

	Topics	Title	Reference	What was the research about?	What was carried out?	Outcome
1.	MTQ48 Factorial Validity	The Mental Toughness Questionnaire-48: A Re-examination of Factorial Validity	Birch, Phil D. J., Crampton, Simon, Greenlees, Iain A., <u>Lowry, Ruth G.</u> and Coffee, Pete (2017) <i>The Mental Toughness Questionnaire-48: A Re-examination of Factorial Validity</i> . International Journal of Sport Psychology, 48 (3). pp. 331-355. ISSN 0047-0767	To re-examine the factorial validity of the four- and six-factor models of MTQ48 using independent student-athlete samples. This is important to test the robustness across different populations that the initial validation of the instrument.	Used confirmatory factor analysis to examine patterns of interrelationships among constructs and to examine the factorial validity. Two studies carried out on competitive student-athletes. Both studies used MTQ48. Study two also includes a social desirability scale.	Study one: Inter-factor correlations suggest that the factors represent related yet independent components of the 4/6Cs models of MT. The four-factor solution demonstrated adequate internal reliability except for challenge and control scales. The six-factor solution demonstrated adequate internal reliability except for commitment, challenge, emotional control and life control. The study showed the six-factor solution to be superior. Study two: Inter-factor correlations suggest that the factors represent related yet independent components of the 4/6Cs models of MT. Four-factor solution demonstrated adequate internal reliability for all scales except control. The six-factor solution also demonstrated adequate internal reliability on scales except from emotional control and life control. Socially desirable responding had little impact. Results indicate that in its present form, the MTQ48 may not be a 579 valid measure of the

						4/6Cs model of MT when using student.
2.	Mt and Sleep	Adolescents with greater mental toughness show higher sleep efficiency, more deep sleep and fewer awakenings after sleep onset.	Brand, S., Gerber, M., Kalak, N., Kirov, R., Lemola, S., Clough, P. J., ... & Holsboer-Trachsler, E. (2014). Adolescents with greater mental toughness show higher sleep efficiency, more deep sleep and fewer awakenings after sleep onset. <i>Journal of Adolescent Health</i> , 54(1), 109-113.	To explore the extent to which greater MT is associated with objectively assessed sleep among adolescents.	92 adolescents completed the German version of MTQ48. Participants were split into groups of high and low mental toughness. Objective sleep recorded via EEG and subjective sleep assessed via questionnaire.	Higher MT had higher sleep efficiency and a lower number of awakenings after sleep onset, less light sleep, more deep sleep compared to those with lower MT. Also reported lower daytime sleepiness. A bidirectional association between MT and sleep among adolescence. Improving sleep should increase MT and improving MT should increase sleep. The present results expand previous findings in that this was the first study to prove that among non-elite sport adolescents, high scores of MT were associated with improved objective sleep.
3.	MT and Sleep	“Sleep well, our tough heroes!”—in adolescence, greater mental toughness is related to better sleep schedules.	Brand, S., Gerber, M., Kalak, N., Kirov, R., Lemola, S., Clough, P. J., ... & Holsboer-Trachsler, E. (2014). “Sleep well, our tough heroes!”—in adolescence, greater mental toughness is related to better sleep schedules. <i>Behavioral</i>	To explore the extent to which greater MT is associated with subjectively assessed sleep among adolescents.	284 adolescents completed a series of questionnaires assessing mental toughness (as a marker for psychological wellbeing), psychological functioning (optimism, curiosity and explorative behaviour, depressive symptoms, perceived stress) and sleep (quality and quantity).	Greater MT was significantly associated with better sleep quality, shorter sleep onset latency, fewer awakenings after sleep onset and longer sleep duration. Greater MT associated with less perceived stress and less depressive symptoms. MT was indirectly associated with sleep quality. MT report good sleep quality and sleep schedules along with psychological wellbeing.

			<i>sleep medicine</i> , 12(6), 444-454.			
4.	MT and sleep	Does objectively assessed sleep at five years predict sleep and psychological functioning at 14 years?—Hmm, yes and no!	Brand, S., Hatzinger, M., Stadler, C., Bolten, M., von Wyl, A., Perren, S., ... & Holsboer-Trachsler, E. (2015). Does objectively assessed sleep at five years predict sleep and psychological functioning at 14 years?—Hmm, yes and no!. <i>Journal of psychiatric research</i> , 60, 148-155.	To explore the extent to which objectively assessed sleep at kindergarten level predicts sleep and psychological functioning in adolescence.	37 adolescents aged 14 years of 67 participants assessed as pre-schoolers took part in the follow-up study nine years later. Completed a series of questionnaires related to sleep and psychological functioning. Sleep-ECG clusters of poor, normal and good sleepers assessed as children nine years earlier were used as predictors for subjective sleep and psychological functioning in adolescence.	At the age of 14, those who were normal and good sleepers at the age of five had more positive psychological functioning on dimensions including mental toughness, peer relationship, self-esteem and perceived stress but did not differ in current sleep patterns. Objectively assessed sleep patterns at the age of five are predictive of aspects of psychological functioning during adolescence.
5.	MT, sleep and life quality	During early and mid-adolescence, greater mental toughness is related to increased sleep quality and quality of life.	Brand, S., Kalak, N., Gerber, M., Clough, P. J., Lemola, S., Pühse, U., & Holsboer-Trachsler, E. (2016). During early and mid-adolescence, greater mental toughness is related to increased sleep quality and quality of life. <i>Journal of health psychology</i> , 21(6), 905-915.	To explore the association between mental toughness, subjective sleep, physical activity and quality of life.	1475 participants aged 11-16 years completed questionnaires related to mental toughness, subjective sleep, physical activity and quality of life.	Greater MT was significantly associated with male gender, lower sleep disturbances and greater quality of life. During early and mid-adolescence, greater mental toughness is related to increased sleep quality and quality of life. Greater MT was associated with lower sleep disturbances. Among late adolescence, greater MT was associated with both increased subjective and objective sleep.

6.	MT and affect intensity	The Relationship between Mental Toughness and Affect Intensity.	Crust, L. (2009). The relationship between mental toughness and affect intensity. <i>Personality and Individual Differences</i> , 47(8), 959-963.	Tested the relationship between mental toughness and affect intensity to determine whether mentally tough athletes generally experienced more or less intense emotions.	A sample of 112 sports performers (55 men and 57 women) aged between 18 and 51 years (M = 29.3, s = 10.3) acted as participants and ranged from recreational to national level in a variety of sports. To determine levels of emotional reactivity, the Affect Intensity Measure (AIM2 Larsen, 1984) was completed by each participant. The MTQ48 (Clough et al., 2002), was used to measure mental toughness.	Mental toughness and affect intensity were found to be unrelated. This is an important finding because it suggests participants with high or low levels of mental toughness do not characteristically experience more or less intense emotions. Thus, there is no evidence to suggest the ability of mentally tough athletes to remain relatively unaffected by pressure or adversity is due to lower levels of affect intensity.
7.	ME + Development + Sport	Developing Mental Toughness: From Research to Practice	Crust, L., & Clough, P. J. (2011). Developing mental toughness: From research to practice. <i>Journal of Sport Psychology in Action</i> , 2(1), 21-32.	Reviews recent evidence concerning the development of mental toughness in young athletes, from first involvement in sport through to early adulthood.		Argue that to develop mental toughness, young athletes must be gradually exposed to, rather than shielded from, demanding situations in training and competition to learn how to cope. Also, as athletes become more emotionally mature, they should become increasingly involved in making decisions regarding their own development.

8.	MTQ Comparisons	Comparing two measures of mental toughness	Crust, L., & Swann, C. (2011). Comparing two measures of mental toughness. <i>Personality and Individual Differences</i> , 50(2), 217-221.	To test the relations between two measures of mental toughness – the MTQ48 and the 14-item SMTQ (Sheard et al., 2009).	A sample of 110 male athletes (M age = 20.81 years, SD = 2.76), derived from University sports teams and local sports clubs	Pearson correlations revealed a significant and positive relationship between higher-order mental toughness scores. Correlations between similar mental toughness subscales were found to be positive and significant but somewhat lower than expected. Results suggest instrument subscales with similar labels are not measuring the same components of mental toughness.
9.	MT and dispositional flow	The relationship between mental toughness and dispositional flow	Crust, L., & Swann, C. (2013). The relationship between mental toughness and dispositional flow. <i>European Journal of Sport Science</i> , 13(2), 215-220.	To examine the relationship between mental toughness and dispositional flow.	A sample of 135 athletes (M age=20.81 years, SD=2.76), derived from University sports teams and local sports clubs completed questionnaires to assess MT and dispositional flow.	Correlations between total MT and dispositional flow subscales were all found to be significant and positive, ranging from 0.26 to 0.68. Correlations between global flow and MT subscales were also all significant and positive, ranging between 0.43 and 0.65. Linear regression analyses found MT subscales to account for 45% of the variance in disposition flow, and flow subscales to account for 50% of the variance in MT. These results suggest a reciprocal relationship between MT and flow.
10	MT, higher education and achievement	Mental toughness in higher education: Relationships with achievement and profession in first-	Perry, J., Clough, P. J., Crust, L., Earle, K., Earle, F., & Clough, A. (2014). Mental toughness in higher education:	The purpose was to examine the importance of mental toughness in higher education and predicted mentally tough students would	Examined mental toughness in 161 first-year sports students at a UK University using a self-report questionnaire (MTQ48). A measure of achievement	Significant and positive correlations were found between total mental toughness, grades, and progression. Linear regression analysis found mental toughness subscales of life control and

		year university sports students	Relationships with achievement and profession in first-year university sports students (Pre-published version).	be more likely to pass and achieve higher grades than less tough students.	(year grade) and progression (pass, fail, or re-sit) was also obtained for each participant.	interpersonal confidence to be significant predictors of academic achievement. Significantly higher levels of total mental toughness, life control and interpersonal confidence were found in students that passed, as opposed to failed. Results suggest that the MTQ48 may be a useful screening device to identify students at risk of failing and dropping out of their program. Interventions that target life control and interpersonal confidence would appear to be most salient.
11	MT and stress	Are Adolescents with High Mental Toughness Levels More Resilient Against Stress?	Gerber, M., Kalak, N., Lemola, S., Clough, P. J., Perry, J. L., Pühse, U., ... & Brand, S. (2013). Are adolescents with high mental toughness levels more resilient against stress?. Stress and Health, 29(2), 164-171.	This study examines whether mentally tough participants exhibit resilience against stress	This is a cross-sectional study based on two different samples: Sample 1 consisted of 284 high school students (99 males, 185 females, M = 18.3 years). Sample 2 consisted of 140 first through fifth-semester undergraduate students (53 males, 87 females, M = 20.0 years). Participants provided information about their level of perceived stress (10-item Perceived Stress Scale), mental toughness (48-item Mental Toughness Questionnaire)	Consistent across the two samples, mental toughness mitigated the relationship between high stress and depressive symptoms. The interaction between stress and mental toughness explained 2% of variance in the adolescent sample and 10% of variance among young adults. Mental toughness may appeal to individuals that are typically difficult to be reached with health interventions. Because mental toughness is part of young people's daily speech, it may serve as a less academic resource than other health psychology concepts.

					and depressive symptoms (Beck Depression Inventory).	
12	MT and physical activity	Adolescents' exercise and physical activity are associated with mental toughness	Gerber, M., Kalak, N., Lemola, S., Clough, P. J., Pühse, U., Elliot, C., ... & Brand, S. (2012). Adolescents' exercise and physical activity are associated with mental toughness. <i>Mental health and physical activity</i> , 5(1), 35-42.	The purpose of this study was to compare the mental toughness of adolescents and young adults with self-reported exercise, physical activity and recommended levels of physical activity.	A total of 284 high school students (99 males, 185 females, M age = 18.3 years, SD = 4.17) completed the Mental Toughness Questionnaire (MTQ48). They also reported on vigorous exercise and moderate physical activity by completing items from the International Physical Activity Questionnaire (IPAQ).	Male participants reported higher toughness scores than females for most subscales. After controlling for gender, participants with higher exercise and physical activity levels scored higher in most MTQ48 subscales. Individuals who fulfilled current physical activity recommendations also reported elevated mental toughness scores compared to those who did not. Acquiring a mindset of mental toughness might be one way that physical activity and exercise can impact an individuals' mental health. Longitudinal and intervention studies are needed to determine the direction of causality.
13	MT, adolescence and stress	Adolescents with high mental toughness adapt better to perceived stress: A longitudinal study with Swiss vocational students	Gerber, M., Brand, S., Feldmeth, A. K., Lang, C., Elliot, C., Holsboer-Trachsler, E., & Pühse, U. (2013). Adolescents with high mental toughness adapt better to perceived	Prospectively examined the association between mental toughness and stress resilience	865 students (M = 17.86 years, 42.7% girls) from two vocational schools. Within each school, separate cluster analyses identified groups with different profiles of risk (assessed with perceived stress) and adaptation	Four clusters emerged characterizing students with well-adjusted (low risk, good adaptation), maladjusted (elevated risk, bad adaptation), deteriorated (low initial risk, worsening adaptation) and resilient profiles (elevated initial risk, improving

			stress: A longitudinal study with Swiss vocational students. Personality and Individual Differences, 54(7), 808-814.		(operationalized with depressive symptoms and life satisfaction).	adaptation). The latter two clusters reported similar levels of mental toughness at baseline, but resilient adolescents scored significantly higher on mental toughness at follow-up. After controlling for possible confounds, baseline toughness levels predicted depressive symptoms and life satisfaction over time. This study shows that mental toughness operates as a stress resilience resource.
14	Burnout, physical activity and stress	Burnout and mental health in Swiss vocational students: the moderating role of physical activity	Gerber, M., Lang, C., Feldmeth, A. K., Elliot, C., Brand, S., Holsboer-Trachsler, E., & Pühse, U. (2015). Burnout and mental health in Swiss vocational students: the moderating role of physical activity. Journal of research on adolescence, 25(1), 63-74.	This study examined the association between burnout and mental health among students.	56 Swiss vocational students (29 males, 27 females, M = 18.1, SD = 1.2 years) and tested whether recommended levels of moderate-to-vigorous physical activity (MVPA) attenuate this relationship.	Burnout was strongly associated with increased depressive symptoms and decreased levels of life satisfaction, mental toughness, and quality of sleep. Students above recommended levels of MVPA reported lower burnout and higher mental health. No significant moderator effects were observed. Symptoms of burnout were associated with increased mental health problems. Physical activity should be promoted to prevent burnout because nearly half of the students did not meet MVPA recommendations.

15	Stress, burnout and adolescents	The relationship between mental toughness, stress, and burnout among adolescents: a longitudinal study with Swiss vocational students	Gerber, M., Feldmeth, A. K., Lang, C., Brand, S., Elliot, C., Holsboer-Trachsler, E., & Pühse, U. (2015). The relationship between mental toughness, stress, and burnout among adolescents: a longitudinal study with Swiss vocational students. <i>Psychological reports</i> , 117(3), 703-723.	The purpose of this study was to test whether mental toughness protects against symptoms of burnout and whether mental toughness moderates the relationship between perceived stress and burnout over time	Fifty-four vocational students (M age = 18.1 yr., SD = 1.2; 27 males, 27 females) completed self-report questionnaires twice, 10 mo. apart. Perceived stress, mental toughness, and burnout were measured using the Adolescent Stress Questionnaire (ASQ), the Mental Toughness Questionnaire (MTQ), and the Shirom-Melamed Burnout Measure (SMBM).	Students who perceived higher stress and lower mental toughness scores reported higher burnout symptoms. Although no significant interaction effects were found between stress and mental toughness in the prediction of burnout, the graphical inspection of the interactions indicated that among students with high stress, those with high mental toughness remained below the cut-off for mild burnout, whereas an increase in burnout symptoms was observable among peers with low mental toughness.
16	Stress, burnout and depression	Effects of stress and mental toughness on burnout and depressive symptoms: A prospective study with young elite athletes	Gerber, M., Best, S., Meerstetter, F., Walter, M., Ludyga, S., Brand, S., ... & Gustafsson, H. (2018). Effects of stress and mental toughness on burnout and depressive symptoms: A prospective study with young elite athletes. <i>Journal of science and medicine in sport</i> , 21(12), 1200-1205.	To examine in a sample of young elite athletes (a) the presence of clinically relevant symptoms of burnout and depression, and (b) a possible interaction of perceived stress and mental toughness in the prediction of burnout and depressive symptoms	A representative sample of 257 young elite athletes (M = 16.82 years, SD = 1.44, 36% females) was recruited in North-Western Switzerland. 197 athletes were followed-up across a 6-month period. Burnout was assessed with the Shirom-Melamed Burnout Measure (SMBM), and depression with the 9-item depression module of the Patient Health Questionnaire (PHQ). Stress perceptions were assessed with the Perceived Stress Scale (PSS), and mental	The percentage of athletes with clinically relevant levels of burnout and depressive symptoms was 12% and 9%, respectively. Both cross-sectional and prospective analyses showed that compared to participants with low mental toughness, those with higher mental toughness scores reported significantly fewer mental health issues when exposed to high stress. By contrast, when stress levels were low, mental toughness was unrelated to psychological health complaints. While high perceived stress was associated with increased psychological health

					toughness with the Mental Toughness Questionnaire (MTQ).	complaints, mental toughness was able to off-set some of the negative consequences resulting from high-stress exposure.
17	MT, Turnover and Forces Recruits	A Model of Voluntary Turnover in Male Canadian Forces Recruits	Renata Godlewski & Theresa Kline (2012) A Model of Voluntary Turnover in Male Canadian Forces Recruits, Military Psychology, 24:3, 251-269, DOI: 10.1080/08995605.2012.678229	In response to growing voluntary attrition concerns, a model of early voluntary turnover was tested.	This study of voluntary turnover was conducted on Canadian Forces (CF) recruits (N = 459) undergoing basic military training. The model included pre-entry individual characteristics (pre-entry normative commitment, desire for military career, and mental toughness), postentry work attitudes and intentions (normative CF commitment, affective commitment, and turnover intentions), and actual turnover behaviour.	Ten of the 13 specified paths were supported, and the model yielded an overall good fit, providing empirical evidence for the influence of pre-entry characteristics on the development of commitment and subsequent turnover.
18	Stress, depression, burnout, anxiety and sleep	Does mental toughness buffer the relationship between perceived stress, depression, burnout, anxiety, and sleep?	Haghighi, M., & Gerber, M. (2019). Does mental toughness buffer the relationship between perceived stress, depression, burnout, anxiety, and sleep?. International Journal of Stress	The present study examines whether mental toughness moderates the relationship between stress and four mental health outcomes (depressive symptoms, anxiety, burnout, and insomnia)	In total, 207 medical students ($M_{\text{age}} = 22.04$ years, $SD = 2.74$, 51% male) from Iran took part in this cross-sectional study and completed a series of self-report questionnaires including the Perceived Stress Scale, the Mental Toughness Questionnaire, the Beck Depression	The findings show that stress was associated with more frequent health complaints across all outcomes, whereas mental toughness was associated with fewer mental health complaints. Elevated stress was only associated with higher depressive symptoms among students with low mental toughness scores, not among students with high mental

			Management, 26(3), 297.		Inventory, the State–Trait Anxiety Inventory, the Maslach Burnout Inventory—Student Survey, and the Insomnia Severity Index.	toughness scores. Thus, our findings suggest that mental toughness may operate as a stress resilience resource among university students and may constitute a target variable for health interventions aimed at student populations.
19	Dispositional flow in sports	Exploring athletes' perceptions of the relationship between mental toughness and dispositional flow in sport	Jackman, P. C., Swann, C., & Crust, L. (2016). Exploring athletes' perceptions of the relationship between mental toughness and dispositional flow in sport. <i>Psychology of Sport and Exercise</i> , 27, 56-65.	Based on common overlaps with peak performance, confidence, control, concentration, and thriving in demanding situations, the present research aimed to explore the relationship between MT and dispositional flow and elucidate the psychological variables underlying dispositional flow.	An intensity sampling strategy was used to identify individuals with higher/lower MT and dispositional flow. Semi-structured interviews were conducted with 16 athletes (M age = 25, SD = 3.24; female n = 10; male n = 6). An inductive content analysis was undertaken to interpret data.	Seven general dimensions describing the psychological attributes related to dispositional flow in athletes with higher and lower MT emerged. Specifically, differences in confidence, perfectionism, goal orientation, coping mechanism selection, locus of control, optimism and concentration were apparent and could account for differences in dispositional flow. While all athletes experienced flow, there were differences in dispositional flow and the processes involved in entering, maintaining and restoring flow between higher and lower MT subgroups. Findings are discussed in relation to the existing literature, and recommendations for future research into the MT-flow relationship are outlined.

20	Dispositional flow in sports	Further examining the relationship between mental toughness and dispositional flow in sport: A mediation analysis	Jackman, P., Crust, L., & Swann, C. (2017). Further examining the relationship between mental toughness and dispositional flow in sport: A mediation analysis. <i>International Journal of Sport Psychology</i> , 48(3), 356-374.	The purpose of the study was to further examine the relationship between mental toughness (MT) and dispositional flow in sport	A sample of 256 athletes (M age = 23.65 years, SD = 5.43), competing at international (n = 59), national (n = 77), and club/university (n = 120) levels completed questionnaires assessing MT and dispositional flow.	A significant and positive correlation was found between MT and dispositional flow ($r = 0.50$, $p < 0.001$). Mediation analysis revealed that MT had a significant direct effect on the flow dimensions of challenge-skills balance, clear goals, unambiguous feedback, sense of control and concentration on the task at hand, and significant indirect effects on concentration on the task at hand, sense of control, loss of self-consciousness, action-awareness merging and autotelic experience. Findings suggest that MT has direct and indirect effects on the characteristics of flow, offering new insights regarding optimal human functioning.
21	Hypomania, MT, Physical Activity, Depression and Sleep	"Always Look on the Bright Side of Life!" – Higher Hypomania Scores Are Associated with Higher Mental Toughness, Increased Physical Activity, and Lower Symptoms of Depression and Lower Sleep Complaints	Jahangard, L., Rahmani, A., Haghighi, M., Ahmadpanah, M., Sadeghi Bahmani, D., Soltanian, A. R., Shirzadi, S., Bajoghli, H., Gerber, M., Holsboer-Trachsler, E., & Brand, S. (2017). "Always Look on the Bright Side of Life!" - Higher Hypomania Scores Are Associated	Explored the associations between hypomania, symptoms of depression, sleep complaints, physical activity and mental toughness.	The non-clinical sample consisted of 206 young adults (M = 21.3 years; age range: 18–24 years; 57.3% males). They completed questionnaires covering hypomania, mental toughness, symptoms of depression, physical activity, and sleep quality.	Higher hypomania scores were associated with higher mental toughness, increased physical activity, lower symptoms of depression and lower sleep complaints. No gender differences were observed. Higher hypomania scores were predicted by higher scores of mental toughness subscales of control and challenge and physical activity. The pattern of results suggests that among a non-clinical sample of young

			with Higher Mental Toughness, Increased Physical Activity, and Lower Symptoms of Depression and Lower Sleep Complaints. Frontiers in psychology, 8, 2130. https://doi.org/10.3389/fpsyg.2017.02130			adults, self-rated hypomania scores were associated with higher scores on mental toughness and physical activity, along with lower depression and sleep complaints. The pattern of results further suggests that hypomania traits are associated with a broad range of favourable psychological, behavioural and sleep-related traits, at least among a non-clinical sample of young adults.
22	Stress, Coping Effectiveness and Sport	Mental toughness, stress, stress appraisal, coping and coping effectiveness in sport	Kaiseler, M., Polman, R., & Nicholls, A. (2009). Mental toughness, stress, stress appraisal, coping and coping effectiveness in sport. Personality and individual differences, 47(7), 728-733	The present study aimed to investigate the relationship between mental toughness, stressor appraisal, coping strategies and coping effectiveness among a sample of athletes.	Participants were 482 athletes (male n = 305; female n = 177), aged between 16 and 45 years (M age = 20.44 years, SD = 3.98).	Mental toughness was associated with stress intensity and control appraisal, but not the type of stressor experienced by athletes. Total mental toughness and its six components predicted coping and coping effectiveness in relation to the self-selected stressor. In particular, higher levels of mental toughness were associated with more problem-focused coping, but less emotion-focused and avoidance coping. Coping effectiveness was influenced by the coping strategy employed by the athletes.

23	Suicide and university students	Mental toughness is a predictor of suicidality in university students	http://sheu.org.uk/sh eux/EH/eh362ek.pdf	The purpose of the present study was to examine the extent to which MT statistically predicts suicidality in a sample of students. It was hypothesized that MT would be a significant negative predictor of suicidality after controlling for demographic variables	A sample of 166 (male n = 53, female n = 113) university students aged 19-64 (M = 27.16, SD = 9.31) from the UK universities was recruited using an online survey. The Mental Toughness Questionnaire-18 (MTQ18; Clough et al., 2002) was used to assess MT. The Suicidal Behaviors Questionnaire-Revised (SBQ-R; Osman, Bagge, Gutierrez, Konick, Kooper & Barrios, 2001) was used to measure four elements of suicidal risk; lifetime suicidal ideation and attempts, frequency of past suicidal ideation, the threat of suicidal behaviour, and thoughts about future suicidal behaviour.	The results confirmed that MT can be considered a predictor of suicidality, explaining 21.4% of the variance. In terms of suicidality, results also found that students within second year exhibited higher suicidality levels.
24	Physical activity, sleep and psychological functioning.	Adolescents' personal beliefs about sufficient physical activity are more closely related to sleep and psychological functioning than self-reported physical activity: A prospective study	Lang, C., Brand, S., Colledge, F., Ludyga, S., Pühse, U., & Gerber, M. (2019). Adolescents' personal beliefs about sufficient physical activity are more closely related to sleep and psychological functioning than self-	To examine whether and how self-reported PA and personal beliefs about sufficient PA are associated with sleep and psychological functioning in a sample of Swiss adolescents, using both cross-sectional and prospective data.	864 vocational students (368 girls, 17.98 ± 1.36 years, mean ± SD) was followed prospectively over a 10-month period. At each measurement occasion, participants filled in a series of self-report questionnaires to assess their PA levels, their personal beliefs about whether or not they engage	Adolescents who believe that they are sufficiently physically active to maintain good health reported more restoring sleep. No differences in sleep were found between adolescents who meet PA recommendations vs. those who do not. Additionally, adolescents who believe that they were sufficiently physically active also

			reported physical activity: A prospective study. <i>Journal of sport and health science</i> , 8(3), 280-288.		in sufficient PA, sleep (insomnia symptoms, sleep quality, sleep-onset latency, and number of awakenings), and psychological functioning (depressive symptoms, quality of life, perceived stress, and mental toughness).	reported better psychological functioning.
25	Non-cognitive attributes and education	The study of non-cognitive attributes in education: proposing the mental toughness framework	McGeown, S. P., St Clair-Thompson, H., & Clough, P. (2016). The study of non-cognitive attributes in education: Proposing the mental toughness framework. <i>Education al Review</i> , 68(1), 96-113.	Reviews past research examining mental toughness across different domains (e.g. sport, occupation, education), the extent to which mental toughness aligns with concepts commonly studied within education (i.e. resilience, buoyancy, perseverance, self-efficacy, confidence and motivation), advantages to using a mental toughness framework within education and suggestions for future research.	This review discusses past research into mental toughness. This review will consider the extent to which mental toughness aligns with concepts commonly studied within education (e.g. resilience, self-efficacy, etc.), will propose advantages to using a mental toughness framework within education and provide suggestions for future research.	Mental toughness has been found to be a very useful concept to help explain performance differences in sport and business, as well as showing a significant and positive relationship with mental health and wellbeing. Studying the four components of mental toughness may provide an alternative but fruitful route towards better understanding individual differences in education and allow interventions and supports to be focused more efficiently and effectively.

26	Mental Toughness, adolescents and education.	Understanding and supporting adolescents' mental toughness in an educational context	McGeown, S., Putwain, D., St. Clair-Thompson, H., & Clough, P. (2017). UNDERSTANDING AND SUPPORTING ADOLESCENTS' MENTAL TOUGHNESS IN AN EDUCATION CONTEXT. <i>Psychology in the Schools</i> , 54(2), 196-209.	This study sought to explore the concept of mental toughness (comprising the attributes challenge, commitment, control, and confidence) from the perceptions of adolescents, to better understand their views on these attributes and the extent to which each were regarded as important within an educational setting.	In total, 54 adolescents (31 female) aged 12–17 participated. Focus group interviews ($n = 15$, average group size 3–4) were conducted, audio-recorded, and transcribed verbatim.	The present study highlights considerable value in using the mental toughness framework to understand important noncognitive attributes in an educational setting. Indeed, the combination of these attributes may help to contribute to our understanding of why and how some adolescents flourish at school while others experience difficulties.
27	Mental Toughness, Age and Managerial Level	Mental toughness: managerial and age differences	Marchant, D. C., Polman, R. C., Clough, P. J., Jackson, J. G., Levy, A. R., & Nicholls, A. R. (2009). Mental toughness: Managerial and age differences. <i>Journal of Managerial Psychology</i> .	The purpose of this study is to investigate whether employees at various levels of managerial positions (e.g. senior, middle, and junior) exhibit different levels of mental toughness. In addition, the study seeks to explore possible effects of age on mental toughness.	A total of 522 participants working in UK-based organisations completed demographic information and the Mental Toughness Questionnaire.	Results revealed significant main effects for both managerial position and age. Follow-up analysis revealed that mental toughness ratings were higher in more senior positions, and that mental toughness generally increased with age.

28	Mental Toughness, narcissism and education	Longitudinal associations between narcissism, mental toughness and school achievement	Papageorgiou, K. A., Malanchini, M., Denovan, A., Clough, P. J., Shakeshaft, N., Schofield, K., & Kivas, Y. (2018). Longitudinal associations between narcissism, mental toughness and school achievement. <i>Personality and Individual Differences</i> , 131, 105-110.	This study is the first to explore longitudinally the development of the association between MT, narcissism and achievement in a sample of adolescents.	In total 339 students took part in both collection waves (54% females). Participants' ages ranged between 14 and 21 (M = 15.63, SE = 1.40, in wave 1 and M = 15.83, SE = 1.40, in wave 2).	MT correlated positively with narcissism and predicted a small percentage of the variation in school achievement. Narcissism did not correlate significantly with school achievement. However, subclinical narcissism exerted a significant positive indirect effect on school achievement through MT. The findings suggest that the relationship between narcissism and MT could be one of the non-cognitive mechanisms that underlie individual variation in school achievement.
29	Factorial Validity	Factorial validity of the Mental Toughness Questionnaire-48	Perry, J. L., Clough, P. J., Crust, L., Earle, K., & Nicholls, A. R. (2013). Factorial validity of the mental toughness questionnaire-48. <i>Personality and individual differences</i> , 54(5), 587-592.	The purpose of this study was to assess the factorial validity of the Mental Toughness Questionnaire-48 (Clough, Earle, & Sewell, 2002)	In total, 8207 participants (male n = 4019, female n = 3922, unspecified = 266) aged between 16 and 68 years (M = 37.00, SD = 12.09) completed the MTQ48. Model fit was assessed using confirmatory factor analysis (CFA) and exploratory structural equation modeling, in addition to the robust maximum likelihood estimator	Overall, our results support the factorial validity of the MTQ48 and indicate that the MTQ48 is a robust psychometric measure of mental toughness. Along with previous data, which supports the internal validity of the MTQ48 in addition to results of this study, it would appear that the MTQ48 is an acceptable method of assessing mental toughness.

30	Dark Triad, Mental Toughness, Physical activity and young adults	Examining Dark Triad traits in relation to mental toughness and physical activity in young adults	Sabouri, S., Gerber, M., Bahmani, D. S., Lemola, S., Clough, P. J., Kalak, N., ... & Brand, S. (2016). Examining Dark Triad traits in relation to mental toughness and physical activity in young adults. <i>Neuropsychiatric disease and treatment</i> , 12, 229.	The aims of the present study were 1) to investigate the association between Dark Triad, Mental Toughness, and Physical Activity, and 2) to compare the Dark Triad, Mental Toughness, and Physical Activity scores of men and women.	A total of 341 adults (M=29 years; 51.6% women; range: 18–37 years) took part in the study. Participants completed a series of questionnaires assessing DT, MT, and PA.	DT traits, high MT, and vigorous PA are interrelated. This pattern of results might explain why, for instance, successful professional athletes can at the same time be tough and ruthless.
31	Mental toughness and education	Mental toughness in education: exploring relationships with attainment, attendance, behaviour and peer relationships	St Clair-Thompson, H., Bugler, M., Robinson, J., Clough, P., McGeown, S. P., & Perry, J. (2015). Mental toughness in education: Exploring relationships with attainment, attendance, behaviour and peer relationships. <i>Educational Psychology</i> , 35(7), 886-907.	In a series of three exploratory studies, the research examined the relationship between mental toughness and different aspects of educational performance in adolescents aged 11–16, focusing on academic attainment, school attendance, classroom behaviour and peer relationships.	The participants were 159 students (89 males and 70 females) aged 13–15 years of age (mean age 14 years and 5 months) from a school in the north east of England. Students were asked to complete the Mental Toughness Questionnaire 48 (MTQ48, Clough et al., 2002). The school was then asked to supply the latest national curriculum levels for each student who took part in the study.	Study 1 revealed significant associations between several aspects of mental toughness (but particularly control of life) and academic attainment and attendance. Study 2 revealed significant associations between several aspects of mental toughness (but again particularly control of life) and counterproductive classroom behaviour. Finally, Study 3 demonstrated significant associations between aspects of mental toughness (confidence in abilities and interpersonal confidence) and peer relationships. The results are discussed in terms of the potential value of mental

						toughness as a useful concept in education.
32	Mental Toughness, High School and Undergraduate	Mental toughness and transitions to high school and to undergraduate study	St Clair-Thompson, H., Giles, R., McGeown, S. P., Putwain, D., Clough, P., & Perry, J. (2017). Mental toughness and transitions to high school and to undergraduate study. <i>Educational Psychology, 37</i> (7), 792-809.	The current studies explored the associations between mental toughness and educational transitions. Study 1 examined the relationships between mental toughness and concerns about moving to a new school in 105 children aged 12–13 years of age. Study 2 examined the relationships between mental toughness and adjustment to university in 200 undergraduate students at various stages of their course.		Study one revealed significant relationships between several aspects of mental toughness, but particularly confidence in abilities, and children’s concerns. Study two revealed a role for several aspects of mental toughness; commitment, control of life, control of emotion, confidence in abilities and interpersonal confidence.
33	Mental Toughness, psychological wellbeing and undergraduate students	Relationships between mental toughness and psychological wellbeing in undergraduate students	Stamp, E., Crust, L., Swann, C., Perry, J., Clough, P., & Marchant, D. (2015). Relationships between mental toughness and psychological	This study examined relationships between mental toughness (MT) and psychological wellbeing (PWB) in undergraduate students. Following	Participants were undergraduate students (n = 168) from nine United Kingdom universities. The sample included participants from a range of different degree programmes and	Multiple linear regression analyses found that components of MT were moderate to strong predictors of PWB with between 35% and 64% of variance explained. Importantly, age, gender, and level of study were not

			wellbeing in undergraduate students. <i>Personality and Individual Differences</i> , 75, 170-174.	previous research that identified significant and positive relations between MT and academic performance, it was hypothesised that MT would predict PWB within a student population.	from all three years of standard undergraduate study. Online questionnaires were completed to assess MT and PWB.	found to predict PWB. These findings are consistent with stated hypotheses and further demonstrate the potential importance of MT within educational settings.
34	Mental Toughness, barriers to exercise and undergraduate students	Relationships between mental toughness, barriers to exercise, and exercise behaviour in undergraduate students	Perry, J., Stamp, E., Crust, L., & Swann, C. F. (2017). Relationships between mental toughness, barriers to exercise, and exercise behaviour in undergraduate students.	The present study explored relationships between mental toughness (MT), barriers to exercise, and self-reported exercise behaviour in university students. Perceived barriers to exercise are important since previous work has identified barriers as strong predictors of exercise behaviour. MT was hypothesised to predict exercise barriers and self-reported exercise behaviour.	Participants were 173 undergraduate students (45 men, 128 women) from 10 United Kingdom universities. Questionnaires were used to assess MT, exercise levels, and exercise barriers.	Path analysis identified that MT predicted barriers to exercise, with higher MT associated with weaker perceived barriers. Regular exercisers were found to have significantly higher MT than non-regular exercisers, with commitment identified as a key difference. These findings support the proposed hypotheses and provide further evidence of the importance of MT in exercise / physical activity contexts. Future research that adopts longitudinal designs and tests targeted interventions to reduce perceptions of barriers and enhance exercise participation are encouraged.