REVIEW ARTICLE

How Personality Matters for Education Research

Hayley K. Jach[1] · Lisa Bardach[1] · Kou Murayama[1,2]

Abstract

The field of personality psychology could contribute to the aims of educational research, but several misconceptions may hold back this synthesis. We address three "misconceptions" about personality psychology that are surprisingly pervasive outside of that field: that there are personality types, that personality is fixed, and that the existence of personality implies that situations are unimportant. We then cover four ways that personality psychology can assist educational aims: personality can be used to (1) boost our ability to accurately predict educational outcomes, (2) inform educational interventions, (3) support the academic development of all learners in personalised learning interventions, and (4) be employed as target outcomes for education. In the process, we show how personality relates to important educational outcomes, outline theoretical links with educationally relevant concepts like socio-emotional skills, and include an overview of current personality scales that can be used when getting started. Through this paper, we hope to stimulate and enthuse researchers to advance synthesis between the disciplines.

Keywords Personality · Individual differences · Interdisciplinarity · Multidisciplinary

Introduction

The modern study of education investigates how best to support students to achieve their full academic potential and engage in life-long learning, to become good citizens in their local and global society, and to develop resilience and reduce the concerning increase in mental health issues observed in adolescence (Bor et al., 2014; Kieling et al., 2011). For these aims, educational researchers are increasingly

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✉ Hayley K. Jach
  hayleyjach@gmail.com

1   Hector Institute for Education Sciences & Psychology, University of Tübingen, Europastraße 6, 72072 Tübingen, Germany

2   Kochi University of Technology, 185 Miyanokuchi, Tosayamada, Kami-shi, Kochi 782-8502, Japan

embracing tools, methods, and practices of diverse disciplines such as computer science (e.g. Goldberg et al., 2021), neuroscience (Howard-Jones, 2010), cognitive science (Reif, 2008), social psychology (Verkuyten & Thijs, 2013), sociology (Jansen et al., 2022), and positive psychology (Seligman et al., 2009). The interdisciplinary mindset offered by fields such as these can spark new ideas, generate hypotheses, and provide access to methods that had not previously been possible.

The purpose of the current article is to show that personality psychology (John et al., 2008) can also contribute to educational science. The integration of personality psychology into education research is particularly timely and useful given an increasing focus on acknowledging and accommodating individual differences in students' learning and development (Zhang et al., 2020). Yet, from our perspective, educational science and personality psychology have yet to be fully integrated. Indeed, we identified only one review paper summarising the connections between personality and education in depth, and this was published nearly three decades ago (De Raad & Schouwenburg, 1996). We suspect that one reason for the lack of integration could be several lingering misconceptions about personality psychology from outside of this field, such as the misconception that people generally conform to a personality "type", or the misconception that personality is fixed and unmalleable. Given that many education researchers do not have a psychology background, or may not have studied personality psychology specifically, these misconceptions may be held by educational researchers and educational professionals. Therefore, in the current article, after providing a short primer on personality and traits, we first "bust these myths" that we believe are relatively prevalent about personality psychology, and subsequently describe in detail four reasons that personality matters for education research.

Personality: A Primer

Researchers can investigate personality at (at least) three levels of analysis. These include *life narratives* (participants' self-defining stories and descriptions of their life trajectory), *characteristic adaptations* (e.g. motives, strategies, values, and goals), and *personality traits* (characteristic patterns of thoughts, feelings, and behaviours manifest in isomorphic situations); details of these components and comparisons between them can be found in several theoretical frameworks (DeYoung, 2015; McAdams & Pals, 2006; Roberts & Wood, 2006). Given space considerations, we leave discussion of integration between education research and life narratives/characteristic adaptations to future research and centre our focus on personality traits.

Educational researchers who have some familiarity with personality psychology may have heard of the Big Five Model of personality traits and its factors *openness to experience* (describing variance in imagination, creativity, intellect, and aesthetic appreciation), *conscientiousness* (describing variance in work ethic, goal-directedness, and appreciation of order), *extraversion* (describing variance in sociability, enthusiasm, and assertiveness), *agreeableness* (describing variance in prosocial tendencies, compassion, and politeness), and *neuroticism* (describing

variance in negative emotionality and anxious/depressive tendencies; see John et al., 2008, for a review). It may then be natural to assume that *personality traits* only refer to these five traits. But although many personality psychologists employ the Big Five as a key assessment tool, personality is not just the Big Five. Almost any dimension of individual difference in regularities of affect, behaviour, or cognition can count as a personality trait; according to this definition, then, many thousands of traits may be investigated. To select a few examples that are relevant in an educational context:

- Need for cognition (Cacioppo & Petty, 1982) and the related trait typical intellectual engagement (Goff & Ackerman, 1992) each describe the tendency to enjoy thinking in depth about topics, and many studies have considered how either trait impacts academic effort, interest, and achievement (Chamorro-Premuzic et al., 2006; von Stumm et al., 2011)
- Self-esteem, the subjective assessment of one's own worth as a person (Rosenberg, 1979), is an important predictor of one's success and wellbeing, including educational attainment (Orth et al., 2018; Orth & Robins, 2014).
- Vocational interests describe the tendency to enjoy forms of activities (e.g. artistic interests or enterprising interests; Holland, 1997) and trait preferences for classes of interests predict important life outcomes. For example, one study found that interests reported by high school students predicted work, relationships, and health outcomes assessed 10 years later (Stoll et al., 2017).
- Ethnic-racial identity captures individuals' beliefs and feelings about their ethnicity or race, including their exploration of these beliefs and feelings (Rivas-Drake et al., 2014; in European contexts also referred to as cultural heritage identity, e.g. Juang et al., 2020). The construction of an ethnic-racial identity is considered a crucial developmental milestone, especially for minority children and youth (e.g. Rivas-Drake et al., 2014).

Given plentiful individual scales, why do many personality researchers focus their efforts on the Big Five? One reason is that it reduces redundancy in research. When traits are only studied in isolation, multiple studies may be performed on the same or very similar traits that only differ in their label. This practice can forestall communication as the same trait is being studied despite the different labels (i.e. the Jangle fallacy; Kelly, 1927), thus making it challenging to synthesise knowledge and build cumulatively from prior research (John et al., 2008). The Big Five is useful as a shared language that reduces this redundancy.

The Big Five traits emerged from a bottom-up factor-analytic process lasting roughly sixty years (Allport & Allport, 1921; Allport & Odbert, 1936; Costa & McCrae, 1992; Fiske, 1949; see John & Srivastava, 1999, for a review). Like other descriptive models of personality, the Big Five model is hierarchical, meaning that more fine-grained traits (called *facets;* e.g. being hardworking, punctual, or orderly) can be "located" below a Big Five trait (i.e. conscientiousness). Facets are an important part of personality psychology, allowing researchers to leverage the fidelity (i.e. higher predictive power for specific outcomes) of narrow measures while also retaining the bandwidth (i.e. generalisability) of a broad measure. Studies have

found, for example, differing effects of facets in their relation to elements of well-being (Anglim et al., 2020), or intelligence (Anglim et al., 2022; DeYoung, 2020; Kretzschmar et al., 2018).

The Big Five can also provide an organising framework to locate many personality traits identified outside of the Big Five tradition (Bainbridge et al., 2022). For example, the traits need for cognition and typical intellectual engagement described earlier can be considered facets of openness to experience, and the educationally popular trait *grit* can be located within conscientiousness, highly overlapping with its *perseverance* facet (Duckworth et al., 2007; Schmidt et al., 2018; Spielmann et al., 2022).

Of course, not all individual personality traits can be easily located under one Big Five trait or across several (though see Bainbridge et al., 2022, who found that most traits assessed could fit within the Big Five framework at least as well as other established Big Five facets). Moreover, individual traits may provide incremental variance over Big Five traits (e.g. vocational interests and some academic outcomes; Stoll et al., 2017). Finally, it is important to acknowledge that the majority of research exploring the factor structure of the Big Five was performed in WEIRD (Western, Educated, Industrialised, Rich, and Democratic) nations. Although there is evidence that the Big Five factor structure is broadly similar across countries (Kajonius & Giolla, 2017; Schmitt et al., 2007) and has some support for cultural metric invariance, a recent systematic review found little support for stricter forms of measurement invariance, suggesting that the scales may be measured differently across cultures (Dong & Dumas, 2020). A lack of measurement invariance may indicate translation errors, cultural differences in response biases and differences in self-presentation motives, the cultural specificity of items, or sampling errors which restrict the extent to which a specific sample is representative for the respective culture from which it was drawn (e.g. van de Vijver & Tanzer, 2004; for examples, see Achaa-Amankwaa et al., 2021). There is thus more work necessary to explore which of these factors may be driving reported invariance and to develop versions of the Big Five that can be considered equivalent across cultures.

Taken together, while the Big Five is not perfect (see also Ashton & Lee, 2007) and should not be the only choice to assess any and every personality trait, it is a useful framework because it draws on a century of incremental scientific evidence, summarises the broad dimensions on which many people differ, shows how facets are located within these dimensions, and, as we discuss in the following section, has substantial predictive power for a vast swathe of life outcomes. For these reasons, the Big Five is the framing with which we discuss personality traits in the context of this article. To further orient readers unfamiliar with the Big Five, Table 1 includes a description of key scales used to measure these traits, including the number of facets in each.

Personality Predictors of Educational Outcomes

Big Five personality traits are robust predictors of many important life outcomes, including future health and longevity, relationship satisfaction, addiction, career choice (Soto, 2019), and psychopathology (Lamers et al., 2012). Crucially for the

Table 1 The most popular current global personality trait scales

Scale	# items	# facets per trait	Open access?	Citation	Note
Medium-length scales					
Big Five Inventory 2 (BFI-2)	60	3	Yes	(Soto & John, 2017b)	We recommend this scale for its breadth (i.e. representing the trait space relatively comprehensively) without compromising efficiency (i.e. quick to administer)
BFI-2-Short	30	3	Yes	(Soto & John, 2017a)	
Big Five Aspect Scales	100	2	Yes	(DeYoung et al., 2007)	In this scale, facets are called *aspects* because they are proposed to be at a level below Big Five traits but above facets. The aspects are empirically estimated and maximally distinguish between dimensions of a personality trait. Recommended when wanting to assess unique contribution of each aspect (e.g. how much variance attributed to the Openness vs Intellect aspect in openness to experience)
NEO-FFI	60	0	No	(Costa & McCrae, 1992)	
HEXACO	100	4	Yes	(Ashton & Lee, 2007)	Measures 6 factors, not 5: repartitions the variance of Big Five agreeableness and neuroticism to become *honesty-humility*, *emotionality*, and *agreeableness*. Honesty-humility is considered a useful trait to measure individual differences in moral character. Also comes in scale versions with 60 or 200 items
Big Five Inventory	44	0	Yes	(John et al., 2008)	Very popular 10+ years ago but less so now (superseded by BFI-2)
Large scales					
International Personality Item Pool (IPIP-NEO)	300	6	Yes	(Goldberg et al., 1999)	
NEO-PI-R Inventory (Costa & McCrae, 1992)	240	6	No	(Costa & McCrae, 1992)	IPIP-NEO is similar and open access
Super short scales (recommended only when brevity is essential)					
Ten Item Personality Inventory	10	0	Yes	(Gosling et al., 2003)	
BFI-2-Extra-Short	15	0	Yes	(Soto & John, 2017a)	
Mini-IPIP	20	0	Yes	(Donnellan et al., 2006)	

current paper, Big Five personality traits also predict critical educational outcomes including academic performance, academic motivation, engagement, and other important outcomes like wellbeing and moral virtue/prosociality. For example, conscientiousness is robustly associated with academic performance across primary, secondary, and tertiary education (see Spielmann et al., 2022, for a review) and continues to demonstrate reliable effects across a variety of performance measures (Kappe & van der Flier, 2010) and controlling for intelligence (Mammadov, 2022; Poropat, 2009). Students higher in conscientiousness also show fewer counterproductive academic behaviours, such as absenteeism and low effort (Conard, 2006; Cuadrado et al., 2021; Rijavec & Miljkovic, 2015), and tend to display better time management/less procrastination (Aeon et al., 2021; Steel, 2007; Theobald et al., 2018), complete their homework on time, and have higher engagement and more positive attitudes toward study (Conrad & Patry, 2012; Credé & Kuncel, 2008; Donche et al., 2013).

Beyond conscientiousness, other traits demonstrate smaller, somewhat less consistent relations to academic performance. Openness to experience is the next strongest predictor of academic performance (von Stumm et al., 2011). Meta-analytic evidence sometimes (Poropat, 2009; Richardson et al., 2012), though not always (Mammadov, 2022), finds that this trait remains statistically significant when controlling for intelligence (Poropat, 2009; Richardson et al., 2012), which is particularly important to control for in this instance as openness to experience is positively correlated with intelligence, another important marker of achievement (Anglim et al., 2022; DeYoung, 2020). Openness to experience is also strongly related to the traits of interest and curiosity (Silvia & Christensen, 2020) which sustain engagement, exploration, and academic motivation (Murayama, 2022; Vogl et al., 2019). Theoretical connections have also been proposed between other Big Five traits and academic performance (Bardach et al., 2023) though to date empirical research has been equivocal, with meta-analytic evidence showing small or close to zero relations (Poropat, 2009; Richardson et al., 2012).

Education's purpose is not only to develop high-performing students, but those with high wellbeing who make positive contributions to society. When considering wellbeing, the strongest personality correlates are greater extraversion and less neuroticism (Steel et al., 2008). However, when wellbeing is measured not just with affect and life satisfaction but also via a sense of meaning and purpose, connection with others, and/or engagement (Butler & Kern, 2016; Ryff, 1989), agreeableness, openness to experience, and conscientiousness all play additional roles, with particular facets of each trait driving the relationship to wellbeing (Anglim et al., 2020; Sun et al., 2018). Agreeableness stands out in the realm of moral character, robustly relating to gratitude, forgiveness, volunteerism, and negatively relating to criminal behaviour (Ozer & Benet-Martínez, 2006; Soto, 2019). Agreeableness and a related trait called honesty-humility from an alternate descriptive model of personality (Lee & Michael, 2004) predict prosocial behaviour such as fairness, cooperation, and non-retaliation across a variety of economic games (see Smillie et al., 2019, for a review). Taken together, Big Five personality traits demonstrate robust relations to important educational outcomes, which is a necessary (if not sufficient; Underwood, 1975) condition to regard them as important variables in educational research.

Busting the "Big 3" Myths of Personality

Like any term that is popular in lay language and is also studied scientifically, there can be discrepant perceptions between popular understanding and the understanding of those who study the topic. These misperceptions may stop researchers from recognising the value of personality psychology and might also be deleterious for teachers who assume that personality means something different from how it is conceptualised in modern research. There are arguably three core, interrelated misperceptions that people hold about personality traits.

Myth 1: You Have a Personality "Type"

A common lay belief about personality is that people fall into different binary "types" (e.g. an extravert *or* an introvert). Typological models were first proposed in antiquity (e.g. Galen's *sanguine*, *melancholic*, *choleric*, and *phlegmatic* temperament styles from the second century BCE) and have stayed popular up to and including modern corporate measures of personality (Stein & Swan, 2019). It is therefore understandable that the concept of the personality type would pervade educational research and lay perceptions, despite this being contrary to modern scientific description of personality. This myth is important to address in education as its belief may promote categorical thinking in teachers, missing nuance in the ways that students are different from one another, and may increase the prevalence of sub-optimal typological questionnaires employed to, for example, suggest career pathways for students (Pittenger, 1993).

Myth 2: Personality Is Fixed

Personality is commonly falsely thought to be *fixed* (i.e. that our trait scores cannot change much), and therefore, personality is not a suitable target for interventions, in contrast to concepts that are assumed to be more "malleable", such as socio-emotional skills/competencies, self-regulation, leadership, decision-making, communication, and social awareness (Lerner et al., 2005; Park et al., 2017; Soto et al., 2021; see the section *Personality Change as an Outcome Measure* below where we discuss the similarties between traits and socio-emotional skills). The myth of the fixed personality is particularly relevant in education, because if a student is not currently demonstrating personality traits characteristic of a "good" student (e.g. highly conscientious), they may believe that they do not have the capacity to change their tendencies and will subsequently not try. Similarly, teachers who espouse a view that personality is fixed may switch off/give up on students who do not show good "character" (i.e. desirable personality traits), which can also have flow-on effects to student perceptions (i.e. the so-called Pygmalion effect; Rosenthal, 2010).

Myth 3. Personality is Decontextualised

Educational research frequently considers how the many nested spheres of influence for children (e.g. teacher, perceptions of the classroom, school, peers, family, socioeconomic context) may impact student outcomes (e.g. Bardach et al., 2020; Bronfenbrenner, 1977; Maaz et al., 2008; Mitchell & Bradshaw, 2013; Rivkin et al., 2005). Some researchers may incorrectly believe that personality does not give any consideration to how the environment or situation can shape behaviour, assuming that everything is due to personality. This misperception may be a relic from the era of the person-situation debate (Lucas & Donnellan, 2009; Mischel, 1968) which argued whether personality or the situation mattered more to drive behaviour. Incorrectly believing that personality psychologists espouse an extreme view—that only personality matters and that the situation or context is never important to consider or account for—makes it easier to dismiss the field outright and assume it has nothing to offer. At the same time, teachers who think that students' academic behaviour can either be explained by personality or situational characteristics may disregard the complex interactions between the two (e.g. students with certain personality traits reacting differentially to certain situational cues than students scoring lower on these traits).

An Example to Bust These Myths

We introduce two high school students, Rosa (sixteen years old) and Aki (seventeen years old), who have agreed to take part in a study where they rate their momentary extraversion multiple times per day via the item "I feel enthusiastic, assertive, sociable right now"; momentary personality expression can be called their *personality state*. Though fictional, this scenario is representative of prevalent "experience sampling" research in personality psychology (e.g. Jacques-Hamilton et al., 2019). At the same time as they rate their state extraversion, these participants also state their location. Figure 1 shows a selection of Rosa's reported extraversion in three contexts—in a library, in class, and at a party—with a corresponding density distribution superimposed underneath. Although a hypothetical scenario, this is a common pattern of empirical data when conducting this type of experience sampling research; see examples from Fleeson (2001) and Fleeson and Gallagher (2009).

From this figure, we can see three key things:

First, Rosa's reported extraversion varies over the course of the study: she sometimes reports very high extraversion, sometimes relatively low extraversion, and sometimes in-between. Thus, *the momentary expression of personality is not fixed.* This is not simply measurement error, as Rosa's reported extraversion is meaningfully related to the context where she finds herself: she tends to report higher extraversion at parties, lower extraversion in libraries, and class reports are somewhere in-between. *Thus, personality expression is inherently context-dependent.* The context-dependent nature of personality is a core element of theories of personality

(Allport, 1937; Gray, 1982; Tellegen, 1981) and has been incorporated into computational models of personality trait expression (Read et al., 2010, 2017). Researchers studying context-dependent personality have proposed that important contexts are broad classes of cues related to social factors, rewards, punishments, distractions, and so on; features that have been present over the course of evolutionary time (DeYoung, 2015).

Third, the average of this density distribution corresponds theoretically to a person's self-reported trait extraversion score on a questionnaire; something that has also been documented by empirical evidence (Fleeson, 2001). We see in Fig. 1 that the average of Rosa's reported extraversion is higher than the average of Aki's reported extraversion. Thus, Rosa is higher on extraversion than Aki, and we would expect this to be reflected in self-report questionnaires. But the two distributions are overlapping, indicating that Aki sometimes reports extraversion just as high or higher than Rosa. Both Rosa and Aki are also not at the extreme ends of the scale; thus, we could call Aki "more introverted" and Rosa "more extraverted", but we would not necessarily call the former an introvert and the latter an extravert. This is also the case when we assess personality traits of a large sample and not just individuals: although a few people score at the extreme ends of the scale, many more people score somewhere in the mid-point of the scale. This forms a statistical normal distribution, a consistent empirical finding across the long history of psychometric investigation of personality (John & Srivastava, 1999). Thus, *personality traits can be thought of as a continuous dimensions or spectrums*, rather than binary opposites or types.

Fourth, if personality traits are density distributions of personality states, then if this typical pattern changes (i.e. if there is a greater or lesser frequency or intensity of extraverted thoughts, feelings, or behaviours across a given time period), then this describes a change in extraversion. Theoretically, then, *there is room for personality traits to change.* And indeed, we have strong evidence that traits do change, both across the lifespan and in response to interventions. Numerous longitudinal studies document personality development over the lifespan, particularly marked in early adulthood but continuing far into older age (Lucas & Donnellan, 2011; Orth et al., 2018; Roberts et al., 2006). For example, in the case of conscientiousness, robust evidence demonstrates that trait scores increase throughout the lifespan. The rank order of traits (i.e. your level of a trait relative to another person's) is also relatively consistent but changes on average throughout the lifespan, with the greatest level of change in adolescence and early adulthood. Indeed, a study with school-aged students demonstrated that Big Five personality traits change just as much as academic motivational variables which are commonly believed to be more "malleable" than personality (Rieger et al., 2017). Turning to intervention research, in a systematic review and meta-analysis, Roberts and colleagues (Roberts et al., 2017) compiled the results from 207 studies and concluded that there were robust reductions in neuroticism following psychotherapy, in addition to observable increases in conscientiousness. Several additional studies have found evidence that people can change their traits when they are motivated to change them (Hudson & Fraley, 2015; Stieger et al., 2021); we discuss this research further in later sections.
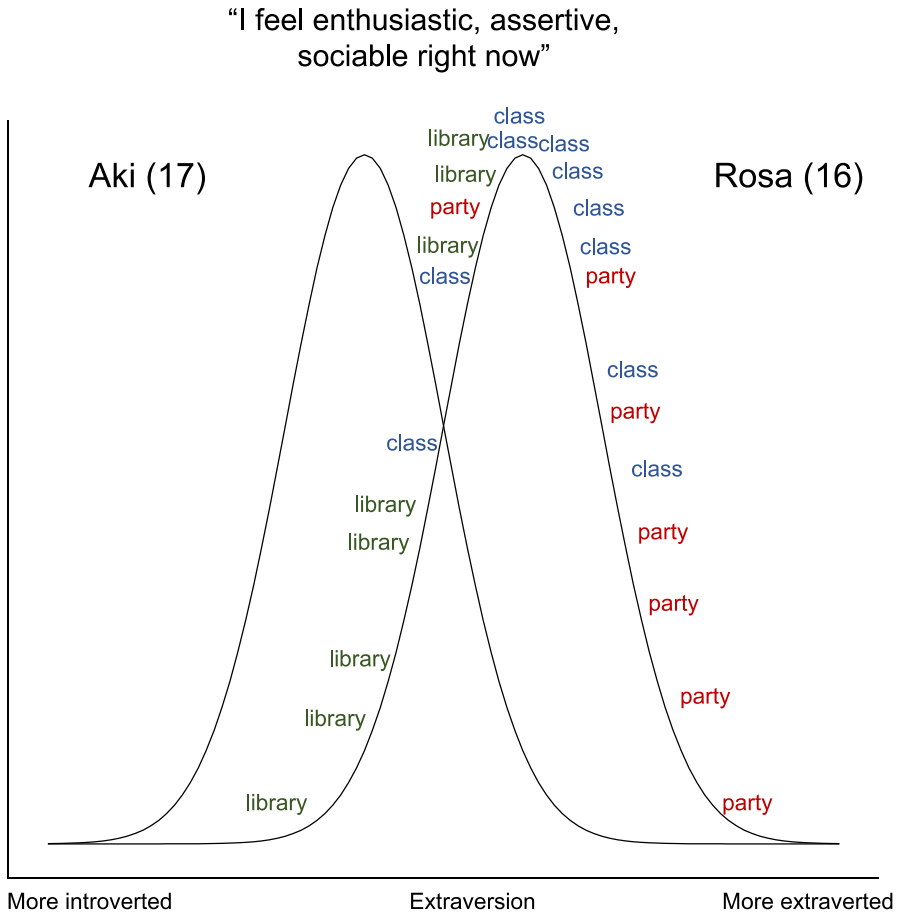
Fig. 1 Two overlapping normal distributions from two theoretical high school students, Rosa and Aki, reporting their state extraversion (*x* axis) while in three different locations (library, class, party). Some examples of different extraversion ratings are superimposed for Rosa to give an intuitive understanding. See main body for full explanation

It is important, in our emphasis on the malleability of personality, not to fall too far into the other direction to believe that personality traits have no stability at all. On the contrary, all major current Big Five scales (Table 1) have high test-retest reliability, meaning that people tend to score similarly when their Big Five scores are assessed on multiple occasions. And though longitudinal research highlights how personality can change, it also demonstrates high stability over time (Damian et al., 2019; Lucas & Donnellan, 2011; Roberts & DelVecchio, 2000). We can frame this once more in the context of Fig. 1. We have already described that Rosa can be considered "more extra-verted" than Aki. If these students were assessed 1 year, 10 years, or even 50 years later (Damian et al., 2019), Rosa would still likely be more extraverted than Aki. But these tendencies in personality development are not set in stone: there is also room for change, as we outlined theoretically (Fig. 1) and empirically.

Four Ways that Personality Can Assist Educational Aims

Now with a solid grasp on the foundations of personality theory and with three potential misperceptions addressed, we have reached an appropriate place to discuss how the methods and concepts from personality can be used for educational research. Specifically, personality psychology can be used to (1) boost accurate predictions for educational outcomes, (2) design personality change interventions, (3) support the academic development of all learners in personalised learning interventions, and (4) be employed as a target outcome for education.

Accurate Predictions

Accurate predictions of student outcomes are important to understand risk factors and vulnerabilities for students to assist interventions, and building the best predictive model is a key focus in areas such as big data and machine learning, methods that are now being increasingly applied in the educational domain (Goldberg et al., 2021). Given the extensive research documenting personality traits as predictors of key educational outcomes (see the primer on personality above), prediction of educational outcomes could likely be boosted by including personality traits into models. Personality traits such as the Big Five have high utility in predictive models not just because of their prior replicable evidence of relating to important outcomes (Soto, 2019), but their excellent psychometric qualities. High-quality measurement has been acknowledged as a crucial aim in psychological research in general and in education specifically (Duckworth & Yeager, 2015; Flake & Fried, 2020). With decades of history of predictive validity and wide use, assisting between-study comparisons, Big Five personality traits have plentiful evidence that they accurately reflect their target constructs (John et al., 2008).

One point of confusion that educational researchers may have in adding personality scales to their existing test battery is the sheer number of personality trait measures that exist. Even limiting one's search to measures of the Big Five, there are many different scales, of different lengths, with different numbers of facets measured, and different items included. Education researchers may wonder which one is appropriate for their particular study design. Table 1 addresses this question via a list of the most popular current Big Five personality trait scales, including data on their length, number of facets, and which are open access. This includes, for example, the Big Five scales that could be used when there is very little space for items in a survey (e.g. the Ten Item Personality Inventory; Gosling et al., 2003, or the extra-short Big Five Inventory-2; Rammstedt et al., 2020), the Big Five scales that have the maximum number of facets included (i.e. the NEO-PI-R or the IPIP-NEO), and our overall recommended scale balancing length and breadth (the BFI-2; Soto & John, 2017b). Ideally, future longitudinal education studies should include personality at multiple waves, allowing the contribution of personality across various other predictors to be assessed or controlled for (e.g. Israel et al., 2022; Rieger et al., 2017; Spengler et al., 2016).

What if researchers would prefer to measure narrower individual differences? Of course, given that narrow measures can provide stronger relations to the target outcome of choice (i.e. the bandwidth/fidelity trade-off; Salgado, 2017) these may be more appropriate to include in predictive models than a broad Big Five measure. For example, researchers may wish to examine how particular facets of impulsivity (e.g. sensation seeking, urgency, premeditation) relate to effort across school and university classes, in which case UPPS Impulsive Behaviour scale (Whiteside & Lynam, 2001) would be a more appropriate measure of individual differences to employ. But if there is space in the survey battery, we would also recommend including a global personality measure such as the Big Five because it provides a shared nomenclature across such a wide variety of studies over time: findings can be compared across the broad research literature and be easily incorporated into meta-analyses.

Personality Change Interventions

As discussed earlier, personality can change naturally over the lifespan and has the capacity to change following interventions. Typically, naturally-observed changes are strongest in adolescence and early adulthood (Bleidorn et al., 2018; Roberts et al., 2006; Schwaba & Bleidorn, 2018), precisely the period in which the greatest degree of formal education is taking place. This suggests that adolescence and early adulthood may be a promising time to intervene.

In contrast to the decades of research assessing the factor structure, outcomes, and lifespan trajectory of personality traits, the intentional personality trait change literature is newer and sparser. However, there are to date several frameworks and theories of personality change (Allemand & Flückiger, 2017, 2022; Hennecke et al., 2014; Magidson et al., 2014; Roberts et al., 2017), many of which converge in their emphasis on the importance of "bottom-up" processes to produce changes in personality over time. For example, the TESSERA framework (Wrzus & Roberts, 2017a) is a theoretical perspective on the keys to personality development that can be applied in an educational context. This framework specifies that short-term sequences of situational cues, momentary thoughts and emotions related to these situations, and reactions following the situation are key to understanding the shift of personality over time (Wrzus & Roberts, 2017b). Repeated shifts of cues and reactions can form new patterns that can shift the distribution of personality states, thereby also bringing trait change. With this in mind, interventions often attempt to change personality by changing patterns of behaviour. But behaviour is not the whole story. Researchers have proposed that people must *want* to change their personality traits and believe that trait change is *possible* alongside engaging in behaviour sufficient to change habits (Hennecke et al., 2014). This emphasises the importance of individual preference and agency in effective personality change interventions.

One important question is, then, how much do students want to change their personality? In university students, we have preliminary evidence that can speak to this.

Hudson and Roberts (2014) found that almost all students reported goals to change at least one Big Five personality trait and also found high agreement in wanting to change their traits in a socially desirable direction, from 89% wanting to increase in agreeableness up to 97% wanting to increase their conscientiousness. Hudson and Roberts (2014) also found a negative correlation between reporting personality traits and wanting to change those same traits, indicating that, for example, when students were *lower* on conscientiousness, they were more likely to want to increase conscientiousness. This indicates that in general, people do want to change their personality.

Importantly, although Hudson and Roberts (2014) found promising results with respect to agreeableness, two additional studies found that people in general do not want to be more moral and do not want to change disagreeable personality characteristics such as Machiavellianism, sadism, and psychopathy (Hudson, 2022; Sun & Goodwin, 2020). Thus, in university and adult-aged samples, agreeableness may be the most difficult Big Five trait to shift. One open question for future research is whether this is also the case for younger students still in the school system, which may be a particularly pertinent question given that countering antisocial behaviour and bullying are key educational research foci (Walker et al., 1996; Wallinius et al., 2016; Zhu et al., 2021).

Assuming that most students want to change at least one trait, what approach can be provided to help them do so? Again following from the research conducted in university students, Hudson and colleagues (Hudson, 2022; Hudson et al., 2019) ran several interventions where participants were first taught about personality traits and were then allowed to select which traits they wanted to increase. Participants were subsequently presented with small behavioural challenges related to the chosen Big Five trait; these challenges increased in difficulty throughout the study to give participants a structured approach to develop this trait (e.g. for openness to experience, one easy challenge is "Read a news story about a foreign country" and one hard challenge is "Seek to understand some else's thoughts on a controversial topic. Don't argue with them, but rather try to understand their perspective"; Hudson et al., 2019, pp. 60–63). These studies found that in general, people who took part in more challenges (i.e. expressed trait-relevant behaviour more frequently) demonstrated greater trait change over the course of the 15-week study. Importantly, these were traits that participants had already expressed desire to change. This research supports the theoretical proposition that trait change can occur when people want to change, believe that change is possible, and frequently enact behaviour in line with trait-change goals (Hennecke et al., 2014).

We propose that something similar could be employed in a secondary school setting (perhaps not elementary school given the relatively high level of self-reflection required). Students could be taught about Big Five personality traits and could test themselves with a self-report scale; the teacher could then share anonymised student results with the class. This itself could be a useful tool for both teachers and students, making all parties aware of diversity in personality tendencies. Students could then be taught about the malleability of personality. Finally, students could nominate traits which they would like to develop, and they could be provided with weekly "games" where they try to enact trait-relevant behaviour.

What sort of small, achievable behavioural challenges could be employed in a secondary school context? Though speculative, we propose some initial ideas adapted from challenges included in Hudson et al. (2019) that may spark idea generation in future studies. For openness to experience, students could read one book per month, help to design the school newsletter, join the school theatre group, or become a reporter for the school magazine and report on the latest news. For conscientiousness, students could check their calendar every morning, join a school committee, or employ self-regulated learning strategies (e.g. planning of one's learning, monitoring of the learning progress via learning diaries, structuring one's environment in a way that facilitates learning, evaluating one's learning progress, e.g. Zimmerman & Moylan, 2009). For agreeableness, students could take part in volunteer work after school, or join a "buddy" program to mentor to a younger student. For extraversion, students could join a school committee or, like openness to experience, join a theatre group. For neuroticism, students could be taught strategies of reflection and perspective from therapies such as cognitive-behavioural therapy or acceptance and commitment therapy, could practice relaxation strategies such as mindfulness, or could attempt to expose themselves in a slow, graded way to things that they are fearful of.

Schools are important developmental contexts for children and youth growing up in increasingly culturally diverse societies, and education is a major vehicle for transmitting culture (e.g. Rosenthal et al., 2019). Hence, we suggest that personality change interventions in educational settings explicitly take into account students' different cultural backgrounds, and, more generally, the importance of culture as a defining aspect of who we are. For example, when implementing personality change interventions in classes, educators could also provide opportunities for students to learn about their own and other students' culture(s), integrate examples from (minority) students' cultures into the curriculum and teaching practices, support (minority) students' identity development and belonging, and discuss and challenge social inequities and (structural and interpersonal) discrimination that marginalised minority groups face (e.g. Byrd, 2017; Schwarzenthal et al., 2022). This can help to avoid unintentionally transmitting colorblind messages to students and thus communicate to students that issues relating to culture should be ignored (e.g. Rosenthal & Levy, 2010); such colorblind climates may undermine minority students' sense of belonging at school and contribute to persistent minority-majority achievement gaps (Celeste et al., 2019; Rosenthal & Levy, 2010).

There are numerous interventions employed in education that meta-analytic evidence finds have generally been successful for increasing learning, motivation, and academic achievement (Dignath & Büttner, 2008; Lazowski & Hulleman, 2016). We would not suggest that these be replaced by personality change interventions; rather, we see them as complementary, with the choice partially depending on the intervention's purpose. If one seeks to target a specific skill (e.g. learning strategies), subject-specific educational construct (e.g. maths motivation; Simpkins et al., 2006), or motivation related to a particular theoretical framework (e.g. interests, achievement goals, expectancy-value; see Lazowski & Hulleman, 2016 for a review), then current educational interventions would be a natural choice. But if the goal is to prioritise the shift of a broader array of characteristics, then personality change interventions

may be more appropriate. If change interventions are also focused on giving students the power to choose which trait they would like to develop, as in existing personality change interventions previously outlined, then this also provides a sense of agency relative to interventions where students are all provided with the same content. This personalisation of intervention may be appealing to students. Lastly, and speculatively but included for the purpose of future idea generation, there may be substantial benefits from the *combination* of existing educational interventions and personality interventions. For example, consider an educational intervention aiming to improve students' motivation for maths and maths performance, with maths being a subject that many students, particularly secondary students, do not like (Cleary & Chen, 2009). This intervention could be combined with a personality change intervention that is implemented *within the context* of their maths class. For example, students may nominate extraversion as a trait that they would like to develop, and their challenges could be something like participating in small-group discussions or raising their hand and speaking up when they have questions. Successfully enacting their stated goals in the math class might in turn increase maths motivation/performance, and perhaps also increase students' sense of belonging and their well-being.

In our experience, there can be hesitance over implementing an intervention designed to "change" students' personalities. However, we view this as stemming from preconceived misperceptions about the purpose of these interventions. We hope that concerns are allayed by emphasising the way in which personality interventions are grounded in individual students' preferences and allow them to enact change that they wish to see about themselves.

Personality in Personalised Learning

Personalised learning (also referred to as personalised education, adaptive teaching, differentiated instruction, individualisation, etc.) is concerned with systematically adapting instruction and the learning context to individual learners (Tetzlaff et al., 2021). How to best personalise learning has long been a solid (and still unsolved) question in education practice and research (Bloom, 1984; Dockterman, 2018). In recent years, this field often combines educational science with engineering and computer science (Bernacki et al., 2021) and has a strong focus on digital learning and artificial intelligence interventions to provide personalised learning opportunities to students. To personalise something means to alter the learning paths (i.e. course material or its delivery) to accommodate individual differences of the students, and naturally, given the focus on individual learners, individual differences are the central pillar of personalised learning (Chen & Wang, 2021). In this research area, the most common individual differences on which to tailor learning materials and processes are prior achievement, cognitive abilities, and (to a lesser extent) reported interest (Reber et al., 2018). Yet variability across multiple dimensions, not just domain knowledge and skill, is inevitable. Given the importance of personality traits for predicting important educational outcomes, and the precise and low-cost measurement involved in assessing personality traits outlined in the section on

accurate predictions above, personality traits could be a promising dimension on which to explore personalised learning. But there has been limited implementation of other individual differences such as personality measures in personalised learning (with the exception of "typological" personality models, such as learning styles, which do not accurately reflect the distributional nature of personality differences—and where a large body of evidence now shows that using learning styles as a basis of personalising learning does not improve student learning or performance; Cuevas, 2015; Kirschner, 2017; Pashler et al., 2008).

As Big Five personality traits describe the broad ways that individuals differ from one another, reflecting different tendencies of behaviours, emotions, and thoughts, students might respond differently to learning tasks depending on this variability, and their learning might be optimised by different approaches that take this variability into account. We provide several examples herein of possible areas to personalise by each Big Five trait. For example, we know that individuals higher in conscientiousness tend to have better study habits, attendance, and self-regulation skills in general, whereas those lower in conscientiousness can find it difficult to self-regulate their learning even if they want to (Spielmann et al., 2022). For individuals lower in conscientiousness, then, it may be important to provide more structure and scaffolding that provides many of these habits and skills that can help students to better deal with any self-regulatory deficits (e.g. regular reminders and check-ins, detailed guides to what is required, assistance in evaluating one's progress on a learning task). Conversely, people higher in conscientiousness may not need as many task reminders, and may even find them irritating, which has the potential to increase negative affect, impacting motivation to complete the task. The key elements that are varied (e.g. reminders) can be varied by degree according to where a person scores on conscientiousness. As another example, individuals higher in neuroticism may be more sensitive to threats (Luo et al., 2022), and their performance and/or wellbeing may suffer when given a task where the risk of failure is salient. These individuals may find the idea of public speaking (e.g. speaking up in class or giving an oral presentation) extremely stressful relative to their peers. For these individuals, then, it could be useful to encourage the development of these skills first in a less stressful context (e.g. small-group discussions and presentations, allowing them to record a presentation rather than putting the student on the spot). Conversely, students higher in extraversion may thrive from the opportunity for public speaking. Because people higher in openness to experience tend to appreciate art, literature, and design, these elements could be heightened for these individuals, for example, by structuring the learning task in the context of a story. This might come at a cost of increased time to complete the task but could be balanced by the increased engagement and effort of higher-openness students.

Personalising via art and stories that high-open students tend to prefer is similar to the concept of personalisation via student interest (Reber et al., 2018), and our suggestions to provide greater reminders/check-ins by conscientiousness is similar to the research on personalised self-regulated learning (Heikkinen et al., 2023). Our goal here in personalising via personality is not necessarily to reinvent the wheel, but to provide a new way to assess for whom certain personalised learning interventions might be successful, drawing on the best descriptive models of the ways that people vary from one another (John et al., 2008).

Personality Change as an Outcome Measure

Interventions and assessment of natural experiments in the school setting are major foci of educational research. Researchers may, for example, assess whether a study skills training program improves students' self-regulated learning (Dignath & Büttner, 2008) or investigate the efficacy of strategies to reduce bullying (Hoagwood et al., 2007). There are also a variety of interventions targeting greater student wellbeing (Waters, 2011), for example, character strength interventions aim to teach students about their signature "strengths" (e.g. love of learning) and encourage them to apply these strengths across daily life (Gander et al., 2021). Studies have investigated the effect of school community service programs to assess whether this increases their future volunteering and prosocial attitudes and behaviour (Reinders & Youniss, 2006). There are reading interventions aimed to encourage reading achievement and future reading interest and motivation (McBreen & Savage, 2021). A wealth of intervention programs aim to reduce anxiety and depression in students (Caldwell et al., 2019). Finally, there is a large body of literature dedicated to developing students' non-cognitive socio-emotional skills, of which self-regulated learning is included, but also capacities such as leadership, decision-making, communication, and social awareness (hence: socio-emotional skills; Duckworth & Yeager, 2015; Lerner et al., 2005; Park et al., 2017; Soto et al., 2021).

The purpose of this section is not to review the relative success of these interventions, but to advocate for incorporating global personality measures such as the Big Five in the pre- and post-assessment of many such interventions, and to consider whether personality traits themselves could be additional target outcomes of such studies. This is because, to the degree that these interventions attempt to assess changes in mean patterns of emotion, behaviour, and/or cognition, they can also be considered personality change interventions.

For example, anxiety and depression are considered facets of neuroticism, while prosocial attitudes and behaviour are considered facets of agreeableness. Interest in art and literature relates to openness to experience, and character strengths are described as morally valued personality traits (Park & Peterson, 2009). Traditionally, socio-emotional skills, including self-regulated learning processes, were thought to be distinct from personality traits, with the former malleable (and therefore worthy of intervention) and the latter not. Yet this may be at least partially a false dichotomy given that personality traits are malleable, as we previously explained. In their review of conscientiousness, Spielmann et al. (2022) conclude that conscientiousness is highly correlated with many socio-emotional skills, aligning with a recent study (Bainbridge et al., 2022) that found evidence that several socio-emotional skills (e.g. grit, emotion regulation, and self-control) can be located within the Big Five and considered facets of Big Five traits or "interstitial facets" (i.e. located between given Big Five traits). There is also a new hierarchical framework of socio-emotional skills based on a similar framework as the Big Five hierarchy called the BESSI (Soto et al., 2021, 2022). The authors found that socio-emotional skills could be organised into five domains representing social engagement, cooperation, self-management, emotional resilience, and innovation skills. Each of these domains was strongly positively correlated with a Big Five trait (extraversion,

agreeableness, conscientiousness, lower neuroticism, and openness to experience, respectively), suggesting close comparisons between skills and traits. Of course, simply because two traits are positively correlated does not mean that they describe the same thing, and in recent years, researchers have proposed a conceptual distinction between socio-emotional skills and personality traits whereby personality traits describe *average tendencies* toward emotion, behaviour, and cognition, and socio-emotional skills describe the *capacity* to engage in certain emotions, behaviours, and cognitions (Soto et al., 2021). For example, a student may not have the tendency to work hard, but if the right incentives are present (e.g. a prize for best essay is offered), they may find that they have the capacity to work hard in the pursuit of their goal. However, in practice, education researchers may be interested in seeing if developing the capacity to work hard increases the tendency to work hard. In this case, assessing Big Five conscientiousness (in addition to the BESSI self-management skills) would be beneficial.

We described at the beginning of this article how the Big Five can be an organising framework for individual differences that encourages incremental knowledge building while avoiding jingle-jangle fallacies and construct proliferation. This feature can be useful when assessing potential utility of future studies. A core element of research ethics is to minimise anticipated costs and maximise anticipated benefits, and reducing redundant research is one way of doing so. If there are already many existing interventions that assess constructs very similar to conscientiousness, for example, it may not be necessary to conduct another one (and might even be considered wasteful to research funds which could instead be applied to other topics); instead, the existing body of literature could be synthesised via meta-analytic methods. At the same time, it could also be possible to identify gaps in the literature where there is comparatively less research on a given personality trait. For example, Grosz et al. (2022) conducted a review on personality change through arts (e.g. drama, music, dance, visual arts) education. In this domain, one theoretically important trait to assess would be openness to experience, but the authors noticed that very few studies had assessed change in this trait, suggesting that this would be an avenue for future research.

Personality is a "crucible of theory construction" (Underwood, 1975), partially because one can use the knowledge of the organising framework to frame and develop theory and understand research findings. For example, imagine an intervention assessing strategies to reduce bullying and increase prosocial attitudes and behaviour in students. One might compare a "tough love" condition which emphasises punishment (e.g. threats of expulsion and detention) versus a "compassion" condition which emphasises the emotional experience of students who are being bullied. It might be the case that bullying frequency reduces in both conditions. But assessing personality, we might see agreeableness increases only in the latter compassion condition, suggesting that the students in the former condition are avoiding bullying only because of the current punishment, and that bullying patterns might resume once they perceive there are no more negative consequences for their actions. This is important given that the aim of such interventions would be to reduce long-term bullying, not just in the context of the study.

Conclusion

Perhaps due to its lay appeal and the popularity of typological models, personality psychology sometimes has an "image problem", with frequent misperceptions that forestall interdisciplinary collaboration. In this review, we have attempted to clarify three core misperceptions and have suggested several jumping off points and areas where researchers can begin to incorporate personality psychology into educational research. In the process, we have shown how personality relates to important educational outcomes, have discussed starting points for personality change interventions in schools, have outlined theoretical links with educationally-relevant concepts like socio-emotional skills, and have included an overview of personality scales that researchers may use when bridging personality psychology with educational research. We hope that greater understanding can spur cross-disciplinary collaboration, harnessing the strengths of both disciplines.

Declarations

Competing Interests The authors declare no competing interests.

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