Chapter 15
Positive Education and Teaching for Productive Disposition in Mathematics

Aimee Woodward, Kim Beswick, and Greg Oates

Abstract The Australian Curriculum: Mathematics defines four proficiency strands. The work from which they are drawn includes a fifth proficiency (productive disposition) that relates to students' propensity to persevere and to perceive mathematics as worthwhile. We argue for the importance of productive disposition as reflecting the importance of affect in mathematics learning. We link it with work in positive education, particularly around character strengths, to suggest ways in which mathematics teachers' awareness of the importance of affect might be raised. Positive education may offer a means of putting productive disposition on the agenda in considerations of improving mathematics achievement.

15.1 Mathematical Proficiency

Kilpatrick, Swafford, and Findell (2001), in their seminal work on what it means to be mathematically proficient, described the qualities with respect to mathematics that they believed students should develop as a result of studying mathematics at school. They defined mathematical proficiency in terms of five interdependent aspects: conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition. Mathematical proficiency requires, in their view, all of these components working together. Crucially, they claimed that mathematical proficiency was as, if not more, important for the teacher of mathematics than for the student, and linked this to the need for teachers to be effective and versatile: Effective in terms of assisting students to learn worthwhile content; and versatile in terms of working effectively with a range of students, environments and content. In this paper we consider how mathematical proficiency is portrayed in the Australian Curriculum: Mathematics (AC: M) (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2016) and elsewhere. The term, disposition is frequently used without explicit definition but implicitly to mean attitude (e.g. Moyer, Robison, & Cai, 2018)

A. Woodward · K. Beswick (✉) · G. Oates
University of Tasmania, Tasmania, Australia
e-mail: kim.beswick@utas.edu.au

B. Rott et al. (eds.), *Views and Beliefs in Mathematics Education*,
https://doi.org/10.1007/978-3-030-01273-1_15

where attitude refers essentially to a positive or negative assessment of an entity (Ajzen & Fishbein, 1980). We therefore situate productive disposition within the mathematics education research on affect, and consider how ideas from positive education, in particular character strengths, might influence mathematics teaching and assist in the development of students' productive dispositions.

The proficiency strands of the AC: M are based on and similar to the proficiencies described by Kilpatrick et al. (2001). Table 15.1 provides a summary of the four proficiencies common to Kilpatrick et al. (2001) and the AC: M. Problem-solving in the AC: M differs slightly from Kilpatrick et al.'s (2001) strategic competence, with no explicit reference to flexible and novel approaches, but instead calling for the application of existing strategies in seeking solutions. The most obvious difference is the absence of productive disposition among the proficiencies of the AC: M. Kilpatrick et al. (2001) claimed that productive disposition develops as students are engaged in solving problems, reasoning, and developing understanding and fluency, and is also a necessary precursor to the development of the other proficiencies.

Kilpatrick et al. (2001) defined productive disposition as the "habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy" (p. 26). Students with a productive disposition are motivated, confident about their knowledge and ability, see mathematics as sensible, and have a growth mindset concerning their capacity to learn mathematics, believing that effort will lead to success (Kilpatrick et al., 2001). Productive disposition

Table 15.1 Mathematical proficiencies in Kilpatrick et al. (2001) and the Australian Curriculum, v8.3

Proficiencies	Australian curriculum: mathematics	Kilpatrick et al. (2001)
Understanding	Build a robust knowledge of mathematical concepts and be able to adapt, connect and represent this knowledge in familiar and new ways	Conceptual Understanding: develop an integrated and functional comprehension of mathematical content and ideas
Fluency	Develop skills to recall definitions, facts and procedures and to calculate answers efficiently by the selection of appropriate methods	Procedural fluency: develop the "knowledge of procedures … when and how to use them appropriately and [the] skill in performing them flexibly, accurately and efficiently" (p. 121). Knowledge of effective ways to estimate
Problem-solving	Develop skills to make choices, design, interpret, formulate and model familiar and unfamiliar problem situations and to communicate verifiable solutions effectively	Strategic Competence: develop the ability to flexibly formulate, represent and solve mathematical problems. Key focus on the formulation of problems not just solving
Reasoning	Develop logical thought and actions, including analysing, proving, adapting, explaining, inferring, justifying and generalising	Adaptive Reasoning: Capacity to logically consider relationships among concepts and situations, focus on justification of methods and solutions appropriate to the task

concentrates on affective, rather than the cognitive influences on learning, encompassing positive attitudes and beliefs about mathematics, how it is learned, and one's capacity to learn it. It can be regarded as comprising four aspects related to (1) the utility and (2) value of mathematics; (3) self-efficacy and (4) diligence.

Concerns have also been expressed in the United States about the lack of explicit mention of productive disposition (beyond a comment in the introduction) in the Standards for Mathematical practice associated with the Common Core State Standards for mathematics (Grady, 2016). In addition, Andrews (2010) noted that, although the five proficiency strands of Kilpatrick et al. (2001) are reflected in Finnish curricular guidelines, observable evidence of teaching for productive disposition was absent in the four classrooms observed in that country.

15.2 Affect and Mathematics Learning

The attitudes and beliefs (i.e. propositions regarded as true) of both teachers and students have been of interest to mathematics education researchers because of their association with students' mathematics achievement, usually considered in terms of standardised tests or grades (e.g. Ma & Kishor, 1997), and the role they play in teachers' practice. Mathematics educators have struggled to find consensus on the conceptualisation of, and distinctions and relationships among these and other aspects of the affective domain. Hannula (2012) proposed a three-dimensional meta-theory, for organising research on affect in mathematics education. The three dimensions concerned (1) the aspect of affect (e.g. attitude, emotion), (2) whether the affect was considered a trait or state, and (3) whether it was considered a biological, psychological or social phenomenon. The metatheory illustrates the complexity of studying mathematics-related affect. Figure 15.1 shows how the Organisation for Economic Cooperation and Development (OECD) (2016) represented what they considered the most important relationships among affective variables, beliefs, perseverance behaviours, and academic performance. The four aspects of productive disposition can be seen in aspects of the representation. For example, beliefs in the usefulness and of mathematics and that it is worthwhile, as well as beliefs in one's capacity to learn and do mathematics fit in the rightmost box and influence, by way of motivation, the time and effort (i.e. diligence) that students apply and hence academic performance.

In the sections that follow, we provide a brief review of the literature on the relationship of each of student and teacher attitudes and beliefs to mathematics achievement, with a focus on Australian students who are experiencing the AC: M.

15.2.1 Students' Attitudes and Beliefs

Students' attitudes to mathematics positively correlate with achievement (Ma & Kishor, 1997; Thomson, Wernert, O'Grady, & Rodrigues, 2017) but attempts to determine causation have led to the conclusion that affect and achievement interact

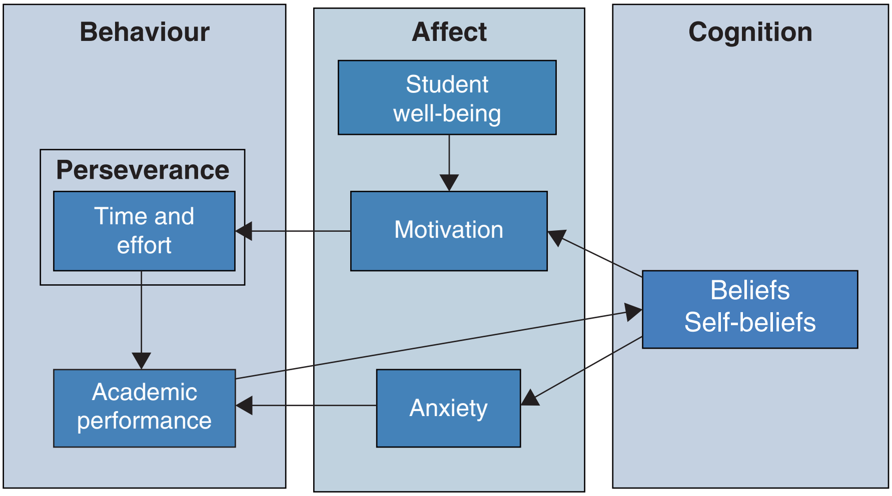

Fig. 15.1 A simplified conceptual map showing the interplay of students' attitudes, beliefs and academic performance (Source: OECD, 2016)

in complex and reciprocal ways (Hannula, 2012). For example, Ma and Kishor (1997) found, from a meta-analysis of 113 studies, weak evidence of causation directed from attitude (encompassing tendencies to like/dislike mathematics, engage with/avoid the subject, consider oneself good/bad at mathematics, and regard mathematics as useful/useless, easy/difficult and important/unimportant) to achievement but the effect sizes were small. Other aspects of affect, including particular dimensions of attitude, self-confidence and beliefs, have also been associated with achievement in mathematics but causal connections are yet to be explored.

The 2012 PISA results for mathematical literacy showed that each of; students' intrinsic motivation, self-concept (i.e. believing that one is good at mathematics), self-efficacy with respect to specific mathematical tasks (i.e. believing that one can succeed with a task), instrumental motivation, (i.e. believing that mathematics is important for such things as finding employment), and the tendency to take responsibility for their own mathematics achievement, were correlated with achievement (Thomson, de Bortoli, & Buckley, 2013). All of these constructs are related to productive disposition: Self-efficacy is a key part of it, instrumental motivation relates to the utility and valuing aspects of productive disposition, and self-concept and taking responsibility are connected to belief in the value of diligence for mathematical achievement. The relationships reported by Thomson et al. (2013) applied to Australian 15-year-olds and across the OECD. Australian students scored similarly to or above the international average on these measures and 90% indicated that they believed that putting in effort (diligence) would result in success in mathematics. Nevertheless, approximately 60% of Australian 15-year-olds reported worrying that their mathematics classes would be too difficult, reflecting a lack of self-efficacy. In addition, mathematics anxiety was negatively associated with achievement (Thomson et al., 2013). The OECD (2014) reported that students who are open to solving problems performed higher on average than other students. Such students believe they "can handle a lot of information, are quick to understand things, seek explanations for things, can easily link facts together, and like to solve complex problems" (OECD, 2014, p. 18). The difference was greater for high achieving students. Nevertheless, in many high performing countries students scored below the OECD average on openness to problem-solving (OECD, 2014). Regardless of achievement, it is a concern that 30% of students in PISA 2012 reported, "that they feel helpless when doing mathematics problems" (OECD, 2014, p. 18) again reflecting low self-efficacy in relation to mathematics.

15.2.2 Teachers' Attitudes and Beliefs

Kilpatrick et al. (2001) emphasised the need for teachers of mathematics to be mathematically proficient themselves. It is established that teachers must know and understand the content that they teach (Ball, Thames, & Phelps, 2008). According to Kilpatrick et al. (2001) other aspects of mathematical proficiency can be understood for teachers in terms of procedural fluency in performing classroom routines, strategic competence in planning and solving problems that arise during teaching, and adaptive reasoning in articulating and reflecting on practice. If teachers are to develop productive dispositions in their students, they must themselves have productive dispositions towards the discipline and its teaching and learning (Kilpatrick et al., 2001). That is, they must believe that they and all their students can learn mathematics and improve in their ability to do so; that mathematics is intelligible, and that they can improve their teaching of mathematics as well as their understanding of the subject through effort.

There is evidence that many teachers of mathematics do not have productive dispositions to the subject and/or its teaching. Primary pre-service teachers commonly exhibit unease with the discipline (Kalder & Lesik, 2011). They often fear and dislike mathematics and are unlikely to have developed adequate understanding (Beswick & Callingham, 2014). Beswick and Callingham (2014) also showed that in-service teachers of mathematics are less likely than mathematics teacher educators to regard problem-solving as inherent to mathematics, but more likely to do so than primary pre-service teachers. Secondary mathematics teachers seem not to regard the proficiency strands that are included in the AC:M, other than fluency, to be teachable, but rather as distinguishing characteristics of capable and struggling students (Beswick, 2017).

Teachers' beliefs and attitudes matter for their students' affective and achievement outcomes. For example, teachers' beliefs about the nature of mathematics, and the teaching and learning of mathematics lead to differences in classroom environment that are discernible to students (Beswick, 2005) and there is evidence that these sorts of differences can have long term impacts on students' perceptions of their mathematical competence (i.e. self-concept and self-efficacy) and how they regard the utility of mathematics (Moyer et al., 2018). Sakiz, Pape, and Hoy (2012) showed that students' perceptions of the affective support provided by their teachers, defined in terms of listening, respect, recognition and fairness, were associated with greater academic enjoyment, self-efficacy and effort. Teachers' beliefs about their students' ability to succeed and their own ability to influence student learning are associated with improved student mathematics achievement (Archambault, Janosz, & Chouinard, 2012). Data from PISA 2012 showed that better teacher–student relationships were associated with better engagement with school and with learning while at school, which in turn were associated with higher performance (OECD, 2014).

15.3 Positive Education

The strong social, emotional and academic components of teaching and learning (Zins, Weissberg, Wang, & Walberg, 2004) have led to international interest in positive education models as evidenced by the International Positive Education Network (IPEN, n.d.). Current research on mental wellbeing has been derived from two general perspectives: the hedonic approach, which focuses on happiness and defines well-being in terms of pleasure attainment and pain avoidance; and the eudaimonic approach, which focuses on meaning and self-realisation and defines well-being in terms of the degree to which a person is fully functioning (Clarke et al., 2011). Key ideas that underpin positive psychology include well-being theory (Seligman, 2011), self-determination theory (Deci & Ryan, 1985), broaden and build theory (Fredrickson, 2001), and growth mindset (Dweck, 2006). Over the past decade, school-based programmes grounded in positive psychology have aimed to cultivate positive states including resilience, optimism, hope, gratitude, mindfulness and perseverance. Well-being curricula have produced positive results for school climate, student autonomy and influence, learning and attainment (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011). Green (2014) argued that positive education is best when concepts are applied meaningfully and practically to students' academic and personal lives. One strand of positive education that we believe offers potential for assisting mathematics teachers to develop their own and their students' productive dispositions concerns character strengths.

15.3.1 Character Strengths

Peterson and Seligman (2004) defined character strengths as psychological ingredients that define virtues. Virtues are characteristics that have been valued by moral philosophers and religious thinkers, across time and cultures. Neither talents nor abilities are components of character strengths, due to key differences in value across cultures. Park and Peterson (2009) argued that "attention to young people's character is not a luxury for our society but a necessity, and it requires no trade-off with traditional academic goals" (p. 8). Indeed, some curricula, such as that of Australia, contain references to character-related aspects. For example, the Australian Curriculum includes Personal and social responsibility and Ethical understanding among general capabilities that the curriculum is intended to address. The character strengths are not traditional academic areas of success or weakness, such as "your strength lies in English, not mathematics" nor are they at odds with the character-related aims of curricula such as that of Australia. Peterson and Seligman (2001) identified six virtues with which they aligned 24 character strengths—the means by which one achieves virtue. Table 15.2 defines the character strengths aligned with each of the virtues.

Research on relationships between various character strengths and educational outcomes has shown positive connections, although links to academic achievement at the secondary level are rare. For example, Weber, Wagner, and Ruch (2016) found that love of learning, perspective, zest and gratitude all showed a replicable association with school achievement. Shoshani and Slone (2013) found that grade point average could be predicted by the strength of temperance. Madden, Green, and Grant (2011) found that a strengths-based coaching programme was associated with increases in students' self-reported levels of engagement and hope, and Choudhury and Barooah (2016) showed significant correlations of academic achievement with both humour and social intelligence.

15.4 Character Strengths and Productive Disposition

Despite the lack of prominence afforded productive disposition in curriculum documents and practice in many mathematics classrooms (e.g. Andrews, 2010), teachers can explore this area in their own contexts, using research into the development of characteristics that align with increased participation in learning and that facilitate the development of confident, capable and flexible learners. We argue that many of the character strengths align with aspects of productive disposition and that an awareness of students' character strengths can allow teachers to afford opportunities for students to exercise their favoured strengths, and for less-utilised strengths to be addressed. Similarly, teachers' awareness of their own favoured strengths can inform reflection on the extent to which they have a productive disposition towards mathematics, and the ways in which they interact with particular students (those with similar and very different character strengths profiles to their own). Student awareness of teacher strengths could contribute to meaningful, supportive dialogue in the classroom and a powerful way to develop positive teacher–student relationships with consequent benefits for engagement and achievement (OECD, 2014). In the following paragraph we provide initial illustrative examples of how a focus on character strengths could be used to reinforce findings from mathematics education research.

Boaler (2013) discussed the importance of teachers and students having growth mindsets in relation to mathematics learning, the role of open tasks to this end and

Table 15.2 Virtues and character strengths (Peterson & Seligman, 2001)

Virtue	Character strength	Definition
Wisdom and knowledge	Creativity	Novel and productive approaches to activities
	Curiosity	Interest, exploration and discovery of new knowledge and experience
	Open mindedness	Balanced and fair judgements
	love of learning	Seeking new knowledge and skills
	perspective	Wise counsel to oneself and others
Courage	Bravery	Acting upon convictions, not retreating from threat, challenge or difficulty
	Persistence	Finishing what one starts, manoeuvring through obstacles
	Integrity	Being genuine and responsible for one's feelings and actions
	Vitality	Zest, energy
Humanity	Love	Valuing relationships where sharing and caring are mutual
	Kindness	Doing good for others
	Social intelligence	Awareness of the motivations of others and oneself
Justice	Social responsibility	Citizenship; working effectively as a member of a group
	Fairness	Unbiased treatment of others
	Leadership	Encouragement of good relationships within a group
Temperance	Forgiveness	Mercy; acceptance of others' mistakes
	Humility	Humbleness
	Prudence	Self-regulated decision-making
	Self-regulation	Self-disciplined in thought and action
Transcendence	Beauty and excellence	Appreciation of skill and beauty in others and the environment
	Gratitude	Aware and thankful of good things
	Hope	Working to a better future
	Humour	Seeing and sharing the lighter side of life events
	Spirituality	Sense of purpose

the damage that ability grouping can do to students' self-efficacy beliefs. These ideas link to character strengths of creativity, curiosity, open-mindedness, and love of learning. Bravery and persistence are character strengths that align with research by Sullivan and colleagues (e.g. Sullivan & Mornane, 2014) on the use of challenging tasks in teaching mathematics. Metacognition is related to the character strength of self-regulation and has been found to be enhanced when students are tasked with teaching one another (Muis, Psaradellis, Chevrier, DiLeo, & Lajioe, 2016). The act of teaching another draws upon the character strength of perspective. Liking mathematics, motivation, self-efficacy and self-concept in relation to mathematics, and taking responsibility for one's performance are among affective characteristics associated with higher mathematics achievement (OECD, 2016). They have clear connection to the character strengths of love of learning, curiosity, hope, persistence, and bravery. Appreciation for the inherent beauty and value of mathematics is a worthy aim of mathematics education (Romberg & Kaput, 1999) that aligns with the character strength of appreciation of beauty and excellence.

15.5 Conclusion

We have highlighted how within the affective domain, student well-being is identified in the literature as an important component of student attitude and performance, but at the same time such factors are seldom explicit in curriculum documents or their recognition is difficult to identify in classroom practice. When viewed through the lens of positive education, character strengths are linked to students' positive disposition towards mathematics. It could be argued that character strengths could have similar value in promoting productive dispositions towards any school subject and this may well be so, but productive disposition in mathematics, as defined by Kilpatrick et al. (2001), is inherently mathematical: The construct might appear differently in other subjects. In addition, we know that mathematics evokes negative affect that inhibits productive disposition, in many students (OECD, 2014) and so efforts to address productive disposition (in mathematics), including via character strengths is of particular importance. Existing research points to the value of some character strengths for achievement but the potential impacts of others remain unexplored. Little is known about the relationships between character strengths in teachers, the ways in which they teach, and the impacts on students' affective traits (including character strengths), and aspects of attitude and beliefs known to be associated with achievement. These discussions highlight two principle areas that warrant future research and are indeed the subject of a study being undertaken by the first author. These are the extent to which mathematics' teachers are aware of, and seek to build positive disposition within their students, and the value of character strengths in achieving this. As we have argued here, we believe strengthening the understanding and position of productive disposition within the AC: M, and providing teachers with tools by which they might develop this may have real benefits for students' mathematical learning.

Although we have focussed on the Australian context, concern for students' affective responses to mathematics is international, with curricula in many other countries (e.g. USA (Grady, 2016) and Finland (Andrews, 2010)) encompassing in some way Kilpatrick et al.'s (2001) notion of mathematical proficiency. Although further research is needed to examine in detail the ways in which teachers might use aspects of positive education to build their own and their students' productive dispositions in relation to mathematics, we believe that the approach as potential to do so while, at the same time, enhancing students' and teachers' well-being.

References

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behaviour*. Englewood Cliffs, NJ: Prentice-Hall.

Andrews, P. (2010). Finnish mathematics teaching from a reform perspective: A video-based case-study analysis. *Comparative Education Review, 57*(2), 189–211.

Archambault, I., Janosz, M., & Chouinard, R. (2012). Teacher beliefs as predictors of adolescents' cognitive engagement and achievement in mathematics. *Journal of Educational Research, 105*(5), 319–328.

Australian Curriculum Assessment and Reporting Authority. (2016). The Australian curriculum: Mathematics. Retrieved from http://www.australiancurriculum.edu.au/mathematics/structure.

Ball, D. L., Thames, M. H., & Phelps, G. (2008). Content knowledge for teaching: What makes it so special. *Journal of Teacher Education, 59*(5), 389–407.

Beswick, K. (2005). The beliefs/practice connection in broadly defined contexts. *Mathematics Education Research Journal, 17*(2), 39–68.

Beswick, K. (2017). Raising attainment: What might we learn from teachers' beliefs about their best and worst mathematics students? In C. Andra, D. Brunetto, E. Levenson, & P. Liljedahl (Eds.), *Teaching and learning in maths classrooms* (pp. 95–106). Cham: Springer International Publishing.

Beswick, K., & Callingham, R. (2014). The beliefs of pre-service primary and secondary mathematics teachers, in-service mathematics teachers, and mathematics teacher educators. In C. Nicol, P. Liljedahl, S. Oesterle, & D. Allan (Eds.), *Proceedings of the 38th conference of the international group for the psychology of mathematics education* (Vol. 2, pp. 137–144). Vancouver: PME.

Boaler, J. (2013). Ability and mathematics: The mindset revolution this is reshaping education. *Forum, 55*(1), 143–152.

Choudhury, S. A., & Barooah, I. P. (2016). Character strengths and academic achievement in undergraduate college students. *Indian Journal of Positive Psychology, 7*(1), 76–83.

Clarke, A., Friede, T., Putz, R., Ashdown, J., Martin, S., Blake, A., et al. (2011). Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS): Validated for teenage school students in England and Scotland. *Public Health, 11*, 487.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum Press.

Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., & Schellinger, K. B. (2011). The impact of enhancing students' social and emotional learning: A meta-analysis of school based universal interventions. *Child Development, 82*, 405–432.

Dweck, C. S. (2006). *Mindset: The new psychology of success*. New York: Random House.

Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden and build theory of positive emotions. *American Psychologist, 56*(3), 218–226.

Grady, M. (2016). Whatever happened to productive disposition? *Mathematics Teaching in the Middle School, 21*(9), 516–517.

Green, L. S. (2014). Positive education: An Australian perspective. In M. J. Furlong, R. Gilman, & E. S. Huebner (Eds.), *Handbook of positive psychology in schools* (pp. 401–415). New York: Taylor & Francis.

Hannula, M. S. (2012). Exploring new dimensions of mathematics-related affect: Embodied and social theories. *Research in Mathematics Education, 14*(2), 137–161.

International Positive Education Network. (n.d.). Retrieved from http://www.ipositive-education.net/.

Kalder, R. S., & Lesik, S. A. (2011). A classification of attitudes and beliefs towards mathematics for secondary mathematics pre-service teachers and elementary pre-service teachers: An exploratory study using latent class analysis. *Issues in the Undergraduate Mathematics Preparation of School Teachers, 5*, 20–20.

Kilpatrick, J., Swafford, J., & Findell, B. (Eds.). (2001). *Adding it up: Helping children learn mathematics*. Washington, DC: National Academy Press.

Ma, X., & Kishor, N. (1997). Assessing the relationship between attitude toward mathematics and achievement in mathematics: A meta-analysis. *Journal for Research in Mathematics Education, 28*(1), 26–47.

Madden, W., Green, S., & Grant, A. (2011). A pilot study evaluating strengths-based coaching for primary students: Enhancing engagement and hope. *International Coaching Psychology Review, 61*, 71–83.

Moyer, J. C., Robison, V., & Cai, J. (2018). Attitudes of high-school students taught using traditional and reform mathematics curricula in middle school: A retrospective analysis. *Educational Studies in Mathematics, 98*(2), 115–134.

Muis, K. R., Psaradellis, C., Chevrier, M., DiLeo, I., & Lajioe, S. P. (2016). Learning by preparing to teach: fostering self-regulatory processes and achievement during complex mathematics problem solving. *Journal of Educational Psychology, 308*(4), 474–492.

OECD. (2014). *PISA 2012 results: What 15-year-olds know and what they can do with what they know*. Paris: OECD Publishing.

OECD. (2016). *Low performing students: Why they fall behind and how to help them succeed*. Paris: PISA. OECD Publishing. https://doi.org/10.1787/97892642502246-en

Park, N., & Peterson, C. (2009). Character strengths: Research and practice. *Journal of College and Character, 10*(4), 1–10.

Peterson, C., & Seligman, M. E. (2004). *Character strengths and virtues: A handbook and classification*. New York, NY: Oxford University Press.

Peterson, C., & Seligman, M. E. P. (2001). Classifying and measuring strengths of character. In S. J. Lopez & C. R. Synder (Eds.), *Oxford handbook of positive psychology* (2nd ed., pp. 25–33). New York: Oxford University Press.

Romberg, T. A., & Kaput, J. J. (1999). Mathematics worth teaching, mathematics worth understanding. In E. Fennema & T. A. Romberg (Eds.), *Mathematics classrooms that promote understanding* (pp. 3–17). Mahwah, NJ: Lawrence Erlbaum Associates.

Sakiz, G., Pape, S. J., & Hoy, A. W. (2012). Does perceived teacher affective support matter for middle school students in mathematics classrooms? *Journal of School Psychology, 50*(2), 235–255.

Seligman, M. E. P. (2011). *Flourishing: A visionary new understanding of happiness and wellbeing*. New York: Free Press.

Shoshani, A., & Slone, M. (2013). Middle school transition for the strengths perspective: Young adolescents' character strengths, subjective wellbeing and school adjustment. *Journal of Happiness Studies, 14*(1), 1163–1181.

Sullivan, P., & Mornane, A. (2014). Exploring teachers' use of, and students' reactions to, challenging mathematical tasks. *Mathematics Education Research Journal, 26*, 193–213.

Thomson, S., de Bortoli, L., & Buckley, S. (2013). *PISA 2012: How Australia measures up*. Camberwell, VIC: Australian Council for Educational Research.

Thomson, S., Wernert, N., O'Grady, E., & Rodrigues, S. (2017). *TIMSS 2015: Reporting Australia's results*. Camberwell, VIC: Australian Council for Educational Research.

Weber, M., Wagner, L., & Ruch, W. (2016). Positive feelings at school: On the relationship between students' character strengths, school-related affect and school functioning. *Journal of Happiness Studies, 17*, 341–355.

Zins, J. E., Weissberg, R. P., Wang, M. C., & Walberg, H. J. (Eds.). (2004). *Building academic success on social and emotional learning: What does the research say?* New York: Teachers' College Press.