an indirect connection (i.e., mediated by anxiety) to immune health, with

simultaneous indirect and inverse relationships to other well-being outcomes. Importantly, positive affect serves as a buffering mediator rather than a pure ancestral node. It receives negative influences from both depression and anxiety but simultaneously exerts positive influences on well-being, mindfulness, and virtuous gratitude. This positioning suggests positive affect plays a protective role against the negative impacts of depression and anxiety on downstream well-being variables. The DAG also indicates that mindfulness functions as a mediating node, directly connecting to virtuous gratitude while also linking to life-satisfaction through virtuous conscientiousness. Furthermore, virtuous conscientiousness is indicated to be a parental node, with direct connections to life-satisfaction, Big Five conscientiousness, and virtuous gratitude. At the bottom of the network, virtuous gratitude, well-being, and Big Five conscientiousness are represented primarily as outcome variables, though they maintain some interconnections with each other.

Figure 11

Directed Acyclic Graph Models for Combined General and Student Samples.



Note. Depr = Depression, Anx = Anxiety, Virtue = Virtuous Conscientiousness, Mind = Mindfulness, Positive = Positive Affect, Consci = Big Five Conscientiousness, Well = Life-Satisfaction, Immune = Immune Health, Grat = Virtuous Gratitude.

Corresponding strength and directional probability estimates, for the connections depicted in Figure 10, can be seen in Table 13. The strength values indicate the robustness of the causal connection between two variables, with higher values suggesting a more stable relationship across the bootstrapped samples. The directional probability represents the

likelihood that a connection follows the specified causal direction, estimated across 10,000 bootstrapped iterations (Heeren et al., 2021). For example, virtuous conscientiousness strongly predicts virtuous gratitude (strength = 1.00), with a directional probability of 83%, meaning that in 8,300 of the 10,000 bootstrapped models, this relationship appeared in the same direction.

The results from Table 13 indicate that the majority of relationships were moderately to highly stable across both samples, with strength scores ranging from 0.54 to 1.00. It is worth noting that strength values of 1.00 indicate a connection that was consistently identified across all 10,000 iterations, but this does not imply a perfect correlation. Instead, it reflects a stable relationship with a credible interval not overlapping zero (Efron & Tibshirani, 1993). Alternatively, differences in directional probabilities are more varied, meaning causal assumptions may be more tentative, warranting further investigation. For example, a weaker probability estimate, of 51%, was indicated between mindfulness and Big Five conscientiousness, providing little to no evidence that mindfulness is more casually dominate in this relationship.

Table 13

Directional Strength and Directional Probability of Key Relationships in the Directed Acyclic Graph Model Between the Combined General and Student Samples

from	to	strength	direction
Virtue	Grat	1.00	0.83
Virtue	Well	1.00	0.79
Virtue	Consci	1.00	0.64
Depr	Well	1.00	0.90
Depr	Positive	1.00	0.69
Depr	Consci	0.54	0.84
Depr	Mind	0.54	0.69
Anx	Depr	1.00	0.57
Anx	Positive	0.79	0.78
Anx	Consci	0.11	0.88
Anx	Mind	0.66	0.79
Anx	Immune	0.81	0.52
Stress	Virtue	0.53	0.85
Stress	Anx	1.00	0.55
Stress	Mind	1.00	0.79
Stress	Immune	1.00	0.58
Well	Grat	0.98	0.63
Positive	Grat	0.95	0.82
Positive	Well	1.00	0.81
Positive	Mind	1.00	0.53
Mind	Virtue	0.55	0.64
Mind	Grat	0.86	0.53
Mind	Consci	1.00	0.51
Immune	Depr	0.74	0.52
Immune	Consci	1.00	0.73

Note. Depr = Depression, Anx = Anxiety, Virtue = Virtuous Conscientiousness, Mind = Mindfulness, Positive = Positive Affect, Consci = Big Five Conscientiousness, Well = Life-Satisfaction, Immune = Immune Health, Grat = Virtuous Gratitude.

Discussion

The present study investigated how virtues, within an Aristotelian framework, relate to well-being outcomes such as positive affect, life-satisfaction, psychological distress, and immune health. To explore these connections, a Bayesian network approach was employed, analysing and comparing target variables across two independent samples. This approach yielded several key findings, identifying a stable network structure with the majority of pathways confirmed across samples. The directed acyclic graph (DAG) analysis indicated that stress was the most causally dominant ancestral node, exerting an influence on all other nodes in the network. Additionally, positive affect was suggested to influence all other well-being related outcomes, whereas mindfulness was predicted to influence both the virtuous conscientiousness and virtuous gratitude, suggesting it plays a key role in character development. In both the general and student Bayesian Gaussian graphical model (BGGM) networks, and the DAG plot, virtuous conscientiousness emerged as a key positive variable, with connections to life-satisfaction, positive affect, virtuous gratitude and Big Five conscientiousness. These connections between virtuous conscientiousness and important well-being outcomes provides empirical support for the Aristotelian view that virtues are central to flourishing and that developing and exercising virtue leads to eudaimonia.

The key role of virtuous conscientiousness in well-being is suggested across both the BGGM and DAG networks. Importantly, while this study found a stronger correlation between virtuous conscientiousness and Big Five conscientiousness than previous research (e.g., McManus et al., 2024b), virtuous conscientiousness maintained independent links to positive outcomes, such as positive affect and life-satisfaction—both of which serve as protective factors against psychological distress (Diener & Chan, 2011). This suggests that while Big Five conscientiousness is a well-established predictor of life outcomes within the

Five-Factor Model, conscientiousness—when conceptualised as an Aristotelian virtue—may play an even more central role in well-being.

One possible reason for why the virtue of conscientiousness related more directly to well-being outcomes (i.e., compared to the personality conception), might be because virtues are defined by their target, with virtuous conscientiousness being directed at role-specific excellence. As a virtue, conscientiousness encompasses multiple components, with the total scale integrating behaviours, motivations, beliefs, and affective states, all directed toward excellent functioning. In contrast, Big Five conscientiousness emerged from a data-first approach, capturing a broad cluster of related traits such as diligence, organisation, and self-control. In essence, the results from this study suggest that these conceptual differences matter to well-being, indicating that possessing virtue is more important than mere personality differences, which could have implications for character research and education by directing more attention to an Aristotelian approach to virtue.

While the findings largely support the idea that virtues promote well-being, it is important to acknowledge that the pursuit of excellence can sometimes lead to maladaptive outcomes. This is evident in the weak edges connecting virtuous conscientiousness to depression in both the general and student BGGM networks. This finding is not altogether surprising, as virtuous conscientiousness does include a component capturing the vice of excess. The inclusion of this aspect is to help distinguish between high and excessively high scores—which are potentially related to adverse effects. In previous studies, this vice was referred to as “Excessive Conscientiousness” and involves prioritising one’s role-specific responsibilities over other values, such as one’s own well-being and the needs of others (McManus et al., 2024b; Author, Under Review).

Interestingly, previous research found that Excessive Conscientiousness was closely related to the other items in the Aristotelian Virtue of Conscientiousness Scale (AVCS), indicating that striving for excellence can easily go astray, leading to maladaptive behaviour. Although this is concerning, Author. (Under Review) found a possible way to mitigate this relationship. For instance, in a previous network analysis, they found an inverse connection between Acting with Awareness (i.e., a facet of mindfulness) and Excessive Conscientiousness, with simultaneous positive connections between components of the virtue, such as Practical Wisdom and Excellent Behaviour, with aspects of mindfulness—Acting with Awareness and Not Judging Internal Experiences. These results are consistent with the DAG plot in the present study, which indicates that increases in mindfulness may lead to increases in virtuous conscientiousness. Overall, the current evidence suggests that combining mindfulness and character interventions might be effective for mitigating excessive tendencies associated with the vice of excess while still promoting virtue.

Virtuous gratitude also showed direct positive links to life-satisfaction across both BGGM networks, highlighting its independent role in well-being, distinct from virtuous conscientiousness. However, virtuous gratitude's connections differed slightly between the student and general samples. In the general population BGGM, gratitude was positively linked to mindfulness, suggesting that gratitude may support present-moment awareness and reflective engagement (Brown et al., 2007). However, this connection did not emerge in the student network. Instead, in the student sample, gratitude was positively associated with both positive affect and anxiety. While the link between gratitude and positive affect is well-documented (Wood et al., 2010), its association with anxiety was unexpected.

One possible explanation for this finding is that higher levels of gratitude may lead to increased feelings of indebtedness, particularly among students who feel a strong sense of

obligation toward teachers, or others who have supported them (Tsang, 2006). This could heighten pressure to meet deadlines and succeed academically, leading to greater anxiety, and in turn, reducing levels of mindfulness. This interpretation aligns with previous research suggesting that gratitude can sometimes contribute to rumination, making individuals more aware of social expectations, guilt, and the potential consequences of failing to reciprocate kindness (Watkins et al., 2004). Interestingly, this finding brings attention to the possibility that gratitude, like other virtues, may also have a vice of excess, where an overemphasis on ‘gratitude’ leads to psychological distress. For instance, this could occur if someone directed gratitude to an abusive partner instead of trying change their relationship and so on. Thus, exploring this vice of excess represents a promising direction for future research, particularly in exploring the boundaries between virtue and excess in the experience and expression of gratitude.

Alternatively, the observed link between gratitude and anxiety may be explained by their shared association with heightened sympathetic nervous system activity (Behnke et al., 2022). Gratitude is often accompanied by positive emotions that can feel stimulating and energising (Shiota et al., 2017). As indicated in the DAG model, anxiety appears to influence gratitude indirectly via increases in positive affect, suggesting that some levels of anxiety may contribute to experiencing certain positive emotions, such as alertness and attentiveness. These subtle increases in positive affect, mediated through mild anxiety, may have a downstream effect on gratitude, as it is plausible that experiencing more intense or frequent positive emotions lead to stronger feelings of gratitude (Fredrickson, 2004).

Another unexpected result that emerged when comparing the BGGM plots was that no connection between positive affect and life satisfaction was detected in the student sample. This discrepancy may reflect meaningful differences in well-being across populations. For instance, this finding may indicate that for the general sample, which likely includes a

broader range of life stages and circumstances, positive affect plays a more central role in shaping overall life satisfaction. In contrast, university students may base their life satisfaction more heavily on academic or social outcomes, which are not always reflected in their momentary affect.

Overall, while this study primarily investigated the role of virtue in well-being, it is important to acknowledge that stress emerged as the most causally dominant variable in the DAG analysis. This finding is consistent with research demonstrating that psychological distress is a key determinant of well-being outcomes (Chalmers et al., 2025). Across both networks, stress influenced multiple pathways, contributing to anxiety, lower life satisfaction, and poorer immune health. These results align with findings by Breeze et al. (2024), who reported a consistent link between anxiety and reduced immune functioning across cultures. Similarly, depression and anxiety also played dominant roles, acting as downstream predictors of lower life satisfaction and positive affect, which supports previous research identifying them as key risk factors for reduced well-being (Barry et al., 2020; Lathabhavan & Sudevan, 2023).

However, while the DAG networks suggest that distress variables are the most influential factors in well-being, it is possible that this causal direction may shift with intentional efforts to cultivate positive traits. For example, although the networks indicate that gratitude has only a weak influence on distress, previous research suggests that gratitude interventions can actively reduce depression and anxiety through positive cognitive appraisals and emotional regulation (Wood et al., 2010; Layous et al., 2013). A similar case can be made for mindfulness, which can be deliberately cultivated through intentional practice and has been shown to mitigate stress and anxiety while promoting psychological resilience (Brown et al., 2007; Hofmann et al., 2010). At present, there is no direct evidence that interventions designed to enhance virtuous conscientiousness reduce psychological distress, but this

represents a promising direction for future research. Investigating whether virtue-based interventions can buffer against distress over time would provide valuable insights into the long-term benefits of virtue cultivation for psychological well-being. This is a particularly promising area, as the BGGM networks in this study show a potentially indirect link to protecting immune health through increased levels Big Five conscientiousness and mindfulness.

Limitations and Future Directions

As mentioned, one major limitation of the present study relates to the causal inferences. That is, while the DAG uses statistical clues to predict the direction of influence, this study still depends on cross-sectional data. For this reason, the directional results should only be used for future hypothesis generation, rather than proof of causality. Future research should thus aim to employ longitudinal designs to assess what patterns in well-being emerge over time while accounting for levels of virtue and character. Longitudinal designs are particularly important for assessing the accuracy of virtue assessments, as virtues are thought to be highly stable traits, with psychological patterns that reoccur across situations.

Moreover, while this study found a link between virtuous gratitude and conscientiousness, this does not entail that all virtues are related. It could be the case that some virtues, like courage or temperance, are not related to virtues like gratitude and conscientiousness. This is an interesting possibility, as when more virtue assessments emerge, larger networks studies can be conducted, which might help in understanding the nature of virtuous traits including which ones cluster together, and how different clusters have both shared and distinct functions. This type of future study could go a long way to advancing understanding of how different virtues relate differently to outcomes, improving efforts to improve character or certain aspects of health and well-being.

Furthermore, while this network assessed two distinctive samples, improving the generalisability of the results, it is worth noting that both samples came from New Zealand, meaning these results might not generalise to a predominantly non-Western society, or perhaps not even to a non-New Zealand-based sample. For this reason, more research needs to be done regarding how virtues present differently across different cultures, and whether the same traits relate to well-being in similar or different ways across distinct groups. This point also applies to groups within a Western context that are underrepresented. For instance, this study did not investigate character in people under 18, so the results of the present study do not necessarily generalise to this group, warranting further research.

An additional limitation of the study is its reliance on self-report in assessing character. Although self-report assessments have advantages, such as being quick and easy to administer, they also have distinctive limitations (Fowers et al., 2024). Namely, while character traits are a subset of personality traits, they differ in being more evaluative—virtues involve getting things right and possessing certain skills and knowledge. These characteristics may lend well to ability-styled questioning. This is particularly true of components assessing practical wisdom, which is considered both an independent virtue, and a part of each individual virtue). For this reason, future assessments can look at incorporating additional measurement techniques to capture more objective assessments of knowledge and behaviour. The recent Short Phronesis Measure goes some way in addressing this limitation by including some ability-styled questions. This instrument could be a useful tool for applying alongside other self-report-based scales for gaining a more comprehensive picture of character.

Lastly, while this study investigated how virtues interact with well-being outcomes, it did so using total scores to establish a broader perspective involving more variables. This approach may miss certain nuances, such as relationships that only emerge on a facet level. For this reason, future studies can investigate whether certain facets of virtues, including

gratitude and conscientiousness, uniquely contribute to certain positive outcomes associated with well-being.

Conclusion

This study explored how virtuous traits, including conscientiousness and gratitude, link to health and well-being outcomes, such as life-satisfaction, positive affect, psychological distress and immune health. This was done using a Bayesian network approach to compare target variables across two distinct samples. Overall, a stable network structure was identified, where distress variables played overarching roles in well-being, with virtues connecting to key positive outcomes, including positive affect and life-satisfaction. The results of this study indicate the virtue of conscientiousness, in particular, plays a key role, presiding over life-satisfaction, virtuous gratitude and Big Five conscientiousness. Future research can expand on these results by developing interventions, and conducting and longitudinal research, targeted at improving health and well-being.

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Chapter 8: A Network Analysis of Mindfulness and Virtuous Conscientiousness

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Chapter Introduction

This paper, submitted to the *International Journal of Applied Positive Psychology*, also used network analysis to explore how the facets of the Aristotelian Virtue of Conscientiousness Scale (AVCS) relate to facets of mindfulness, specifically to determine whether it can reduce the vice of excess while supporting other components of the virtue. We employed both an undirected Bayesian Gaussian graphical model and a directed acyclic graph model. Across both analyses, the constructs were mutually supportive, with a negative association between Acting with Awareness and Excessive Conscientiousness. The directional model further suggested that Acting with Awareness may causally reduce the vice. These findings suggest that the mindfulness–conscientiousness link warrants further investigation, particularly as a potential avenue for targeted interventions.

Abstract

Objectives: The study of virtue has important implications for well-being. This study aims to contribute to the growing body of empirical research on virtue development by examining whether mindfulness protects against excessive tendencies that are consistent with vice. We focus specifically on the virtue of conscientiousness and associated vices of excess (e.g. perfectionism and workaholism).

Method: Data from a representative New Zealand sample ($n = 662$), with a roughly equal gender distribution, were analysed using a Bayesian Gaussian graphical model and a directed acyclic graph model. These models examined interactions between mindfulness, measured by the Five Facet Mindfulness Questionnaire (FFMQ), and virtuous conscientiousness, measured by the Aristotelian Virtue of Conscientiousness Scale (AVCS).

Results: Network analysis suggested that excellent behaviours are connected to downstream cognitions and affects, suggesting that engaging in virtuous actions—particularly those tied to everyday roles—may be foundational in developing other aspects of character. A non-judgmental attitude emerged as another key factor, working through enhanced awareness to reduce excessive tendencies. Acting with awareness demonstrated a protective effect against excessive conscientiousness, while maintaining positive connections with other virtue components, particularly practical wisdom.

Conclusions: This study suggests that the development of virtue and mindfulness is mutually reinforcing, with excellent behaviours potentially serving as a catalyst for positive change. The findings highlight the importance of both behavioural practice and mindful awareness in character development, offering insights for designing interventions that promote virtue while protecting against excessive tendencies that may compromise well-being.

Keywords: Aristotelian virtues; network analysis; mindfulness; Aristotelian Virtue of Conscientiousness Scale; character assessment

According to the dominant Aristotelian account, virtues are human excellences; they are disposition to behave, think, and feel in ways that are appropriate. In this view, the virtues allow the individual to function well in society; to flourish or live a good life (*eudaimonia*), where a “good life” is interpreted as both an admirable life and one that is attractive or desirable (Snow, 2020). For instance, courage allows one to overcome fear and pursue valuable goals, temperance enables one to regulate bodily desires and thus to maintain health, and benevolence allows one to live well with others. Although we are not committed to a eudaimonistic account that defines the virtues in terms of *eudaimonia*, we accept the weaker claim that virtue and virtuous activity is often leads to subjective feelings of happiness, satisfaction, well-being, and fulfilment (Badhwar, 2014; Van Zyl 2018). In short, virtues are desirable traits, which people have good reason to cultivate in themselves and encourage in others.

So far, positive psychology has yielded important empirical findings relating to virtues, especially with the Values-in-Action (VIA) Survey (Peterson & Seligman, 2004). The VIA Survey classifies 24-character strengths according to six broader virtues, including Justice, Humanity, Courage, Temperance, Wisdom and Transcendence. According to this system, each strength represents a way of exercising one of these virtues; for instance, humility represents a way to be courageous, and leadership is a way of being just (Peterson & Seligman, 2004). Importantly, research investigating the link between VIA strengths and well-being produces compelling evidence that character strengths are related to a variety of well-being outcomes, such as life satisfaction, positive emotions, relationship quality and engagement (Green, 2022; Wagner et al., 2020; Bruna et al., 2019). Psychologists have therefore investigated various strategies for developing strengths. One promising method is Mindfulness-Based Strength Practice (MBSP; Niemiec, 2023).

Mindfulness can be described as nonjudgmental and attentive awareness of the present moment, including one's mental states and bodily sensations (Kabat-Zinn, 1990). Studies investigating mindfulness link it to a wide variety of desirable outcomes, including increases in positive emotions and decreases in depression, anxiety and stress (Bränström et al., 2012; Querstret et al., 2020; Medvedev et al., 2021). With many interventions to improve mindfulness, it is generally seen as a capacity that can be cultivated with intentional effort, leading to mindful-based practices being popular strategies for improving overall health and well-being (Michalak et al., 2020; Niemiec, 2023).

Importantly, emerging research suggests that mindfulness practice may support the development of moral character. For instance, Zhu et al. (2024) found that Mindfulness-Based Strengths Practice (MBSP) was associated with improvements in overall character development. More broadly, a meta-analysis by Berry et al. (2020) indicates that mindfulness can enhance prosocial behaviour, even when practiced independently of explicit character interventions. Additionally, Pang and Ruch (2019) propose a mutual support model, suggesting that mindfulness and character strengths may reinforce one another over time through reciprocal processes. Scholars suggest this may be because mindfulness cultivates a non-judgemental stance and a capacity to observe one's thoughts and experiences with greater clarity (Zhu et al., 2024). By reducing automatic reactivity, mindfulness may prevent the formation of unhelpful habits and support insight into one's own patterns of behaviour—mechanisms which may ultimately foster character growth.

However, while suspending judgment may be beneficial in some cases, Aristotelian theorists often regard certain forms of negative emotion—such as guilt or shame—as useful and even necessary for moral development (Hursthouse, 2001). These feelings can provide the motivational impetus for reflection and behavioural change. This idea is supported by a finding in Medvedev et al. (2021); being less judgmental toward inner experiences was

inversely related to compassion. From this perspective, mindfulness would need to be practised wisely, in ways that allow space for—rather than indiscriminately suppressing— instructive emotional responses.

Another way mindfulness could aid in character development is by preventing the underuse and overuse of strengths, thereby, facilitating their optimal use. Underuse and overuse, in VIA Survey research, refer to the idea that using strengths too much or too little in certain situations can negatively impact oneself and others (Niemi, 2023). This idea is similar to Aristotle's theory of the golden mean, where virtue lies between vices of deficiency and excess (Aristotle, ca. 350 B.C.E./2020). Moreover, although virtue and the vices of deficiency and excess cannot be equated with optimal use, underuse, and overuse, these concepts may still be similar enough for useful comparisons and for creating hypotheses about virtue development; for example, both the underuse and overuse of social intelligence have been linked to increased anxiety, suggesting that extremes in behaviour, cognitions, and emotion can be maladaptive in certain contexts (Freidlin et al., 2017).

To address issues of underuse and overuse, scholars have suggested methods like MBSP, which Niemi (2023) proposes as a potential solution. According to Niemi (2023), mindfulness fosters self-awareness and sensitivity to contextual factors like social dynamics, enabling better judgment in the use of strengths. However, while studies show MBSP can support the development of strengths, as far as we know, its impact on reducing vices of excess has not been investigated.

We are committed to a broadly Aristotelian theory of virtue that has the following features: 1. A virtue is a character trait (i.e. a reliable and stable disposition) that has a behavioural, cognitive, and emotive component. 2. The cognitive component consists of practical wisdom. 3. The virtues are conducive to human flourishing. 4. The virtues are a

“golden mean” between vices of excess and vices of defect. 5. Each virtue is aimed at a worthwhile target (or set of targets).

Despite the growing popularity of virtues in psychology, most existing assessments—including the VIA Survey—are unsuitable for examining or measuring the virtues as they are conceptualised in Aristotelian theory. One systematic review notes that many measures in psychology lack a robust theoretical foundation, having been developed without reference to any comprehensive philosophical framework despite being inspired by Aristotelian virtue theory. For instance, many studies focus mainly or even exclusively on behaviour, while omitting the centrality of practical wisdom. The VIA includes qualities that do not fit the Aristotelian framework, such as self-control and transcendence, while excluding Aristotelian virtues such as self-respect, pride, and justified anger (Van Zyl et al., 2023).

Although positive psychologists are partly addressing this limitation by measuring underuse, overuse and optimal use (e.g., McGarth et al., 2025), scholars note that most current assessments are unduly focused on behaviour (Fowers et al., 2021; Snow, 2022; Bright et al., 2014). For instancing overuse and underuse does not capture the deepness of virtues in the Aristotelian approach which sees virtue as representing a person’s core identity, involving internal components, such as appropriate motivations, reasons and emotions (Hursthouse, 2001). According to this view, virtue are not merely strengths that people may decide to employ or not. Overall, scholars see the VIA Survey as an inadequate tool for investigating Aristotelian virtue theory.

Due to the lack of theoretical grounding in positive psychology, many scholars are embracing interdisciplinary research in philosophy and psychology (e.g., Darnell et al., 2022; Morgan et al., 2017; Wright et al., 2020; Fowers et al., 2024). This development indicates the start of a more comprehensive science of virtue. Recently, new instruments have been created

that more closely align to Aristotelian theory, such as the Multi-Component Gratitude Measure (MCGM; Morgan et al., 2017) and the Aristotelian Virtue of Conscientiousness Scale (AVCS; McManus et al., 2024b), which was operationalised according to broadly Aristotelian framework, such as the one discussed by Hursthouse (2001). These instruments can be used to advance empirical approaches to assess Aristotelian virtue theory. The AVCS is particularly useful in this regard, as unlike the MCGM, it includes eight facets, with one assessing the vice of excess (hyperconscientiousness or perfectionism).

While conscientiousness was not discussed by Aristotle, the clear adaptability of the personality trait led Cawley and colleagues (2000) to call for its operationalisation as a virtue. This process involves identifying which particular form of conscientiousness is most desirable and admirable, being aimed at a worthwhile target and contributing to a flourishing life. The personality trait, as conceived in Big Five models, is too broad, for it consists of a collection of loosely related subtraits, namely Orderliness, Dutifulness, Competence, Achievement-striving, Deliberation, and Self-control (Costa et al., 1991). It is therefore unclear whether there is a core that connects these various facets into a single virtue. For instance, the core of conscientiousness cannot be self-control, which theorists consider to be a skill or corrective capacity, rather than a character trait, because it involves mediating internal conflict between reason and desire. Although self-control may facilitate virtuous activity, it can also be used in the service of bad ends (Annas, 2011).

Another idea is that conscientiousness, as a virtue, essentially concerns reliably fulfilling one's duties (Dutifulness). Thus, for example, some Kantian philosophers define conscientiousness (or, more precisely, moral conscientiousness) as a commitment to fulfilling one's moral duties. Virtue ethicists reject the view that moral conscientiousness is a virtue. Among their reasons for doing so is that they take a naturalistic approach to ethics, which rejects abstract metaphysical entities, such as moral duties (e.g., Angle, 2013; Grovier, 1972).

We argue that the virtue of conscientiousness involves a different form of dutifulness, where the duties in question are not moral duties but rather the duties one has in virtue of occupying a certain role, such as the duties that come with being a teacher or police officer (Annas, 2015). For it to be a virtue, however, dutifulness cannot take the form of blind obedience or a uncritical commitment to potentially harmful rules and regimes. For this reason, we avoid defining conscientiousness in terms of (dutiful) behaviour. Instead, we define it with reference to its target or goal, which is to achieve excellence in a worthwhile role. For example, a conscientious teacher is one who performs their role-duties in a way that allows them to promote their students' learning (McManus. et al 2024b).

The virtue of conscientiousness overlaps with certain aspects of Big Five Conscientiousness. For instance, in a teacher, both forms of conscientiousness will involve a reliable disposition to fulfil role-specific responsibilities and duties, such as show up to class on time and marking course work. However, the virtue of conscientiousness also involves practical wisdom, a form of intelligence that includes the ability to discern which ends are worthwhile and therefore to make accurate judgements about the relative importance of specific tasks. It also allows them to develop the skills needed to achieve these goals in an efficient and appropriate manner. Thus, for example, rather than merely being meticulous and organised, they are able to determine which details to pay attention to and what level of structure or order is required to fulfil their duties efficiently. The implication of this is that having conscientiousness as a virtue does not necessarily require high scores on facets of Big Five conscientiousness like Orderliness.

This conception of the virtue of conscientiousness closely aligns with the Aristotelian theory of virtue as 1) a disposition to behave, think and feel in appropriate ways and therefore as 2) requiring practical wisdom and 3) involving not only behavioural tendencies but also internal states, such as motivations, reasons, attitudes, feelings, and values (Hursthouse,

2001). This allows us to distinguish the virtue of conscientiousness from forms of conscientiousness or other traits that appear behaviourally similar. For instance, where a virtuously conscientious police officer will be motivated by a desire to keep a community safe, the ambitious one might do so to achieve status or power.

The AVCS is a particularly promising tool for measuring the virtue of conscientiousness because it is specifically designed to assess all essential components of virtue, such as appropriate behaviours, motivations, emotions, and reasoning (practical wisdom). In addition, the scale includes a facet that measures the vice of excess, an important aspect often overlooked in other virtue measures. To validate the scale, Rasch analysis—a sophisticated statistical technique—has been used to ensure it adheres to fundamental measurement principles, such as equal distance between units, measurement invariance across groups, and unidimensionality (McManus et al., 2024b; Thurstone, 1931). This validation process confirms the robustness of the AVCS as a reliable tool for measuring conscientiousness.

The validation study by McManus et al. (2024b) found that the AVCS positively correlated with life satisfaction, but also showed a weak positive correlation with anxiety. This unexpected relationship was attributed to the inclusion of the Excessive Conscientiousness facet and its shared variance with the other, more desirable facets. While virtue theorists will object to the label, given that they define virtues as idealised traits that cannot be possessed in excess—McManus et al. (2024b) use the label to refer to the vice of excess, which involves an excessive concern with achieving excellence in a given role, and could manifest in different ways: spending too much time and energy performing these duties, caring too much about doing a good job, and having inappropriately high standards. Their research showed that the Excessive Conscientiousness facet was moderately correlated

with all other AVCS facets, indicating that individuals who score highly on the virtuous aspects of conscientiousness may also be prone to excessive tendencies, potentially compromising their well-being (McManus, 2024b).

Overall, existing results suggest a complex connection between the AVCS and well-being variables. These findings align with previous research in positive psychology, which highlights the underuse, overuse, and optimal use of character strengths, as well as personality psychology's insight that extremely high scores on Big Five traits can be maladaptive (Niemic, 2023; Carter et al., 2018). The challenge, therefore, lies in understanding how to leverage the AVCS-well-being connection effectively without falling into the trap of excess. Mindfulness, with its focus on awareness and non-biased equanimity, may offer a potential solution to navigating this balance.

Although mindfulness may support character strengths, with some studies positively linking mindfulness to particular character strengths, virtues vary in their psychological structure. Empirical studies have not yet mapped how facets of mindfulness relate to facets of virtue. Moreover, this is limiting scholars' understanding of whether mindfulness could help people develop virtues by potentially helping them avoid vices of excess. To investigate this topic, the present study examines how the AVCS relates to mindfulness using network analysis.

Network analysis applies Bayesian statistics to reveal controlled correlations between variables, accounting for other variables within the network (Williams, 2021). A key advantage of this method is its ability to visually represent nomological networks, which clarify both direct and indirect relationships, enhancing data interpretability (Åkerblom et al., 2021; Costantini et al., 2015). For instance, using an undirected network analysis, Medvedev

et al. (2021) demonstrated that compassion indirectly protects against distress by fostering positive emotions.

Undirected network models, such as the Bayesian-Gaussian Graphical Model (BGGM), are particularly useful for identifying general associations among variables (Williams, 2021; Williams & Mulder, 2020). In addition, directed models like the directed acyclic graph model (DAG) incorporate logical constraints to help reason about potential causal directions (Heeren et al., 2021). These models can identify asymmetric dependencies between variables; for example, if higher scores on variable A are conditionally dependent on higher scores on variable B, but not vice versa, this pattern may suggest that variable B is more likely to influence variable A. While these tools cannot definitively establish causality, they can provide valuable probabilistic insights to inform causal hypotheses for further investigation. By applying these techniques, researchers can gain a comprehensive understanding of network associations between mindfulness facets and virtues.

Virtues are desirable and praiseworthy traits related to flourishing; however, new research indicates that higher scores on the AVCS are also related to increases in excessive tendencies connected to anxiety (McManus et al., 2024b). The purpose of this study was to use network analyses to investigate the relationship between the AVCS and mindfulness and to test whether mindfulness plays a role in mitigating potentially distressing excessive tendencies. This is an important area of research, as it helps illuminate the role of mindfulness in virtue development, which may inform interventions designed to improve character and well-being. Based on previous findings and speculations in positive psychology about mindfulness and character strengths (e.g., Zhu et al., 2024; Niemiec, 2023), we hypothesise that mindfulness will correlate with facets of the AVCS, with higher mindfulness associated with greater Practical Wisdom and Excellent Behaviours and lower Excessive Conscientiousness. Acting with awareness may help reduce excessive tendencies by

promoting more balanced decision-making. While specific evidence is limited, previous findings suggest a general link between mindfulness and the development of virtuous traits (Zhu et al., 2024). In this study, network analysis was used to further explore these relationships, focusing on the vice of excess.

Method

Participants

Through the facilitation of Qualtrics, a representative sample of seven hundred New Zealand-based participants were recruited after rigorous data screening. This included removing poor-quality responses, such as surveys completed too quickly, or ones completed by participants who failed an attention check embedded within the first ten items. Three participants were removed for missing data. Furthermore, as representation was a top priority, thirty-five participants were excluded from the dataset to maintain balanced gender quotas. This left data from 662 participants, 278 of them identifying as females and 284 identifying as male. The ages of participants ranged 18 to 90, with a mean of 46.92 ($SD = 17.94$). Region was one of the variables used to ensure the sample was representative of the population. Four hundred and forty-one participants identified as European, 79 as Māori, 58 as Pasifika, 61 as Asian, and 23 as Other. Demographic variables were not included in the network estimation, as the analysis was focused on exploring the psychological structure of AVCS and FFMQ. Ethical approval for this research was obtained from the institutional ethics committee of the authors, which adheres to the ethical guidelines outlined by the American Psychological Association (7th edition; APA, 2022). The dataset utilised in this study can be accessed via the following OSF link:

https://osf.io/p6urj/?view_only=9d4626fb24834a0e8fb19a4f817dda49

Measures

The 28-item AVCS, an eight-faceted questionnaire, was used to measure the virtue of conscientiousness. In total, the AVCS has eight facets: Responsible Behaviours, Excellent Behaviour, Concern for Others, Self-Concern, Appreciation of Excellence, Practical Wisdom, Affect and Excessive Conscientiousness (McManus et al., 2024b). While both Responsible

Behaviours and Excellent Behaviours focus on actions, they capture a key distinction between fulfilling basic duties and achieving excellence. Although meeting basic responsibilities is essential for possessing the virtue of conscientiousness, merely doing so does not make someone an excellent performer. For this reason, the Excellent Behaviours facet measures individuals' self-assessment of role-specific excellence, including whether they believe they perform their roles exceptionally well. This self-assessment, combined with questions about duty fulfilment, provides a more comprehensive evaluation of role performance than duty-related questions alone (McManus et al., 2024b).

In addition to these behavioural facets, the AVCS includes facets assessing motivations, emotions, practical wisdom, and the vice of excess (McManus et al., 2024b). Concern for Others, Self-Concern, and Appreciation of Excellence evaluate the motivations underlying one's actions, while Affect examines whether these actions are accompanied by emotions that align appropriately with the motivations and behaviours. Practical Wisdom measures participants' belief that they know what their important roles are and that they have the knowledge and skills necessary to perform them well. Finally, Excessive Conscientiousness assesses whether someone prioritises their roles and role-specific responsibilities excessively—to the point of perfection and at the cost of their own well-being (McManus et al., 2024b). Each item in this scale is positively worded for ease of interpretation, also meaning no reverse coding was necessary (McManus et al., 2024b). Responses were recorded via self-report on a five-point Likert-style scale with the labels “Disagree” (1), “*Very slightly agree*” (2), “*Moderately agree*” (3), “*Strongly agree*” (4) and “*Completely agree*” (5). As the assessment tool focuses on people's roles generally, this scale was also accomplished by a set of instructions to contextualise the items, for instance:

Instructions: Many statements below refer to personal responsibilities and duties. When answering these questions, please focus on both duties and responsibilities in relation to the roles you have. These roles may include things like your role as a student, family member, friend, worker, or citizen. Some of the statements also ask about work. Work in this survey can relate to any work associated with a particular role. Please respond by clicking how much you agree with each statement.

Overall, the reliability estimates for the total scale were strong ($\alpha = 0.93$, $\omega = 0.92$), with most individual facets displaying ranges within an acceptable range ($\alpha = 0.83-0.72$, $\omega = 0.83-0.74$). The Excessive Conscientiousness facet, however, showed a slightly lower reliability estimate ($\alpha = 0.60$, $\omega = 0.61$).

Mindfulness

Mindfulness was assessed using the short, 18-item version, of the Five Facet Mindfulness Questionnaire (FFMQ; Medvedev et al., 2018). The FFMQ is a comprehensive assessment, originally developed by Bear et al. (2006) by combining different mindfulness assessments. The Facets are labelled Acting with Awareness, Describing, Not Judging Internal Experiences, Not Reacting to Internal Experiences, and Observing.

Acting with Awareness references the tendency to act intentionally and with awareness as opposed to being on 'autopilot', whereas Describing relates to a person's ability to put their thoughts and feelings into words. Relatedly, Observing refers to paying attention to sensory and experiential stimuli, whereas Not Judging Internal Experiences is about accepting thoughts and feelings without labelling them as wrong or getting lost in negative rumination. On the other hand, Not Reacting to Internal experiences relates to noticing thoughts and feelings while having the ability to choose not to react to them, maintaining a sense of detachment (Bear et al., 2006). Responses for the FFMQ were recorded using a five-

point Likert scale, with options labelled “*Never or very rarely true*” (1), “*Rarely true*” (2), “*Sometimes true*” (3), “*Often true*” (4) and “*Very often or always*” (5). Eight FFMQ items were negatively worded and reverse-coded before analyses were conducted (Medvedev et al., 2018). The reliability estimates for the total FFMQ scale were strong ($\alpha = 0.82$, $\omega = 0.79$), with individual facets displaying estimates all within an acceptable range ($\alpha = 0.81-0.78$, $\omega = 0.81-0.79$).

Data Analyses

Prior to the network analyses, IBM SPSS Statistics v.29 was used to access the descriptive statistics, including the arithmetic mean, the mode and the median for both the AVCS and the FFMQ total and subscales. The dataset was then transferred to RStudio (RStudioTeam, 2023) to be analysed according to both BGGM and DAG network models.

Undirected Bayesian Gaussian Graphical Model

The first network model employed was the BGGM, which produces a visual image of undirected and partial correlations between the variables (Williams & Mulder, 2020). The undirected BGGM was developed to address the limitations of the frequentist lasso approach, which relies on accurate sample distributions and can lead to overfitting. To overcome this, Williams (2021) proposed a Bayesian approach that provides a measure of uncertainty through posterior probabilities and posterior distributions for each partial correlation. The BGGM package for R, developed by Williams and Mulder (2020), applies Bayesian estimation, which is nonregularised and can handle data regardless of distribution. Relationships between nodes in BGGM represent the posterior means of the associations (Rubin et al., 2021). This approach combines prior knowledge with observed data to create probability distributions, offering a robust alternative to regularized models.

One of the key advantages of BGGM over DAG is its ability to model bidirectional relationships without assuming a specific causal structure. While Bayesian DAG models also use posterior distributions to quantify uncertainty, they require directional assumptions to establish causality. BGGM, on the other hand, provides a more flexible framework, making it better suited for exploring complex networks where causality is unclear or potentially reciprocal (Heeren et al., 2021). This makes BGGM particularly useful as an exploratory tool prior to conducting DAG analyses, where it can help generate hypotheses about likely causal pathways.

Building on this Bayesian foundation, one key advantage of network analysis lies in its ability to produce posterior estimates for key parameters, such as means and standard deviations (Chiang et al., 2024). Unlike standard point estimates, posterior estimates are accompanied by credible intervals, which represent the range of values the parameter is likely to fall within (Chiang et al., 2024). This provides a more nuanced and reliable understanding of the relationships between variables. Accordingly, posterior estimates of the means and standard deviations were calculated in R Studio for each facet of both the AVCS and FFMQ, enabling a more comprehensive analysis of these scales.

Following the calculation of posterior estimates, a network analysis was conducted using the Bayesian Gaussian graphical model (BGGM). To ensure the model was interpretable, specific priors were set to avoid superfluous complexity and maintain generalisability across samples (Chiang et al., 2024). The analysis assumed that the distribution of correlations followed a normal distribution centred around a mean of zero. The standard deviation of the prior was constrained to 0.25, creating a narrower distribution and assuming that most correlations would fall within a limited range with minimal outliers. This conservative approach is particularly suited for psychological data, which is characterised by many weak or non-existent correlations and a small number of strong relationships (Chiang et

al., 2024). By incorporating these priors, the analysis was better able to highlight meaningful relationships while minimising the risk of noise from negligible correlations cluttering the model or leading to misleading interpretations. Importantly, this approach also mitigated multicollinearity by reducing overlap between highly correlated variables, making the unique contributions of each variable clearer and more interpretable (Chiang et al., 2024).

After setting these recommended priors in R Studio, the visual network image was created using the *qgraph* package (Epskamp et al., 2012). Settings were coded to visualise the variables as circular nodes, while correlations were coded as straight lines, referred to as edges. These lines were also colour-coded: blue lines represented positive relationships, while red lines depicted negative relationships. The strength of these connections was displayed as line thickness and colour density. Thinner and lighter lines symbolise weaker connections, while darker and thicker lines symbolise stronger connections.

In conducting the analysis, the *explore* function was used to calculate the controlled relationships depicted as edges in the network image. This function accounts for the variance of every variable, including the relationships between them (Yan et al., 2024). A semiparametric model with ranked likelihood was also used to model complex dependencies between variables. The BGGM was run using 5000 bootstrapped iterations to minimise uncertainty by providing robust confidence intervals (Chiang et al., 2024). Further, any correlation displaying a confidence interval that included a zero was removed from the network to prevent the presence of nonsignificant connections.

A predictability plot was also generated to assist in interpreting the network model. The predictability plot displays the amount of variability explained in each node by the direct connection it shares with others (i.e., without assuming the causal direction) (Chiang et al., 2024). The plot helps assess which variables may be the most predictable and dependent on

the general network, therefore assisting in hypothesis generation, especially regarding intervention design.

Directed Acyclic Graph Model

After performing the undirected analysis, a directed acyclic graph model (DAG) was created to assess the likely direction of causality between variables (Chiang et al., 2024). To ensure a robust model, the Hill-Climbing algorithm from the *bnlearn* package was used to run 10,000 bootstrapped iterations in R studio (Scutari, 2010). Furthermore, the *Rgraphviz* package was used to create the visual network image used for interpretation; this enabled quicker identification of key nodes, including ones serving as parental and ancestral variables, displayed higher up in the predicted chain of causality and inflicting the most influence on the overall model (Hansen et al., 2022). This model was set to depict nodes as circles and edges as arrows pointing in the predicated direction of causality.

Results

Table 14 shows the Bayesian estimates for the posterior means and standard deviations, along with the 95% credible intervals for each AVCS and FFMQ variable in the network. Unlike conventional averages, these posterior means represent model-derived estimates of a node's overall strength or influence within the network, indicating the importance of each variable in the overall model. The results indicate that the AVCS facets exhibit a more dominant influence within the network, with most facets showing moderate-to-strong posterior means ranging from 0.386 (Concern for Others) to 0.699 (Excellent Behaviours). In contrast, the Excessive Conscientiousness facet shows a lower posterior mean of 0.28, indicating a relatively weaker influence compared to other AVCS facets. The FFMQ facets display slightly weaker posterior means overall, ranging from 0.149 (Observing) to 0.350 (Acting with Awareness). Despite these differences, the standard deviations for all variables are narrow, ranging from 0.022 (Not Reacting to Inner Experiences) to 0.028 (Excellent Behaviours). These narrow deviations indicate a high level of precision across all mean scores.

Table 14

Posterior Means and Standard Deviations (SD) with 95% Upper (Cred.up) and Lower (Cred.lb) Credible Bounds for the Aristotelian Virtue of Conscientiousness Scale and Five Facet Mindfulness Questionnaire Facets

Node	Posterior mean	Posterior SD	Cred.lb	Cred.up
Excel_B	0.70	0.03	0.65	0.76
Duty	0.64	0.03	0.59	0.70
Others	0.39	0.03	0.34	0.44
Self	0.40	0.03	0.35	0.46
Excel_A	0.59	0.03	0.54	0.65
Wisdom	0.56	0.03	0.50	0.61
Affect	0.55	0.03	0.49	0.60
Excess	0.28	0.03	0.23	0.33
Observe	0.15	0.02	0.11	0.19
Act	0.35	0.03	0.30	0.40
Nonjudge	0.33	0.03	0.28	0.38
Describe	0.26	0.03	0.21	0.31
Nonreact	0.15	0.02	0.11	0.20

Note. Excel_B = Excellent Behaviours, Duty = Responsible Behaviours, Others = Concern for Others, Self = Self-Concern, Excel_A = Appreciation of Excellence, Wisdom = Practical Wisdom, Excess = Excessive Conscientiousness, Observe = Observing, Act = Acting with Awareness, Nonjudge = Not Judging Internal Experiences, Describe = Describing, Nonreact = Not Reacting to Internal Experiences.

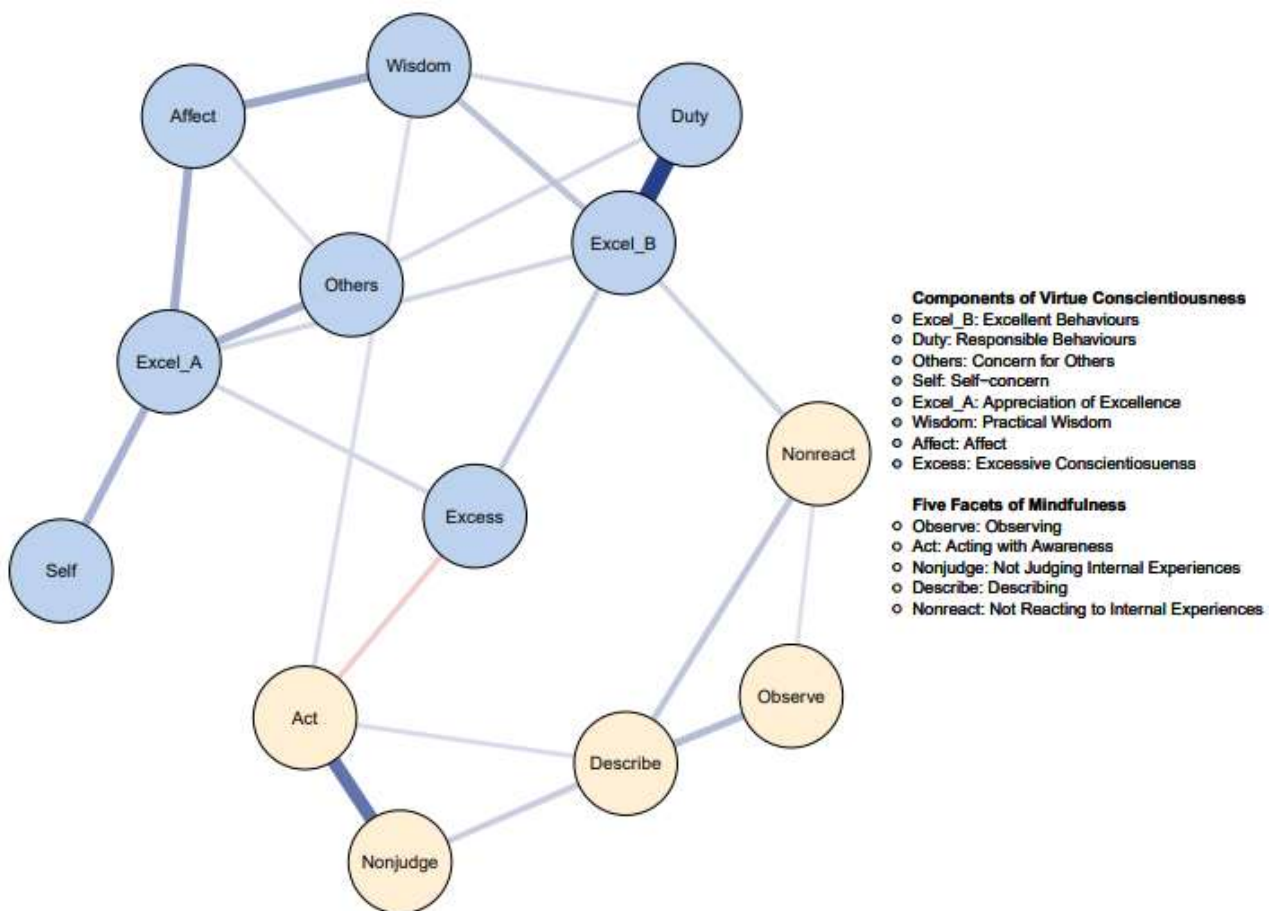
Figure 12 illustrates the controlled relationships between all AVCS and FFMQ facets, with exact correlation coefficients provided in Appendix D. While AVCS facets are linked together in various ways, Excessive Conscientiousness, Excellent Behaviours, and Practical Wisdom show direct connections to mindfulness facets. Specifically, Acting with Awareness negatively correlates with Excessive Conscientiousness ($r = -0.15$), while Excellent Behaviours positively correlates with Not Reacting to Inner Experiences ($r = 0.15$). Practical Wisdom also shows a positive correlation with Acting with Awareness ($r = 0.12$).

In addition, Excellent Behaviours emerges as a central node, with additional positive correlations to Responsible Behaviours ($r = 0.67$), Practical Wisdom ($r = 0.21$), and

Appreciation of Excellence ($r = 0.14$). Appreciation of Excellence further connects to Concern for Others ($r = 0.27$), Affect ($r = 0.29$), and Self-Concern ($r = 0.27$). Practical Wisdom is also linked to Responsible Behaviours ($r = 0.14$) and Affect ($r = 0.30$).

Figure 12

A Graphical Gaussian Model Illustrating Partial Correlations Between Facets of the Aristotelian Virtue of Conscientiousness Scale and the Five Facet Mindfulness Questionnaire.

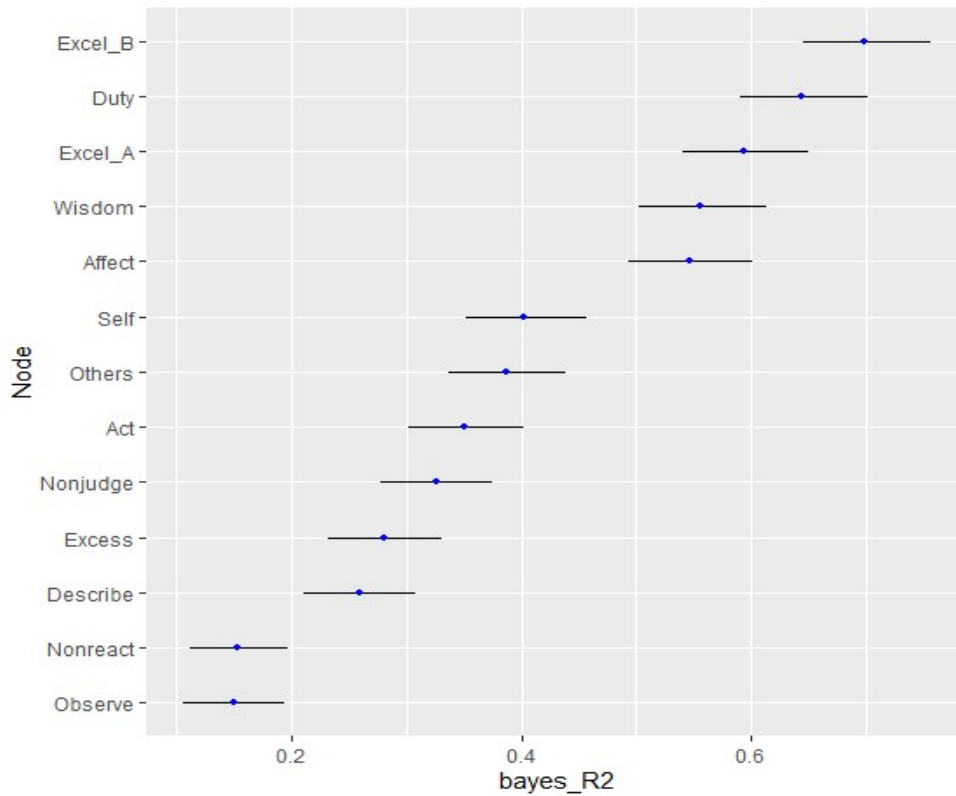


Note. Blue edges represent positive partial correlations, while red edges represent negative partial correlations. Edges that are thinner and lighter are weaker while edges that are thicker and darker are stronger.

Figure 13 illustrates the extent to which each variable is predicted by variance within the overall BGGM network model, as represented by Bayesian R^2 values, which reflect the percentage of variance explained. The Excellent Behaviours facet emerges as the most influential variable, explaining around 70% of the variance of other nodes and demonstrating the greatest ability to account for variation in the network. Generally, the AVCS facets account for more variance compared to the FFMQ facets. However, the Excessive Conscientiousness facet appears less influential than Acting with Awareness and Not Judging Internal Experiences, with Acting with Awareness being the most influential FFMQ facet. Additionally, Observing is identified as the least influential facet, explaining only 15% of the variance.

Figure 13

Probability Plot Showing Posterior Means and Standard Deviations for the Aristotelian Virtue of Conscientiousness Scale and Five Facet Mindfulness Questionnaire.



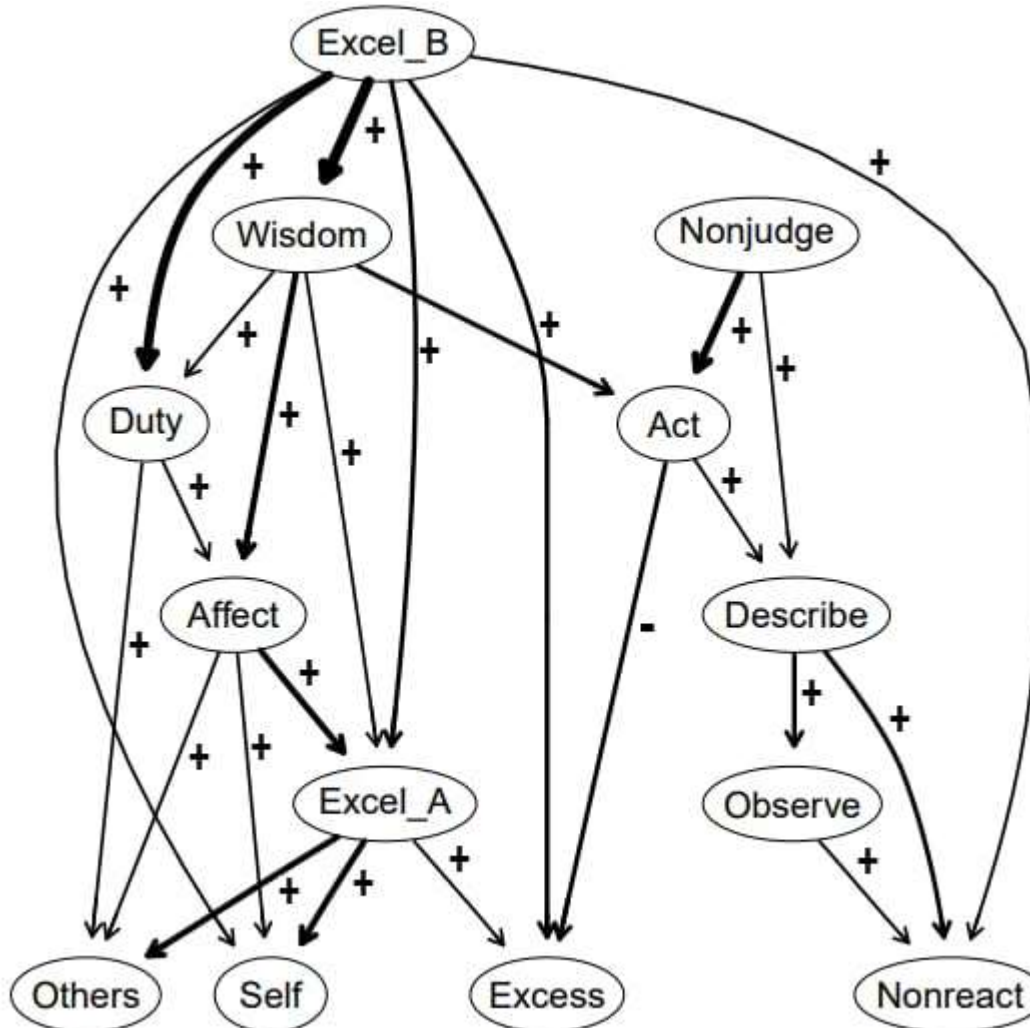
Note. The graph ignores negligible variances below 0.10. Excel_B = Excellent Behaviours, Duty = Responsible Behaviours, Others = Concern for Others, Self = Self-Concern, Excel_A = Appreciation of Excellence, Wisdom = Practical Wisdom, Excess = Excessive Conscientiousness, Observe = Observing, Act = Acting with Awareness, Nonjudge = Not Judging Internal Experiences, Describe = Describing, Nonreact = Not Reacting to Internal Experiences.

Figure 14 illustrates the DAG network, displaying the predicted directions of influence as unidirectional causal pathways between the variables. In this figure, the Excellent Behaviours facet is depicted as an ancestral node, meaning it has both direct and indirect relationships with other variables (Pearl, 2009). Notably, it exhibits either direct or indirect connections to all but one variable in the network. Excellent Behaviours is predicted to positively influence Acting with Awareness (a key node in the FFMQ), with this effect mediated by Practical Wisdom. Similarly, Not Judging Internal Experiences is identified as another ancestral node, exerting influence by reducing Excessive Conscientiousness through

reinforcing Acting with Awareness. In contrast, Concern for Others, Self-Concern, Excessive Conscientiousness, and Not Reacting to Inner Experiences are positioned at the bottom of the causal chain as outcome variables, primarily influenced by other variables in the network and exerting minimal influence themselves.

Figure 14

Directed Acyclic Graph Model of the Aristotelian Virtue of Conscientiousness Scale and Five Facet Mindfulness Questionnaire Facets.



Note. Arrows indicate the predicted direction of dependencies; darker, thicker arrows represent stronger relationships, while lighter, thinner arrows signify weaker ones. Edges depicting positive relationships are accompanied with + symbols while inverse relationships are accompanied with the - symbol. Excel_B = Excellent Behaviours, Duty = Responsible Behaviours, Others = Concern for Others, Self = Self-Concern, Excel_A = Appreciation of Excellence, Wisdom = Practical Wisdom, Excess = Excessive Conscientiousness, Observe = Observing, Act = Acting with Awareness, Nonjudge = Not Judging Internal Experiences, Describe = Describing, Nonreact = Not Reacting to Internal Experiences.

Table 15 represents the strength and directional probability of the relationships depicted in Figure 14. Unlike the BGGM coefficients, which calculate partial correlations, the strengths in this table represent the total predictive importance of one variable on another, incorporating both direct and indirect influences (Pearl, 2009). Each strength value is accompanied by a directional probability, displayed as a percentage, which indicates the likelihood of the relationship's direction. The directional probability reflects how consistently the observed direction is predicted across 10,000 bootstrapped samples (Heeren et al., 2021). For instance, Table 15 indicates that Acting with Awareness has a strong negative influence on Excessive Conscientiousness, with a directional probability of 73%. This means that in 7,300 out of 10,000 bootstrapped networks, this direction was observed. Overall, Table 15 depicts generally strong relationships (strengths ranging from 0.52 to 1.00), while directional probabilities vary from weak to strong (57% to 90%). Note that although strengths of 1.00 represent the maximum predictive importance in this context, they do not imply a perfect correlation. A strength of 1.00 means that the connection was consistently estimated as significant across all 10,000 iterations, with credible intervals that do not cross zero, reflecting a stable and reliable relationship. However, this does not necessarily imply that all connections with a strength of 1.00 are equally important in practical terms, as strength values represent the robustness of the causal connection rather than its magnitude (Efron & Tibshirani, 1993).

Table 15

Strength and Direction of Key Relationships Among the Aristotelian Virtue of Conscientiousness Scale and Five Facet Mindfulness Questionnaire Facets in the Directed Acyclic Graph Model

Arrow		Value determining arrow thickness	
From	To	Strength	Direction
Excel_B	Duty	1.00	0.62
Excel_B	Self	0.69	0.86
Excel_B	Excel_A	0.99	0.65
Excel_B	Wisdom	0.99	0.53
Excel_B	Excess	0.98	0.90
Excel_B	Nonreact	0.87	0.68
Duty	Others	0.91	0.72
Duty	Affect	0.56	0.61
Excel_A	Others	1.00	0.77
Excel_A	Self	1.00	0.86
Excel_A	Excess	0.95	0.84
Wisdom	Duty	0.95	0.57
Wisdom	Excel_A	0.66	0.58
Wisdom	Affect	1.00	0.57
Wisdom	Act	0.67	0.83
Affect	Others	0.87	0.78
Affect	Self	0.63	0.81
Affect	Excel_A	1.00	0.52
Observe	Nonreact	0.52	0.50
Act	Excess	0.93	0.73
Act	Describe	0.88	0.59
Nonjudge	Act	1.00	0.52
Nonjudge	Describe	0.91	0.56
Describe	Observe	1.00	0.53
Describe	Nonreact	1.00	0.67

Note. Excel_B = Excellent Behaviours, Duty = Responsible Behaviours, Others = Concern for Others, Self = Self-Concern, Excel_A = Appreciation of Excellence, Wisdom = Practical Wisdom, Excess = Excessive Conscientiousness, Observe = Observing, Act = Acting with Awareness, Nonjudge = Not Judging Internal Experiences, Describe = Describing, Nonreact = Not Reacting to Internal Experiences.

Discussion

This study employed a Bayesian network approach to understand how mindfulness and virtuous conscientiousness interact and potentially support one another. Our findings reveal several important insights that advance our understanding of character development. First, and perhaps most surprisingly, excellent role-specific behaviours emerged as a primary ancestral node in our network, suggesting that the actual practice of virtuous behaviours might be fundamental to character development. This finding challenges the common assumption that internal changes must precede behavioural excellence, instead suggesting that practicing excellence in our roles might serve as a catalyst for broader character development. Second, we found that a non-judgmental attitude, working through enhanced awareness, plays a crucial role in reducing excessive tendencies while maintaining positive connections with other virtue components. Third, acting with awareness demonstrated a protective effect against excessive tendencies without compromising the development of other valuable aspects of virtue, particularly practical wisdom. These findings are especially significant for the field of character development as they suggest that the relationship between mindfulness and virtue is not simply one of mindfulness supporting virtue development, but rather a complex, mutually reinforcing relationship where both practicing excellence and cultivating mindful awareness contribute to positive character development.

The inverse connection between Acting with Awareness and Excessive Conscientiousness can be observed in both the BGGM and DAG network models. According to the DAG, there is a moderate probability of 73% that this mindfulness facet causes decreases in Excessive Conscientiousness. This aligns with theoretical expectations, as greater present-moment attentive awareness may help inhibit impulsive or excessive actions (Zhu et al., 2024; Niemiec, 2023). Being more mindful may enable individuals to better differentiate between desirable and undesirable behaviours, making appropriate performance

or inhibition easier. This awareness may also help people avoid getting carried away in their actions by impulsively or mindlessly working without realising it. Acting with Awareness also may help people become more aware of when activities start hindering their health and well-being, providing them with more information and about how to balance their role-specific responsibilities with their health more effectively. In some case, fulfilling one's responsibilities may be worth small expenses to one's own health, while in other cases, it is not. This enhanced awareness may act as a protective mechanism against the extreme role commitment characteristic of the Excessive Conscientiousness facet of the AVCS.

Although the partial correlation coefficient between Acting with Awareness and Excessive Conscientiousness, as calculated by the BGGM (Figure 12), is relatively weak, it is important to note that this represents a highly controlled relationship, capturing only the direct influence between these two variables (Williams, 2021). While BGGM captures direct influences, both the BGGM and DAG display indirect causal pathways that could potentially strengthen the relationship through accumulated influence across the network (Pearl, 2009). Additionally, the DAG network, based on 10,000 bootstrapped iterations, demonstrates a highly stable relationship between Acting with Awareness and Excessive Conscientiousness, highlighting the robustness and importance of the connection within the network. These observations have significant practical implications, supporting the hypothesis that practising mindfulness, in general, while cultivating the virtue of conscientiousness, may mitigate harmful excessive tendencies.

In addition to the link between Acting with Awareness and Excessive Conscientiousness, the AVCS also connects to the FFMQ through Practical Wisdom and Excellent Behaviour. According to the DAG, for instance, these variables are strongly linked with a 67% chance of Practical Wisdom increasing Acting with Awareness. The relationship is important, as the

two variables have some conceptual similarities. For instance, in Aristotelian theory, an underlying aspect of practical wisdom is the ability to perceive situationally specific stimuli relevant to virtue (Wright et al., 2020). For instance, to express acts of kindness, one needs to perceive whether any features of a situation call for kind actions, such as noticing that a person is in need. If one lacked attentional awareness, virtue-relevant stimuli would simply go unnoticed.

In terms of the probability estimate between Practical Wisdom and Acting with Awareness, it could be that practice in performing virtuous actions leads to more general attentive awareness via the capacity to notice virtue-relevant stimuli. This could then simultaneously cause one to develop a greater general tendency to be more attentive and act with more awareness. However, it's important to note that this directional probability estimate is relatively weak, so it's likely that these facets are bidirectionally related, meaning developing either can lead to increases in the other. In this case, the exact direction of causality might also depend on context. For example, one can practice mindfulness without attempting to develop virtue, but if one practices mindfulness with the goal of improving awareness of virtue-relevant stimuli, then the direction of influence might change.

The Excellent Behaviours facet presents as an overall ancestral node for the whole network. Importantly, it is also directly connected to Not Reacting to Internal Experiences. A possible explanation for this direction of influence is that people who pursue role-specific excellence will tend to develop further skills that help them accomplish excellence; that is, by aiming to perform tasks to a high standard, they learn to disassociate from negative thoughts and feelings that can potentially undermine success. Another explanation might be that people who have the capacity to perform roles excellently are in environments or situations

that are conducive to developing further adaptive habits, making it easier for them to cultivate these behaviours.

Overall, the possible link between mindfulness and virtuous conscientiousness is consistent with prior research, such as Pang and Ruch's (2019) reciprocal model between mindfulness and character strengths. It is also consistent with research linking dispositional mindfulness to prosocial behaviour, such as the meta-analysis by (Berry et al., 2020) finding that mindfulness practice, without ethics-based concepts, increased prosocial behaviour. The results of this study also align with cross-cultural findings that mindfulness is related to traits such as moral sensitivity and moral identity (Xiao et al., 2020; Liu et al., 2023). Importantly, these results were found in Chinese populations, which place strong emphasis on role-based values (Onwurah, 2025). These findings suggest that the links between mindfulness and virtue-related traits may reflect cross-culturally resilient psychological processes, though culturally specific interpretations of virtue also warrant further examination, and more research is needed to confirm the link between mindfulness and virtue according to an Aristotelian theory.

In discussing these links between the Aristotelian Virtue of Conscientiousness Scale (AVCS) and mindfulness, it is worthwhile to note that a previous network study by Medvedev et al. (2021) found a negative link between compassion and Not Judging Internal Experiences, which is depicted as an important Ancestral node in the present study. Medvedev et al. (2021) speculate that as moral behaviour involves moral judgment, people prone to moral behaviour might be more critical of certain thoughts and feelings, including their own (e.g., see Wang et al., 2017). Inversely, decreases in a judgemental attitude could cause decreases in moral types of judgements and behaviour, including ones associated with virtue. Contrary to Medvedev et al. (2021), the present study suggests that practising virtuously conscientious behaviours may increase aspects of mindfulness, such as Acting

with Awareness and Not Reacting to Internal Experiences. For this reason, it could be the cases that practising virtue, along with mindfulness, results in enhanced capacities for both mindfulness and virtue, where judgements are applied more wisely and in ways productive to the flourishing of oneself others. Overall, the connection between how practising mindfulness alongside virtue influences the application of judgment is unclear, representing a promising topic for further research.

Limitations and Future Avenues for Research

One limitation of the present study is that it only illuminates links between general dispositional mindfulness and the AVCS, which might not fully explain how specific mindfulness practices, like Mindfulness-Based Strength Practice, help in virtue cultivation. For example, examining specific mindfulness-based practices in relation to the AVCS might reveal that some of the observed links are weaker—or even run in the opposite direction.

Moreover, as this study relies on cross-sectional data, causal direction cannot be determined with confidence (Heeren et al., 2021). While network models can suggest plausible causal pathways based on conditional dependencies, cross-sectional data are drawn from a single time point, making it difficult to rule out the influence of uncontrolled third variables. Therefore, before-and-after comparisons are needed to clarify the direction of effects. Future research should investigate AVCS scores before and after mindfulness-based interventions. Combining findings from this study with longitudinal research would provide more robust support for the idea that mindfulness can help people develop virtues while avoiding vices of excess.

The cross-sectional nature of the data also presents limitations for studying virtue, which is traditionally understood as an enduring trait that reflects a person's authentic and consistent dispositions (Hursthouse, 2001). In contrast, cross-sectional data captures

participants at a single point in time and may not accurately reflect stable patterns of behaviour, thought, and emotion. Future studies could better capture the enduring nature of virtues, such as conscientiousness, by using techniques like experience sampling, which collect repeated measures across multiple time points to assess how consistently a trait is expressed.

Additionally, demographic variables such as age, gender, and ethnicity were not included in the network analysis, as the primary aim was to explore the structural relationships between AVCS and FFMQ facets at a general psychological level. Without additional studies targeting these demographics, the results from the present study can not necessarily be generalised to non-Western groups. Moreover, there could potentially be some gender specific effects that could alter the connections of shown in the network model when applied to either solely to male or female populations. However, investigating gender differences through network comparison fell outside the scope of the present study, as it would have introduced additional complexity. While the absence of subgroup analyses limits the generalisability of the findings, future research should examine whether the network structure differs meaningfully across demographic groups. Ideally, gender-specific network models would be compared using larger subsamples to ensure stability and robustness.

Furthermore, it's important to note that this study only represents how mindfulness relates to one virtue—the virtue of conscientiousness. Additional research can, hence, investigate how other virtues, based on Aristotelian theory, relate to mindfulness. This could help create a broader and more generalisable account of how virtues relate to mindfulness. However, the current findings are also limited by the sample, which is representative only of New Zealand. Future studies could benefit from exploring more diverse populations to enhance generalisability. This research could also be pursued by using the Multi-Component

Gratitude Measure to assess how different components of this virtue relate to the FFMQ facets.

A final limitation of the present study concerns the low internal consistency of the Excessive Conscientiousness subscale ($\alpha = 0.60$), which falls below the commonly accepted threshold of 0.70. This lower reliability estimate raises concerns about measurement precision and limits the confidence with which findings related to this facet can be interpreted. Nonetheless, the facet was retained in the analysis due to its theoretical importance—capturing the vice of excess, a concept central to Aristotelian virtue theory but often neglected in existing trait-based measures. Moreover, prior research has reported higher reliability estimates for this subscale (McManus et al., 2024b), suggesting that the lower alpha observed here may be sample-specific. It is also worth noting that Cronbach's alpha is sensitive to the number of items, and the Excessive Conscientiousness subscale includes only four items, which likely contributes to the reduced estimate (Cortina, 1993). Despite this limitation, the associations involving this facet were directionally consistent with theoretical expectations and prior research (McManus et al., 2024b). Even so, findings involving this facet have been interpreted with caution. Future research should consider expanding or refining the item pool to improve internal consistency, and further studies across diverse samples will be important for assessing the reliability and generalisability of this facet.

In conclusion, this study investigated the links between the facets of the FFMQ and AVCS using both BGGM and DAG network models. This was important research because virtuous character is a central topic in the science of well-being, with many seeing the exercise and development as virtue as partly constituting human flourishing (Van Zyl et al., 2023; Kraut, 2019). Overall, mindfulness and the virtue of conscientiousness were found to be self-supporting, with positive links between Excellent Behaviours and Practical Wisdom with Acting with Awareness and Not Reacting to Internal Experiences. Acting with

Awareness was also found to be negatively related to the Excessive Conscientiousness. This is an important finding, as it suggests that mindfulness-based practices might be useful for developing virtues and avoiding vices of excess that are related to heightened distress. This research highlights the need for further investigation, particularly using longitudinal designs, into how mindfulness-based practices may help in virtue development and well-being.

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Chapter 9: General Discussion

The thesis aimed to develop a theoretical framework for understanding the virtue of conscientiousness from an Aristotelian perspective, and to test whether this account could be measured using a range of psychometric methods. These aims were intended to advance both theoretical and practical understanding of moral character and well-being, thereby contributing to the literature in philosophy and psychology and providing guidance for cultivating adaptive character traits.

The first task was to develop a coherent philosophical account of conscientiousness as a character virtue that could be included in the standard list of Aristotelian virtues, alongside virtues such as courage, temperance, and generosity. Subsequently, both Rasch analysis and confirmatory factor analysis were employed to examine whether the Aristotelian Virtue of Conscientiousness Scale (AVCS) conformed to fundamental principles of measurement, and whether a theory-driven, multifaceted model represented the data effectively. Network analysis was then used to investigate how the components of the virtue interrelate both among themselves and with desirable outcome variables. Directional networks were utilised to identify the most promising developmental pathways for cultivating the virtue.

Overall, these aims were achieved, yielding several key findings regarding conscientiousness. The first three empirical papers provided strong evidence of validity at multiple levels: overarching, item-level, structural (facet-level), and internal. Correlational analyses across three independent samples indicated meaningful associations between virtuous conscientiousness and a range of well-being variables, including life satisfaction, depression, anxiety, stress, positive emotions, gratitude, and mindfulness. The network analysis suggested important developmental processes, highlighting the role of practicing virtuous behaviour and engaging in mindfulness in cultivating the virtue of

conscientiousness. Collectively, these findings provide a foundation for future studies aimed at informing how individuals can develop their character and well-being, with potential implications for education and organisational practices.

Contributions to Theory and Research.

This thesis makes several contributions to theory and research relating to character, virtue, and conscientiousness from an Aristotelian perspective. Firstly, by providing a theoretical account of conscientiousness as a moral virtue, it makes an important contribution to the philosophical literature on character and human flourishing. It allows us to identify a form of conscientiousness that is worth cultivating, that is, that contributes to the flourishing of human beings, and that is supported by empirical studies. It thereby expands on the Aristotelian view of human flourishing and what may be required to achieve it. By situating conscientiousness within a virtue ethics framework, this work highlights how the trait differs from Big Five conscientiousness, which, at best, is a performance virtue that can be directed toward any end. By contrast, the virtue of conscientiousness is grounded in the pursuit of excellence in worthwhile roles. It also distinguishes the virtue of conscientiousness from a form that philosophers are more familiar with, namely moral conscientiousness, which involves being motivated by a sense of moral duty. As a character virtue, conscientiousness involves excellence in performing role-specific (rather than moral) duties and responsibilities.

Secondly, this work contributes to the literature in virtue science by showing that conscientiousness, understood as an Aristotelian virtue, is measurable. Given the scarcity and inadequacy of assessment tools that are grounded in an Aristotelian framework, this is a significant advancement, adding to a much-needed empirical foundation for Aristotelian moral psychology. Without such a foundation, it would remain unclear whether human psychology functions in the way Aristotle proposed, casting doubt on whether his

theory—despite its popularity among philosophers—provides a realistic framework for living a flourishing life. This research project supports the view that an Aristotelian theory of character is empirically plausible. Although a small number of researchers have developed assessment tools to measure specific virtues (Morgan et al., 2017; McLoughlan et al., 2025), this research project is entirely novel in being the first attempt to develop and validate a tool capable of assessing conscientiousness as virtue within an Aristotelian framework. It also contributes to our understanding of character traits more generally. Employing Rasch analysis, confirmatory factor analysis, and network modelling, the results support the view that character involves interactions between multiple psychological components, such as praiseworthy behaviour, affect, motivation, and cognitions, and that these components relate meaningfully to well-being outcomes such as life satisfaction and positive affect. These findings align closely with theory, suggesting that Aristotelianism offers a realistic picture of human character.

Thirdly, by investigating potential causal pathways, this work offers theoretical insight into the development of virtuous conscientiousness. The directional network analyses provide empirical support for the long-standing theory, popular among Aristotelian virtue ethicists, that virtues are cultivated through the repeated practice of virtuous behaviour (Kamtekar, 2004; DePaul, 1999). These findings lend empirical weight to a key tenet of virtue ethics: that character is not innate or fixed, but can be shaped through consistent practice over time. At the same time, the findings resonate with social learning theory in psychology (Bandura, 1986), thereby providing a conceptual bridge between philosophical accounts of character development and established psychological models of learning. In addition, the indication that mindfulness may foster desirable aspects of virtuous conscientiousness while mitigating excessive tendencies suggests a novel extension of Aristotelian theory, which has rarely considered the role of mindfulness in character

development. Together, these contributions point to promising avenues for future theoretical and empirical work on how virtues can be cultivated.

Finally, the thesis makes a broader interdisciplinary contribution by bridging philosophy and psychology. By operationalising a normative virtue-ethical construct within empirical science, it demonstrates how Aristotelian ideas can be translated into testable models, offering a template for future research on other virtues.

Practical Implications of Research Findings

Alongside its theoretical and empirical contributions, this thesis also has the potential to have a practical impact in several contexts. In educational contexts, for instance, the AVCS could be used to inform character education programmes by highlighting the importance of performing virtuous behaviours for fostering virtuous conscientiousness. Moreover, because the scale captures excessive tendencies, it can help educators and practitioners identify when behaviours, emotions, or attitudes risk becoming maladaptive, thereby avoiding one-sided or rigid interventions that undermine, rather than promote flourishing.

In organisational settings, the AVCS offers a framework for distinguishing between healthy and unhealthy forms of conscientiousness in workplace performance. By focusing on virtuous aspects such as concern for others, excellence, and practical wisdom, organisations can cultivate a form of conscientiousness that supports both productivity and employee well-being. Similarly, clinicians and counsellors may find value in assessing both virtuous and excessive forms of conscientiousness, as this dual focus may provide a more balanced picture of a person's overall character.

In addition, this research demonstrates how Rasch analysis can be used to improve the accuracy of conscientiousness measurements, by converting raw ordinal scores into interval-level data. This has important practical implications for researchers and practitioners, as it enables more accurate comparisons between individuals and groups, and provides a reliable basis for tracking change over time, thereby enhancing the suitability of the AVCS for use in both applied and research contexts.

Finally, the findings of the network analyses suggest that interventions designed to improve mindfulness may support the cultivation of virtuous conscientiousness while at the same time protecting against the vice of excess. This points to promising applications in well-being programmes, where integrating character development with mindfulness-based practices could strengthen adaptive habits. More broadly, by linking virtuous conscientiousness with flourishing outcomes such as life satisfaction, positive affect, and gratitude, the research conducted for this thesis supports the practical relevance of character research for public health, education, and organisational life.

Validation and Internal Structure

In terms of structural validity, Rasch analysis indicates that the AVCS conforms to fundamental measurement principles (Thurstone, 1931), while confirmatory factor analysis supports an eight-factor model as a good representation of the data. Taken together, these results suggest that the AVCS captures a unified construct that can be assessed on a single scale, while also containing distinctive components. This combination is advantageous because the general construct can be measured more precisely with ordinal-to-interval conversions, while facet-level analyses remain meaningful. The ability to assess both total and facet-level scores enhances flexibility: it allows for parsimonious studies, such as those presented in Chapter 7, while also enabling more targeted analyses of individual components,

as in Chapter 8. In addition, the Rasch analysis indicated that the AVCS, as a total scale, has excellent reliability ($PSI = 0.88$), meaning it can reliably differentiate between individuals with different levels of virtuous conscientiousness. Rasch also indicated that the scale has no significant floor or ceiling effects, suggesting that the scale is suitable for assessing the full range of virtue in the population (Medvedev & Krägeloh, 2022).

Complementing the CFA and Rasch analyses, the results from the network analysis (Chapter 6) contributed findings that are useful for revealing the internal structure of virtuous conscientiousness, indicating how each facet of the AVCS is related through controlled correlations. This study added to previous findings, suggesting that Excellent Behaviours is the most important ancestral node, showing both direct and indirect connections to every other facet of the AVCS. The directed acyclic graph model, in particular, indicated that this facet might be the most causally dominant facet in the network. Alternatively, out of the motivational facets, Appreciation of Excellence was indicated to be the most influential, with connections to the motivations, such as Concern for Others and Self-Concern. However, Excellent Behaviours and Appreciation of Excellence were the only facets that were predicted to cause increases in the Excessive Conscientiousness Facet, suggesting that striving for excellence may be related to both the virtue and the vice of excess.

One potential criticism of the validation process used here is that the AVCS includes the Excessive Conscientiousness facet alongside the other items designed to measure the virtue. Some may argue that this potentially merges conceptually distinct constructs. Virtues are excellences, and by definition, one cannot possess too much of an excellence. From an Aristotelian perspective, the vices of excess and deficiency are not a matter of having too much or too little virtue but are distinct traits altogether (Aristotle, ca. 350 B.C.E./2020). For this reason, theorists may argue that the psychological content of virtues and vices differs qualitatively. For example, courage is guided by practical wisdom, enabling individuals to

judge which risks are worth facing and how to manage fear for the sake of a good end (Russell, 2009). Recklessness, by contrast, involves a lack of such wisdom: the reckless person may drive rapidly through a hazardous area for a thrill rather than for any sound reason. This suggests that virtues and vices differ not only in degree but also in their underlying values, emotions, and motivations.

While this is a reasonable conceptual concern, the approach taken here reflects the psychological reality that few people display fully developed virtues; instead, most exhibit mixtures of adaptive and maladaptive tendencies. Christian Miller's extensive research supports this view, showing that people typically possess "mixed traits" that combine both virtuous and vicious elements (Miller, 2017). From this perspective, including the Excessive Conscientiousness facet does not imply that it is a matter of having "too much" virtue, but recognises that rigid, or maladaptive aspects of (the personality trait of) conscientiousness commonly co-occur with more positive aspects. Empirically, treating these tendencies within the same measure provides a fuller picture of how conscientiousness operates in the general population and allows us to explore both its beneficial and harmful expressions. Future research may even develop an expanded measure of excess to assess whether conscientiousness corresponds to multiple distinct vices, and to examine which of these co-occur most closely with the desirable aspects of the virtue.

Overall, the validation studies provide meaningful contributions to understanding the nature of the virtue of conscientiousness. Notably, the network analysis of the internal structure of the virtue suggests that being motivated by an appreciation for excellence and performing excellent behaviours may also place one at risk of developing excessive tendencies. This finding is particularly interesting, as it indicates that certain vices may share overlapping motivational structures with the virtue itself. This suggests that a concern for excellence must be cultivated carefully and balanced with attention to one's health and well-

being. Taken together, our results suggest that the AVCS can be employed at both the facet level and the total score level, depending on the specific aims of future research.

The AVCS and Desirable Outcomes

Taken together, our network studies reveal meaningful correlations with important outcomes and highlight potential developmental pathways. Specifically, the total-score network indicates that virtuous conscientiousness is directly associated with virtuous gratitude, positive emotions, life satisfaction, and Big Five conscientiousness. These associations were also reproduced in a more homogeneous student sample, lending support for the generalisability of our findings.

Although further research is needed, these results provide preliminary support for a connection between virtue and flourishing. Critics may object that we cannot take certain emotional states and cognitive judgments as indicative of flourishing, given that flourishing is best understood as a way of living rather than being a collection of positive emotions and evaluative beliefs (Kraut, 2009). This is a fair point. However, the consistent associations between virtuous conscientiousness, virtuous gratitude, well-being correlates, and Big Five conscientiousness suggest that the AVCS captures something adaptive. People who report greater life satisfaction also tend to show stronger character strengths and other indicators of healthy functioning (Bruna et al., 2019; Proctor et al., 2018). Moreover, virtuous gratitude can be viewed, not just as an occurrent emotional state but as a functional excellence and as a constituent of flourishing itself. Overall, the pattern of findings points toward virtuous conscientiousness being positively connected to outcomes that are widely valued and accepted as markers of psychological adaptivity, a concept closely aligned with flourishing. For these reasons, the evidence weighs in favour of a link between virtuous conscientiousness and flourishing, but without reducing flourishing to a collection of emotions and beliefs.

In terms of virtue development, the studies in this thesis are limited with respect to the strength of evidence they can provide, given that they rely on cross-sectional designs rather than longitudinal or intervention-based methods (Heeren et al., 2021). Nevertheless, the network analyses do generate testable predictions that can guide future research. For example, the negative association between Acting with Awareness and Excessive Conscientiousness, especially as indicated in our directional analysis, suggests that mindfulness interventions can help foster the virtue while protecting against the corresponding vice of excess. This finding is valuable because it offers preliminary empirical hints, rather than relying solely on theory, for identifying promising avenues of intervention. While such predictions are not foolproof, prioritising interventions with stronger empirical grounding increases the likelihood of advancing knowledge efficiently, while reducing wasted effort on less promising approaches.

Overall, the network analyses contribute meaningful results that may guide future well-being research. They not only support the connection between virtuous conscientiousness and flourishing, but also highlight promising developmental pathways that future research can pursue.

Paradoxical Well-being Findings

A paradoxical finding from the Rasch and Confirmatory Factor Analysis studies was the unexpected positive correlation between anxiety and life satisfaction ($r = 0.36$). This finding contrasts with the typically negative association reported in the literature (e.g., Ghazwin et al., 2016).

One possible explanation is that the present sample does not reflect a purely clinical population, and therefore variation in anxiety may not correspond directly to dysfunction. Rather than representing uniformly pathological anxiety, the observed variation includes a

substantial proportion of scores within the moderate range, which, relative to clinical populations, may still occur within otherwise functional individuals. Consequently, the relationship between anxiety and life satisfaction may reflect a sample-specific effect. In this sample, higher levels of anxiety may have been associated with other positive affective states, such as anticipatory excitement or achievement motivation. This type of affective pattern may be more likely in samples characterised by generally functional populations. For example, MTurk users may be comparatively motivated or goal-oriented, which could produce a subgroup of individuals who report both higher anxiety and higher life satisfaction.

Second, the result may have been influenced by a measurement ordering effect. In the initial study, the Excessive Conscientiousness items appeared prior to the life satisfaction measure. These items may have primed highly driven or anxious participants to reflect on their achievements and responsibilities, potentially inflating subsequent life satisfaction responses. To address this possibility, the ordering of items was altered in later samples, and the positive correlation did not reoccur.

The unexpected relationship observed between anxiety and life satisfaction supports the need for further research into the conditions under which these variables may covary. One promising direction would be a systematic review or meta-analysis examining correlations between life satisfaction and the Depression, Anxiety, and Stress dimensions across diverse samples. Such work could clarify whether the present finding reflects a sample-specific anomaly or whether certain populations, such as anxious high achievers, may report relatively high life satisfaction despite elevated anxiety.

Conceptual Limitations and Potential Harm

In Chapter 2, virtuous conscientiousness was distinguished from a purely performative form of conscientiousness, which more closely resembles the form that is

measured by Big Five Scales. One key difference is that a performance virtue is largely instrumental: it is a skill (*techne*) that can be directed toward any end, including harmful or selfish ones (Dunne, 2022). By contrast, virtuous conscientiousness is a character virtue, because it involves pursuing worthwhile roles. However, the AVCS does not measure or assess whether individuals are, indeed, pursuing roles that are worthwhile. This raises the concern that the scale captures a form of conscientiousness that leans closer to a performance virtue than a character virtue.

While this is a fair concern, the AVCS goes some way toward addressing this aspect of the virtue. For instance, the AVCS asks participants to reflect on their important roles, and whether they are motivated by goods that are objectively worthwhile, such as the well-being of others and their own happiness. These features suggest that the scale is oriented toward measuring a character virtue. Clearly, any attempt to assess or measure the value of roles in a short self-report measure would be methodologically problematic, given that what counts as a worthwhile role will depend on a range of factors, including the individual's particular skills, attitudes and interests. It would also be ethically objectionable. For these reasons, the AVCS emphasises other core aspects of the virtue, while leaving the evaluation of role value for future research. Such work might require the development of complementary reasoning-based assessments, better suited to capturing this more complex dimension of the virtue.

Despite this limitation, preliminary qualitative data (see Appendix E), where participants were asked to describe the roles they value, indicate that many emphasise roles connected to family or society. This aligns with Aristotle's claim that virtues enable human beings to flourish as social animals, and possibly indicates that people are generally capable of recognising worthwhile goals and roles, consistent with the function of practical wisdom concerned with identifying valuable ends. However, it is unclear whether they are equally adept at determining the means to realise these goals. Decisions such as choosing a career

path require evaluating how particular options align with one's skills, abilities, and broader conception of a good life, which reflects the function of practical wisdom directed at achieving those ends. Future research could therefore focus on assessing this aspect of conscientiousness more directly, perhaps through ability tests or expanded qualitative analyses.

Social Stigma and Blame

One point discussed in Chapter 3 concerns the importance of avoiding stigma or blame when evaluating a person's character. This point is worth reiterating here, since there are potential harms in labelling individuals as either virtuous or vicious. Such labels can easily come across as overly judgmental, given that character traits are regarded as features for which people can be held accountable (Thompson, 2018). This concern should not be dismissed. It is entirely plausible that labelling someone in these ways could shape how they are treated by others, potentially even influencing their access to opportunities and resources.

This concern should be taken seriously when assessing individuals, and judgmental labels should mostly be avoided. In evaluating character, it is also important to recognise the powerful influence of circumstances and environments on people's traits and behaviours. One implication is that the ultimate aim of character research may not be to evaluate individuals, but to apply and extend findings to wider systems, such as education, with the goal of fostering traits like virtuous conscientiousness while reducing harmful, excessive tendencies. From this broader perspective, evaluation can be directed toward the quality of social systems and institutions, rather than falling solely on the individual.

Other Limitations and Future Research

As discussed in Chapters 4 to 8, several recurring limitations apply to this project as a whole. Instead of repeating these here I will briefly discuss the most important limitations.

First, all samples were drawn from participants in New Zealand and the United States. While using three samples increases confidence in the generalisability of the findings, the results cannot be assumed to extend to non-Western populations. Future research should therefore consider translating the AVCS and analysing data from a wider range of cultural contexts. Such work might also investigate whether virtuous conscientiousness manifests differently, or is understood differently, across cultures, potentially leading to the development of culturally specific assessments.

Another limitation is that, although promising results have been found regarding virtuous conscientiousness, the same kind of multidimensional structure may not emerge in assessments designed to measure more traditional virtues, such as courage and justice. It is also possible that different virtues relate to well-being outcomes in distinct ways, which means we cannot generalise the relationships observed with the AVCS to other virtues. To address this limitation, future studies should focus on developing assessments for additional virtues, particularly to investigate them in combination with virtuous conscientiousness, phronesis, and virtuous gratitude.

Another major limitation of the present empirical studies is their reliance on self-reports and cross-sectional data. While these approaches are the most appropriate starting point for new research, future studies need to examine whether these traits can also be observed in behavioural research, and whether high scores predict distinct patterns of behaviour across relevant situations. In addition, researchers could employ alternative methods, such as ability-style assessments or qualitative approaches, alongside self-report measures to establish greater confidence in the validity of the findings.

Finally, these studies have employed a general measure of conscientiousness as a virtue. While this is useful for establishing an overarching picture, it may be limited because

it requires participants to summarise their performance across multiple roles, even though they may prioritise some roles and perform them well while performing others less effectively. As a result, this general measure may not be as precise as intended. To address this limitation, future research could develop and validate role-specific measures of conscientiousness, such as for particular occupations. A more domain-specific measure could also improve precision by allowing more concrete behavioural questions that are easier for participants to answer. It would be particularly interesting to examine whether the same underlying structure emerges across different roles, and whether certain motivations, such as Concern for Others or Self-Concern, play a stronger role in some contexts than in others.

Conclusion

Overall, this project contributes to the literature in psychology and philosophy by offering a theoretical account of the virtue of conscientiousness supported by empirical evidence indicating that it is a measurable construct and that it is linked to important well-being outcomes. This research indicates that virtuous conscientiousness comprises eight distinct facets organised under a second-order latent trait. Among these, Excellent Behaviours appear especially influential, suggesting a promising target for interventions aimed at strengthening the virtue. Rasch analyses further indicate that the AVCS captures the full construct without ceiling or floor effects, and without differential item functioning across age or gender, thereby supporting its measurement quality and generalisability. Virtuous conscientiousness also shows positive associations with life satisfaction, positive affect, Big Five conscientiousness, mindfulness, and virtuous gratitude. By contrast, Excessive Conscientiousness is associated with depression, anxiety, and stress. Taken together, these suggest that it is worth learning how to improve virtuous conscientiousness while reducing the vices, and that future work in these areas has the potential to help people become happier and live better lives.

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Appendix A

The Aristotelian Virtue of Conscientiousness Scale (AVCS) **

Many statements below refer to personal responsibilities and duties. When answering these questions, please focus on both duties and responsibilities in relation to the roles you have. These roles may include things like your role as a family member, friend, worker, or citizen. Some of the statements also ask about work. Work in this survey can relate to any work associated with a particular role. Please respond by clicking how much you agree with each statement.

1 - Disagree 2 – Very slightly agree 3 – Moderately agree 4 – Strongly Agree 5 – Completely agree

Responsible Behaviours

1. I finish my work on time.
2. I fulfil my role-specific responsibilities.
3. I fulfil my duties.
4. I fulfil my commitments to others.

Excellent Behaviours

5. I perform my roles excellently.
6. I'm good at prioritising my responsibilities.
7. I complete role-specific responsibilities to an excellent standard.

Concern for Others

8. Caring about others influences how I prioritise my responsibilities.
9. My concern for others motivates me to perform roles well.
10. Consideration of others motivates me to fulfil my responsibilities.

Self-Concern

11. My concern for my own well-being motivates me to do my work.
12. Concern for my future influences how I prioritise my responsibilities.
13. Concern for my own well-being motivates me to complete work to a high standard.

Appreciation of Excellence

14. An appreciation of excellence motivates me to do my work.
15. My desire to perform important roles to an excellent standard influences how I prioritise my responsibilities.
16. My appreciation of a job well done motivates me to perform roles to the best of my ability.

Practical Wisdom

17. I know how to fulfil my role-specific responsibilities.
18. I have the skills needed to perform my roles excellently.
19. I understand what my important roles require of me.
20. I have thought about what my important roles are.

Appropriate Emotions

21. I enjoy completing important tasks to a high standard.
22. I find it rewarding to fulfil my duties.
23. I feel good when I prioritise important responsibilities over things that are less important.
24. I am happy to fulfil role-specific duties.

Excessive Conscientiousness

25. I prioritise my personal responsibilities over the needs of others.
 26. I prioritise role-specific responsibilities over my health.
 27. People tell me that I work too much.
 28. I feel the need to make everything perfect.
-

Appendix B

Table 1 displays the partial correlation coefficients, represented in the network image, between the related facets of the AVCS. According to this table, Responsible Behaviours and Excellent Behaviours share the strongest correlation, while Excellent Behaviours and Excessive Conscientiousness only share a weak connection.

Supplemental Table 1

Correlations between pairs of related AVCS facets, including the standard deviation of these relationships.

	Excel_B	Duty	Others	Self	Excel_A	Wisdom	Affect
Duty	0.68						
Others	ns	0.13					
Self	ns	ns	ns				
Excel_A	0.14	ns	0.27	0.27			
Wisdom	0.23	0.14	ns	ns	ns		
Affect	ns	ns	0.14	ns	0.29	0.32	
Excess	0.13	ns	ns	ns	0.15	ns	ns

Note. Excell_B = Excellent Behaviours, Duty = Responsible Behaviours, Others = Concern for Others, Self = Self-Concern, Excell_A = Appreciation of Excellence. Wisdom = Practical Wisdom, Excess = Excessive Conscientiousness; ns=none-significant.

Appendix C

Supplemental Table 2

Partial Correlations Between the Aristotelian Virtue of Conscientiousness Scale, the Multi-Component Gratitude Measure, a Big Five Conscientiousness Scale, and other Health and Well-being Related Variables depicted in the Exploratory Graphical Gaussian Model

	Virtue	Grat	Depr	Anx	Stress	Well	Positive	Consci	Mind
Grat	0.20								
Depr	0.13	ns							
Anx	ns	ns	0.40						
Stress	ns	ns	0.41	0.42					
Well	0.14	0.11	-.23	0.12	ns				
Positive	0.23	ns	-.30	0.11	0.11	0.21			
Consci	0.42	ns	ns	-.12	ns	ns	ns		
Mind	ns	0.12	ns	ns	-.19	ns	0.27	0.14	
Immune	ns	ns	ns	-.22	ns	ns	ns	ns	ns

Note. To improve interpretability, the graph excludes relationships with strength values below 0.10. Depr = Depression, Anx = Anxiety, Virtue = Virtuous Conscientiousness, Mind = Mindfulness, Positive = Positive Affect, Consci = Big Five Conscientiousness, Well = Life-Satisfaction, Immune = Immune Health, Grat = Virtuous Gratitude.

Supplemental Table 3

Partial Correlations Between the Aristotelian Virtue of Conscientiousness Scale, the Multi-Component Gratitude Measure, a Big Five Conscientiousness Scale, and other Health and Well-being Related Variables depicted in the Confirmatory Graphical Gaussian Model

	Virtue	Grat	Depr	Anx	Stress	Well	Positive	Consci	Mind
Grat	0.26								
Depr	0.09	ns							
Anx	ns	ns	0.35						
Stress	ns	ns	0.34	0.37					
Well	0.09	0.17	-.29	ns	0.04				
Positive	0.12	0.17	-.28	0.13	ns	0.07			
Consci	0.49	ns	ns	-.04	ns	ns	0.1		
Mind	ns	ns	ns	-.10	ns	ns	0.15	0.19	
Immune	ns	ns	ns	-.13	ns	ns	ns	ns	ns

Note. To improve interpretability, the graph excludes relationships with strength values below 0.10. Depr = Depression, Anx = Anxiety, Virtue = Virtuous Conscientiousness, Mind = Mindfulness, Positive = Positive Affect, Consci = Big Five Conscientiousness, Well = Life-Satisfaction, Immune = Immune Health, Grat = Virtuous Gratitude.

Supplemental Table 4

Exploratory Sample Posterior Means and Standard Deviations (SD) with 95% Upper (Cred.up) and Lower (Cred.lb) Credible Bounds for the Aristotelian Virtue of Conscientiousness Scale, the Multi-Component Gratitude Measure, a Big Five Conscientiousness Scale, and other Health and Well-being Related Variables

Node	Posterior Mean	Posterior SD	Cred.lb	Cred.up
Virtue	0.39	0.03	0.34	0.44
Grat	0.22	0.02	0.18	0.27
Depr	0.74	0.03	0.69	0.80
Anx	0.71	0.03	0.65	0.76
Stress	0.71	0.03	0.66	0.77
Well	0.34	0.03	0.29	0.39
Positive	0.45	0.03	0.4	0.50
Consci	0.35	0.03	0.3	0.40
Mind	0.45	0.03	0.4	0.50
Immune	0.27	0.03	0.22	0.32

Note. To improve interpretability, the graph excludes relationships with strength values below 0.10. Depr = Depression, Anx = Anxiety, Virtue = Virtuous Conscientiousness, Mind = Mindfulness, Positive = Positive Affect, Consci = Big Five Conscientiousness, Well = Life-Satisfaction, Immune = Immune Health, Grat = Virtuous Gratitude.

Supplemental Table 5

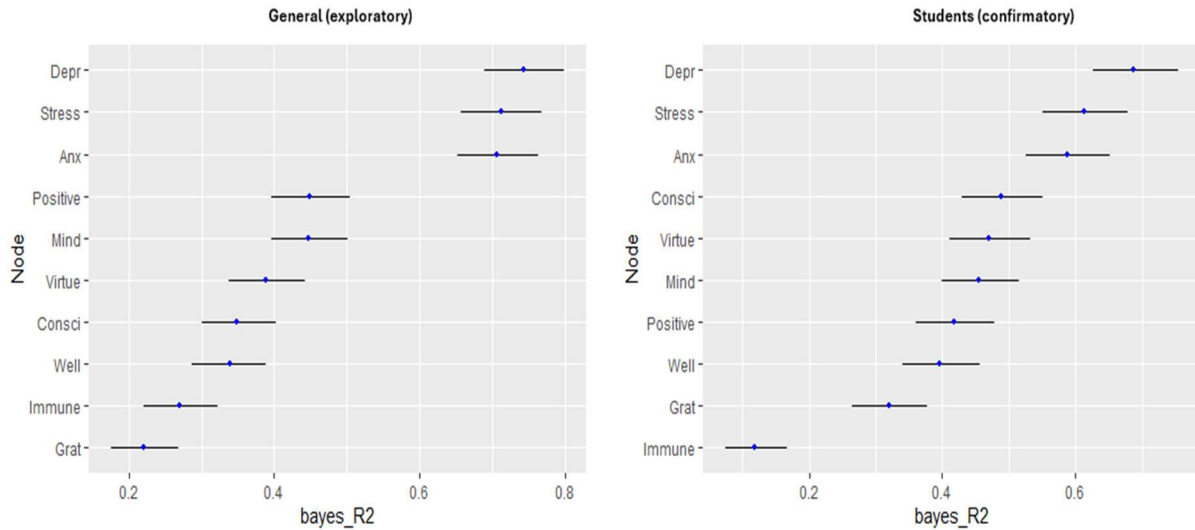
Confirmatory Sample Posterior Means and Standard Deviations (SD) with 95% Upper (Cred.up) and Lower (Cred.lb) Credible Bounds for the Aristotelian Virtue of Conscientiousness Scale, the Multi-Component Gratitude Measure, a Big Five Conscientiousness Scale, and other Health and Well-being Related Variables

Node	Posterior mean	Posterior SD	Cred.lb	Cred.ub
Virtue	0.47	0.03	0.41	0.53
Grat	0.32	0.03	0.27	0.38
Depr	0.69	0.03	0.63	0.75
Anx	0.59	0.03	0.53	0.65
Stress	0.61	0.03	0.55	0.68
Well	0.40	0.03	0.34	0.46
Positive	0.42	0.03	0.36	0.48
Consci	0.49	0.03	0.43	0.55
Mind	0.46	0.03	0.4	0.52
Immune	0.12	0.02	0.07	0.16

Note. To improve interpretability, the graph excludes relationships with strength values below 0.10. Depr = Depression, Anx = Anxiety, Virtue = Virtuous Conscientiousness, Mind = Mindfulness, Positive = Positive Affect, Consci = Big Five Conscientiousness, Well = Life-Satisfaction, Immune = Immune Health, Grat = Virtuous Gratitude.

Supplemental Figure 1.

Probability Plot Showing Bayesian R² values and Standard Deviations for The Aristotelian Virtue of Conscientiousness Scale, The Multi-Component Gratitude Measure, a Big Five Conscientiousness Scale, and other Health and Well-being Related Variables.



Note. To improve interpretability, the graph excludes relationships with strength values below 0.10. Depr = Depression, Anx = Anxiety, Virtue = Virtuous Conscientiousness, Mind = Mindfulness, Positive = Positive Affect, Consci = Big Five Conscientiousness, Well = Life-Satisfaction, Immune = Immune Health, Grat = Virtuous Gratitude.

Appendix D

Supplemental Table 6

Partial Correlations from a BGGM Network Model Between Facets of the Aristotelian Virtue of Conscientiousness Scale and the Five Facet Mindfulness Questionnaire

	Duty	Others	Self	Excel A	Wisdom	Affect	Excess	Observe	Act	Nonjudge	Describe	Nonreact	
Excel_B	0.67			0.14	0.21		0.17					0.15	
Duty		0.14			0.14								
Others	0.14			0.27		0.12							
Self				0.27									
Excel_A		0.27	0.27			0.29	0.14						
Wisdom	0.14					0.3			0.12				
Affect		0.12		0.29	0.3								
Excess				0.14						-0.15			
Observe											-0.11	0.23	0.11
Act					0.12		-0.15				0.48	0.12	
Nonjudge									-0.11	0.48		0.17	
Describe								0.23	0.12	0.17			0.2

Note. Excel_B = Excellent Behaviours, Duty = Responsible Behaviours, Others = Concern for Others, Self = Self-Concern, Excel_A = Appreciation of Excellence, Wisdom = Practical Wisdom, Excess = Excessive Conscientiousness, Observe = Observing, Act = Acting with Awareness, Nonjudge = Not Judging Internal Experiences, Describe = Describing, Nonreact = Not Reacting to Internal Experiences.

Appendix E

Supplemental Table 7

Qualitative data showing which roles people think are important to do well

Role Description
Please give an example of one role that you think is important to do well?
be an excellent parent to your kid/kids if you are a parent
The role of being a mother.
I am a very attentive and caring son, I remember birthdays and buy thoughtful gifts, cook and clean and care take, and listen and spend time with my parents.
It is important to be a good provider for the family.
A negotiator.
business management roll.
It is important to be a good friend.
The role of a teacher is important for doing well.
My job in Histology.
I think one role that is important to do well is the role of being a spouse.
In my roll at work as a senior manager
I am always wanted to be best in my work.
It is important to be a good uncle.
Replying promptly to emails.
Help raise my grandson
Taking care of my birds.
I think being a parent is a role that one should do very well.
good husband and father
My role as a mother is the most important role for me to do well.
The role of a Christian
Being a good worker at my workplace.
It is important to do my job well
A father of two kids, it is my responsibility to give my kids as much as I can so that they don't have deal with the things that I had to deal with as a child. Everything ranging from financial to emotional support.
I am the only person in the household that currently brings in income. I need to work hard to support my family and let my son have the things that I didn't have as a child. If I didn't do well then I would fail my family. I would feel a lot of shame. Therefore, there is no other option but to do the best that I can and give my family a stable life.
Being a good employee who does good work and cares about my co-workers.
Meal Preparing
One role I think is important to do well is the role of a parent.
You should always be friendly and generous to your neighbors and those in your neighborhood.
I think being a good person is an important role to do well in.
I think it's most important to be a good mother to my child and try my hardest to do more.
Creativity & Innovation: I have the ability to generate fresh ideas that can solve complex problems and improve your organization's productivity and effectiveness. I have the skill to execute on these ideas optimally and also ensure that they support your organization's mission and vision. Organizational Awareness: I have the ability to understand how your organization works at a micro and macro level. I also have the ability to connect individual roles and responsibilities to your organization's mission and vision,

which means I know what really matters as such I plan and execute my duties accordingly. Inspirational Vision: I have the ability to see your organization 's true potential and how the current people, finance and capital resources can be leveraged to achieve that vision. This ability makes it easy for me to influence the people around me positively through my unquestionably integrity and accountability.

One of the most important roles in life is to make sure to keep as close to a monetary budget as possible.
my self work.

Leadership

My job as a manager.

Organization of the household and preparation for all needs during the week.

Being a father is a good example of a role that is very important to do well in my opinion.

Worker role

I think it is supremely important to be a good parent.

“Chef” or cook comes to mind, as this is being responsible for someones' enjoyment and not making them sick with food poisoning.

Helping people find answers to problems quickly.

reputation

Being a daughter.

Worker role.

It's important that one be able to do their job well in order to earn a paycheck, such that they can fulfill whatever life responsibilities they have, whether it be paying for a household, raising a family or just having money to enjoy themselves once in awhile.

Being a good significant other.

Taking care of my elderly mom.

Being a caregiver you need to help them.

Being socially responsible is one of the top roles I feel is important to do well. By this I mean making sure we do everything to the best of our ability and leaving what we started or where we are in a better condition than how it was.

The role that comes to my mind is the one that I perform while at my place of employment.

A role that is important to do well is being a good parent.

To provide for my family making sure they have everything they need.

On being punctual and discipline at everything that we are doing.

Caregiver to my ill mother in law.

It is important to support my family and friends in whatever way I can.

One role that I think is important to do well is to be the father to my son and daughter as well as be the boyfriend to my girlfriend.

Reputation

overall I would have to say that financials is important to do well

work balace

career advancement

Career Advancement and work Balance

being able to take care of one's childrens

being a mom

The role that is most on my mind and gradually taking over most of my time is the role of eldest daughter to a mom with quickly worsening dementia. She and I are very close but it's getting difficult to maintain that bond because she increasingly can't understand what's going on when I talk to her about something but she does notice that I don't confide in her the way I once did and doesn't realize why. I am also having to imanage what she can and cannot do and balance her happiness with her safety. It's a tough role that's getting harder by the day.

problem solving

Being a good friend is important to do well.

I think it is important to be a good parent, and to perform this role well.

Being a good parent to your children.

Being able to be a loyal, trustworthy friend.

I think the role of parent is important to do well.

I think it is important to keep promises to all parties including family and work.

I think it is important to do well on your responsibilities.

My role as a boy friend/partner.

Being able to provide for your family and make sure they are safe and secure.

Earn enough money to be totally independent.

Care for disabled mother

Being there for your friends.

I work in the shipping/transportation industry, and I think it's very important to be accurate. This means loading things accurately without breaking them, and delivering/picking up items accurately without making any mistakes.

good to be well

I think I am a good friend. I am always there for them and I feel I have quite a few close friends.

The role of leader. I'm a project manager so leadership ability is very important to how well I do my job.

My role as an employee, and my level of performance is critical to me. I am single and without children, so I am able to prioritize this easily.

Achievement-striving

Helping and protecting my aging parents.

Your role as a worker whether for yourself or someone else.

I think a role that is extremely important to do is to take care of one's family. It is one of the most important things in life and too many times we prioritize work over them, which can be an easy to do since work is what allows us to live and thrive but we need to find a happy medium so that everyone in our life that we care about gets the attention they need. I think this is the most important thing or role that one can aspire to do, well that is if you have a family.

being a brother is important because as an older brother my sisters rely on me to do certain things like specific chores and when they get scared they turn to me to protect them sometimes it is a thankless job but others you feel the love.

Motivation and enthusiasm, Initiative, Organisation and planning.

Being a good friend

I'm confident that I can bring this type of success to this position. I am confident that I am a good fit for this position for several reasons, but most specifically because of my dedication to going above and beyond in a job. I am committed to learning any new skills on my own to succeed in this role.

Innovative and Excellent Work Ethic

I think it is important to be a good citizen, not so much a patriot, but a member of a community, active in your country.

The role which is very important for me is based on work. I work as an engineer because it is my passion so I think it is very important. I do very well in that work. I always work hard for winning the project. It can't be replace.

Being a good example for others.

Communication skills. Enthusiasm and passion. Flexibility. Initiative
reputation career advancement and work balance

A role that it really important to do well is you're parenting role.

teaching my young kids life skills, like how to cook and do their own laundry.

Enthusiasm and passion

it's important to be self-aware and recognize what motivates you.

Being a great mother to my son

Work hard and help family and friends

I am the machine operator on a pipe laying crew.

My role as a brother.

I just want to achieve my company targets and to be good leader to my peers

My work role is important to do well.

Having a positive mind set is needed to do well.

I am retired from the workforce and a homemaker while my husband still works.

reputation

being a parent

My role as a daughter who is caretaker to elderly parent

Leadership

In my work I got Senior Manager it is very important role in my life.

System Administrator

Customer service it's important to business.

I need to be a good and helpful son, especially in the past 18 months or so as my mom had chemo and radiation treatments for cancer and she still feels bad a lot.

Being a parent.

It's important to do my role as an employee well.

I think it is probably most important to be a reliable partner and provide financially. This sometimes means putting work first so that as a couple we don't have to stress over money. It also means being there emotionally when it's needed.

To live happier and peaceful life

career advancement and work balance

I prioritise my health over my work

I think that it is important to be a good parent..

financial analyst

I prefer to prioritise my family over work

Being the oldest out of my siblings it is important to be a good role model for my younger brothers and sister.

The most important role I have currently is providing support for my sister.

the important character is the story.

I think that being a mother is very important to do well.

Taking care of the family, especially the kids, is the most important in my opinion. Guiding them to a brighter future is the job that we as a parent have responsibility to do.

The role of a good employee.

The role of being a good husband.

career advancement and work balance.

Speech true, actions true, behavior true.

have self discipline and self control

I work in customer service. One role I play is to always approach the customer's with a caring personality. I think this is very important to do well.

Self Employed

creating and developing ideas.

Being a father

Being an effective manager at my workplace.

creative process and developed ideas.

being a caring friend to others

My role as a homemaker.

My role as a bread earner of the family.

Versatility of being able to do a variety of tasks. Being able to work virtually. Having a forward-thinking, supportive company that realizes employees are their greatest asset. Working collaboratively with people for successful outcomes

In terms of my roles, I think it's important to do my job as a teacher well.

Parenthood.

I think being a mother or caretaker is very important because in times of sickness, those we love can't take care of themselves very well.

The company wants to discover how you can help and what you'll be able to accomplish if you were to be hired. For most positions other than entry-level jobs, the ideal candidate brings experience, skills, and qualifications to the role.

Do on to others as you want done on to you.

well i need to be a good husband to my wife

Team member at work

To be truthful and honest

self development

Being a father.

I think I'm a good pet owner.

Versatility of being able to do a variety of tasks. Being able to work virtually. Having a forward-thinking, supportive company that realizes employees are their greatest asset. Working collaboratively with people for successful outcomes.

Versatility of being able to do a variety of tasks. being able to work virtually. having a forward-thinking, supportive company that realizes employees are their greatest asset. working collaboratively with people for successful outcomes.

Being a parent is the most important role I can think of.

As a family member It's my duty to support my family whenever necessary.

being a good girlfriend and perform the sexual duties.

I think keeping promises and obligations is an important ideal to uphold.

I think the most important role is one as a friend

HANDLING GROUP COMMUNICATION

One role that is important to be is to be a good daughter. Being there for my parents as they get older and allowing them to rely on me more for help is something I want to do well at. For all that my parents have done for me, I should pay them back for their help and be there for them so they don't have to worry about things.

Operating my business is a role where I feel that I should do well.

I work as a manager in my office. It is very important for me and it is my pleasure to work in this role. Iam very glad that i can afford me whatever i want. I work I really admire my talents and many persons is working under me.

i must work perfect finish

A role that you should do well is taking care of yourself and the people you love.

i work hard for my future

One role that is important to do well is the role of child.

Supervisor

The role of a responsible father

Being a good parent to my children

Well being work of the main role in the hardwork

I think the role of a teacher is important to perform well.

Fatherhood

I think being a parent is a role that is important for me to do well in.

One role that I think I do well is my ability to manage time effectively.

Being a good community leader in my church

Honestly, my job is a big role in my life that is important for me to do well.

I think that it's very important to be a good parent.

Taking care of my physically disabled parents.

parent roll is most important.

The role of being a dedicated colleague within the org.

Being the caretaker of my family

Linux systems programmer

Good family member

Leadership/management skills.

Being a contributing member of the team

Leadership skill - Leadership skills are skills you use when organizing other people to reach a shared goal.

Whether you're in a management position or leading a project, leadership skills require you to motivate others to complete a series of tasks, often according to a schedule.

My job as a Market Research Analyst is a role that I think is absolutely important to do well in.

Taking care of customers.

Role of a father

Note. This data was collected from our US sample. Incomplete and unclear responses were removed ($n = 194$).

Appendix F



THE UNIVERSITY OF
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Te Whare Wānanga o Waikato

Co-Authorship Form

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This form is to accompany the submission of any PhD that contains research reported in published or unpublished co-authored work. **Please include one copy of this form for each co-authored work.** Completed forms should be included in your appendices for all the copies of your thesis submitted for examination and library deposit (including digital deposit).

Please indicate the chapter/section/pages of this thesis that are extracted from a co-authored work and give the title and publication details or details of submission of the co-authored work.

Chapter 2: The virtue of conscientiousness: Bridging the gaps between psychology and philosophy.

Nature of contribution
by PhD candidate

Determined the structure and content of the manuscript and drafted the first version;
revised the manuscript in light of the reviewers' feedback.

Extent of contribution
by PhD candidate (%)

60

CO-AUTHORS

Name	Nature of Contribution
Liezl van Zyl	Helped refine the argument and formulations.

Certification by Co-Authors

The undersigned hereby certify that:

- ❖ the above statement correctly reflects the nature and extent of the PhD candidate's contribution to this work, and the nature of the contribution of each of the co-authors; and
- ❖ that the candidate wrote all or the majority of the text.

Name	Signature	Date
James McManus		28.08.2025
Liezl van Zyl		28.08.2025



THE UNIVERSITY OF
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Please indicate the chapter/section/pages of this thesis that are extracted from a co-authored work and give the title and publication details or details of submission of the co-authored work.

Chapter 3: Measuring virtue: An Aristotelian perspective on advancing positive psychology.

Nature of contribution
by PhD candidate

Determined the structure and content of the manuscript and drafted the first version;
revised the manuscript in light of the reviewers' feedback.

Extent of contribution
by PhD candidate (%)

80

CO-AUTHORS

Name	Nature of Contribution
Liezl van Zyl	Helped refine the arguments and formulations.
Oleg Medvedev	Helped refine and edit the manuscript. Gave advice about statistical methodology.
Dan Weijers	Helped refine and edit the manuscript and helped to come up with the ideas.

Certification by Co-Authors

The undersigned hereby certify that:

- ❖ the above statement correctly reflects the nature and extent of the PhD candidate's contribution to this work, and the nature of the contribution of each of the co-authors; and
- ❖ that the candidate wrote all or the majority of the text.

Name	Signature	Date
James McManus		28.08.2025
Oleg Medvedev		28.08.2025
Liezl van Zyl		28.08.2025
Dan Weijers		28.08.2025



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Chapter 4: Development and validation of the aristotelian virtue of conscientiousness scale using Rasch methodology.

Nature of contribution
by PhD candidate

Determined the structure and content of the manuscript and drafted the first version; revised the manuscript in light of the reviewers' feedback. Conducted data analysis.

Extent of contribution
by PhD candidate (%)

80

CO-AUTHORS

Name	Nature of Contribution
Liezl van Zyl	Helped refine the arguments and formulations.
Oleg Medvedev	Helped refine and edit the manuscript. Helped conduct data analysis.
Dan Weijers	Helped refine and edit the manuscript and helped to come up with the ideas.

Certification by Co-Authors

The undersigned hereby certify that:

- ❖ the above statement correctly reflects the nature and extent of the PhD candidate's contribution to this work, and the nature of the contribution of each of the co-authors; and
- ❖ that the candidate wrote all or the majority of the text.

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James McManus		28.08.2025
Oleg Medvedev		28.08.2025
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Chapter 5: Validation of the Aristotelian virtue of conscientiousness scale using confirmatory factor analysis.

Nature of contribution
by PhD candidate

Determined the structure and content of the manuscript and drafted the first version; revised the manuscript in light of the reviewers' feedback. Conducted data analysis.

Extent of contribution
by PhD candidate (%)

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Chapter 6: The virtue of conscientiousness: A Bayesian network approach.

Nature of contribution
by PhD candidate

Determined the structure and content of the manuscript and drafted the first version;
revised the manuscript in light of the reviewers' feedback. Conducted data analysis.

Extent of contribution
by PhD candidate (%)

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CO-AUTHORS

Name	Nature of Contribution
Liezl van Zyl	Helped refine the arguments and formulations. Helped respond to reviewers' feedback.
Oleg Medvedev	Helped refine and edit the manuscript. Helped conduct data analysis.
Dan Weijers	Helped refine and edit the manuscript and helped to come up with the ideas.
Quoc Cuong Truong	Helped with data collection and helped to refine and edit the manuscript.

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Chapter 7: A Bayesian Network Approach to Virtues and Well-Being.

Nature of contribution
by PhD candidate

Determined the structure and content of the manuscript and drafted the first version;
revised the manuscript in light of the reviewers' feedback. Conducted data analysis.

Extent of contribution
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Chapter 8: A Network Analysis of Mindfulness and Virtuous Conscientiousness.

Nature of contribution
by PhD candidate

Determined the structure and content of the manuscript and drafted the first version;
revised the manuscript in light of the reviewers' feedback. Conducted data analysis.

Extent of contribution
by PhD candidate (%)

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