**Conceptual clarification of mental toughness: A literature review and content analysis**

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# Abstract

A consensus on the definition of mental toughness is yet to be established. From a systematic literature review and content analysis, *maintaining* *stability or consistency* in *challenging and demanding situations*, and in particular, when *performing under pressur*e were common themes among mental toughness definitions. However, the object of stability or consistency remains unclear. Second, mental toughness was compared to similar concepts of resilience, hardiness, grit, psychological flexibility, sisu and mental fitness, to identify their collective function and the incremental validity of mental toughness as a standalone construct. Common themes among constructs was an *ability, skill or competence* to *maintain behaviour and effort towards goals and values,* whereas mental toughness provided incremental validity in the context of *performing under pressure.* An unexpected finding was that mental toughness did not share the largely endorsed feature of *adaptation* with its related constructs. Last, mental toughness was compared with its constituent terms (‘mental’ and ‘toughness’) and its related applications (material toughness and gender norm toughness). From this comparison, *group and/or pattern of emotions,* and *group and/or pattern of cognitions* was inherited from ‘mental’; and *ability, skill or competence* to *maintain behaviour and effort towards goals and values* as well as *determination* and *maintenance of determination under stressful and challenging situations* was inherited from ‘toughness’ and gender norm toughness. The major feature omitted by mental toughness definitions but concurrently endorsed by both groups of similar constructs was *endurance, discomfort tolerance and stress tolerance.* Implications of these findings for current theory and future research are discussed.

Keywords: mental toughness, literature review, definition, similarities, differences.

Suffering and dealing with stressors, adversity and other inordinate demands are part of the human condition ([Sheard, Golby, & van Wersch, 2009](#_ENREF_4)). From the tenets of Positive Psychology, however, certain human strengths may transcend these demands to facilitate growth and thriving (Seligman & Csikszentmihalyi, 2000). Mental toughness may be one such strength. Despite consensus on its benefits, ‘mental toughness’ is one of the most used but least understood terms in psychology (Jones, Hanton & Connaughton, 2007) and is noted for its relative disagreement between researchers and overall lack of conceptual clarity (Connaughton, Hanton, Jones & Wadey, 2008; Sheard, 2013). The overall aim of the research is to address some of these areas of confusion by drawing various sources of conceptual information together in one place for the first time.

First, the diverse academic definitions that conceptualise mental toughness will be drawn together and compared (See Table 1 below). Previously, although researchers have employed robust qualitative methodologies for conceptualising mental toughness (e.g., Coulter, Mallett, & Gucciardi, 2010; Gucciardi, Gordon, & Dimmock, 2008; Jones, Hanton, & Connaughton, 2002; Middleton, Marsh, Martin, Richards & Perry, 2004; Thelwell, Weston, & Greenlees, 2005), these studies have developed new definitions or supported pre-selected existing ones, rather than consolidating knowledge into a single theory. Given this need for conceptual consolidation, the first aim of this study is to systematically review the academic conceptualisations of mental toughness and identify major areas of agreement and disagreement.

Second, mental toughness will be drawn together with its related constructs. As shown in Table 2 below, mental toughness has been empirically linked with constructs such as resilience, hardiness and grit; and can be theoretically tied to psychological flexibility, sisu and mental fitness. Given the strength of these links, ‘fuzzy’ boundaries exist between mental toughness and its related constructs. As a result, it is important to understand the collective function of this group as well as the incremental validity of mental toughness (Gucciardi, Hanton, Gordon, Mallett, & Temby, 2014). Although these issues have been briefly discussed before (e.g., resilience and hardiness; Gucciardi & Gordon, 2009; Gucciardi et al., 2008; Gucciardi et al., 2014), a systematic and comprehensive evaluation of their similarities and differences have not yet been conducted. On this basis, the second aim of this paper is systematically identify the conceptual overlap and divergence between mental toughness and its related constructs.

### Table 1.

*Definitions of mental toughness*

|  |  |
| --- | --- |
| **Author** | **Definition** |
| Loehr (1994, p. 5) | “Toughness is the ability to consistently perform toward the upper range of your talent and skill regardless of competitive circumstances” |
| Jones et al. (2002, p. 209) | “Having the natural or developed psychological edge that enables you to, generally, cope better than your opponents with the many demands (competition, training, lifestyle) that sport places on a performer and, speciﬁcally, be more consistent and better than your opponents in remaining determined, focused, conﬁdent, and in control under pressure.” |
| Clough, Earle and Sewell (2002, p. 38) | “Mentally tough individuals tend to be sociable and outgoing; as they are able to remain calm and relaxed, they are competitive in many situations and have lower anxiety levels than others. With a high sense of self-belief and an unshakeable faith that they control their own destiny, these individuals can remain relatively unaffected by competition or adversity.” |
| Fletcher (2005, p. 158) | “An individual's propensity to manage the demands of environmental stressors, ranging from an absolute resilience to extreme vulnerability.” |
| Thelwell et al. (2005, pp. 328–329) | “Mental toughness is having the natural or developed psychological edge that enables you to always cope better than your opponents with the many demands (competition, training, and lifestyle) that soccer places on the performer. Specifically, be more consistent and better than your opponents in remaining determined, focused, confident, and in control under pressure.” |
| Gucciardi, et al. (2008, p. 278) | “Mental toughness in Australian Football is a collection of values, attitudes, behaviours, and emotions that enable you to persevere and overcome any obstacle, adversity, or pressure experienced, but also to maintain concentration and motivation when things are going well to consistently achieve your goals.” |
| Gucciardi Gordon and Dimmock (2009, p. 67) | “Mental toughness is a collection of experientially developed and inherent sport-specific and sport-general values, attitudes, emotions, and cognitions that influence the way in which an individual approaches, responds to, and appraises both negatively and positively construed pressures, challenges, and adversities to consistently achieve his or her goals.” |
| Coulter et al. (2010, p. 715) | “Mental toughness is the presence of some or the entire collection of experientially developed and inherent values, attitudes, emotions, cognitions and behaviours that influence the way in which an individual approaches, responds to, and appraises both negatively and positively construed pressures, challenges and adversities to consistently achieve his or her goals.” |
| Mallett and Coulter (2011, p. 191) | “Mental toughness is associated with the pursuit of goals in achievement contexts, and in that quest, particular values, attitudes, emotions, cognitions, and behaviours seem to influence the way in which an individual approaches, responds to, and appraises both negatively and positively construed pressures, challenges, and adversities.” |
| Clough and Strycharczyk (2012, p. 1) | “The quality which determines in large part how people deal effectively with challenge, stressors and pressure… irrespective of prevailing circumstances.” |
| Mahoney et al. (2014, p. 234) | “A collection of personal characteristics (i.e., forces, resources, and demands, discussed later) that allow individuals to regularly perform to or around the best of their abilities regardless of circumstances faced.” |
| Hardy, Bell and Beattie (2013, p. 70) | “The ability to achieve personal goals in the face of pressure from a wide range of different stressors.” |
| Gucciardi et al. (2014, p. 28) | “A personal capacity to produce consistently high levels of subjective (e.g., personal goal achievement) or objective (e.g., race times) performance despite everyday challenges and stressors as well as significant adversities.” |

Note: Definitions were obtained through a systematic literature review process (see below for further detail).

### Table 2.

*Definitions of related constructs*

|  |  |  |
| --- | --- | --- |
| **Related construct** | **Definitions** | **Evidence of relationship with mental toughness** |
| Resilience | 1. “Protective factors which modify, ameliorate or alter a person's response to some environmental hazard that predisposes to a maladaptive outcome.” (Rutter, 1987, p. 316; 6060 citations) 2. “The process of adapting well in the face of adversity, trauma, tragedy, threats, or even signiﬁcant sources of stress – such as family and relationship problems, serious health problems, or workplace and ﬁnancial stressors. It means ‘bouncing back’ from difﬁcult experiences.” (American Psychological Association, 2015) | Moderate correlations (r= 35–.54; p < .01; Gucciardi & Gordon, 2009) |
| Hardiness | 1. “Persons who experience high degrees of stress without falling ill have a personality structure differentiating them from persons who become sick under stress. This personality difference is best characterized by the term hardiness.” (Kobasa, 1979, p. 3; 3768 citations) 2. “A personality trait that is indicative of individuals' resilience and success in managing stressful circumstances.” (Golubovich, Chang, & Eatough, May 2014, p. 757) | Weak to moderate correlations(r *=*0.34 **-** 0.384; p < .05;Golby & Sheard, 2004;Sheard, 2009). |
| Grit | 1. “Perseverance and passion for long term goals" (Duckworth, Peterson, Matthews, & Kelly, 2007, p. 1087; 996 citations). 2. “The ability to strenuously pursue long-term goals despite obstacles and adversity” (Anestis & Selby, January 2015, p. 212) | Moderate correlations (r = .424, p < .01; Joseph, 2009). |
| Psychological flexibility | 1. “The ability to fully contact the present moment and the thoughts and feelings it contains without needless defence.” (Bond et al., 2011, p. 678; 718 citations) 2. “The ability to persist with and/or change behaviour that is consistent with personal values while allowing difficult thoughts or feelings to occur.” (Whiting, Deane, Ciarrochi, McLeod, & Simpson, June 2015, p. 415) | No direct comparisons. Conceptual similarities may exist along shared features of ‘emotional control’ (Clough et al., 2002; Jones et al., 2002), ‘emotion regulation’ (Gucciardi et al., 2014) or ‘emotional flexiblity’ (Loehr, 1994). |
| Sisu | 1. “Sisu (SIH-soo or SEE-soo): (1) inner determination; (2) courage, tenacity, stubborn determination, energy and a will and an ability to get things done (Kolehmainen, 1957, p. ix).” (Lucas & Buzzanell, 2004, p. 273; 39 citations) 2. “The Finnish word “sisu” is very dear to us. It is untranslatable, but it means approximately strength of will, determination, and perseverance. We want to see ourselves as modest, hard-working, no-nonsense people who do not bow or resign to anyone.” (Sinkkonen, March 2013, pp. 49-50) | No direct comparisons. Conceptual similarities may exist along shared features of ‘determination’ and ‘courage’ (Bull, Shambrook, James, & Brooks, 2005; Gucciardi et al., 2008; Jones et al., 2002; Lahti, 2013; Lucas & Buzzanell, 2004; Ryba, Stambulova, & Wrisberg 2009) |
|  |  |  |
|  |  |  |
| **Related construct** | **Definitions** | **Evidence of relationship with mental toughness** |
| Mental fitness | a) and b) “Mental fitness is the changeable capacity to utilise resources and skills to psychologically adapt to environmental challenges or advantages to meet psychological needs.” (Robinson, Oades & Caputi, 2015, p. 56) | No direct comparisons. Conceptual similarities may exist along shared features of ‘personal resources’ (Gucciardi et al., 2014; Robinson et al., 2015), ‘strength’ (Robinson et al., 2015; Pickering, Hammermeister, Ohlson, Holliday & Ulmer, 2013; Tenenbaum, Fogarty, Stewart, Calcagnini, Kirker, Thorne, & Christensen, 1999), ‘flexibility’ (Robinson et al., 2015; Loehr, 1994) and ‘endurance’ (Robinson et al., 2015; Crust & Clough, 2005). |

a) most cited and b) most recent source

*Note.* Definitions in a) and b) were obtained through a systematic literature review process (see below for further detail).

Third, mental toughness will be compared with its constituent terms (i.e., ‘mental’ and ‘toughness’) and its related applications of toughness (e.g., material toughness; and gender norm toughness, that is, gender-specific expectations typically ascribed to men for behaving in a tough manner; see Table 3 below).

### Table 3.

*Definitions of ‘mental’, ‘toughness’ and related applications of toughness*

|  |  |
| --- | --- |
| **Related construct** | **Definition(s)** |
| Mental | “Of or relating to the mind; *specifically* of or relating to the total emotional and intellectual response of an individual to external reality <mental health>; of or relating to intellectual as contrasted with emotional activity; of, relating to, or being intellectual as contrasted with overt physical activity; occurring or experienced in the mind <mental anguish>; relating to the mind, its activity, or its products as an object of study; relating to spirit or idea as opposed to matter” (“Mental”, n.d.). |
| Toughness | “Strong or firm in texture but flexible and not brittle; Not easily chewed <tough meat>; Characterized by severity or uncompromising determination <tough laws> <tough discipline>; Capable of enduring strain, hardship, or severe labour <tough soldiers>; Very hard to influence, stubborn <a tough negotiator>; Difficult to accomplish, resolve, endure, or deal with <a tough question> <tough luck>; Stubbornly fought <a tough contest>; Unruly, rowdyish <a tough gang>; Marked by absence of softness or sentimentality <a tough critic>” (“Toughness”, n.d.). |
| Material toughness1 | 1. “A mechanical characteristic that may be expressed in three contexts: (1) the measure of a material's resistance to fracture when a crack (or other stress-concentrating defect) is present, (2) the ability of a material to absorb energy and plastically deform before fracturing, (3) The total area under the material's tensile engineering stress-strain curve taken to fracture.” (Callister, & Rethwisch, 2014, p. 932) |
| Gender norm toughness2 | 1. “Physical prowess, evidenced both by demonstrated possession of strength and endurance and by athletic skill; "masculinity", symbolized by a distinctive complex of acts and avoidances (bodily tattooing, absence of sentimentality, non-concern with "art", "literature", conceptualization of women as conquest objects, etc.); and bravery in the face of physical threat.” (Miller, 1958, p. 9; 2131 citations) 2. “Toughness, which reflects men’s belief that they must appear aggressive and physically and emotionally strong.” (Lisco, Leone, Gallagher, & Parrott, July 2015, p. 59) |

Note: a) most cited and b) most recent source. 1 Citation information unavailable. See below for definition extraction process.

As a compound word, we would expect mental toughness to retain the original meaning of its components (i.e., ‘mental’ and ‘toughness’; Grammarly, 2013), as well as be semantically linked to alternative extensions of ‘toughness’ (e.g., material toughness, gender norm toughness). However, current definitions of mental toughness have not always retained the original meaning of its components. For example, Gucciardi et al. (2014) noted that features central to definitions of mental toughness, such as performance and goal attainment, were not supported by English-language definitions of either constituent terms. Given that this comparison with constituent terms and related applications can provide a useful avenue for identifying the fundamental as well as superfluous features of mental toughness, this review aims to systematically identify conceptual overlap and divergence between mental toughness, its constituent terms and related applications of toughness.

In sum, to facilitate a robust and valid progression of the mental toughness literature, we first need to address the above sources of conceptual confusion. This was the purpose of the current study. To this end, we systematically identified and compared constructs included in Table 1 to 3 above. Similar approaches have been utilised within mental toughness (e.g., Gucciardi et al., 2014) and elsewhere (e.g., ecological stability; Grimm & Wissel, 1997) for dispelling conceptual confusion, and on this basis, is proposed as the most viable method for abetting the current aims.

# Method

## Data search

A systematic literature search was conducted between May 2015 to July 2015 in accordance with PRISMA recommendations ([Moher, Liberati, Tetzlaff, & Altman, 2009](#_ENREF_2))[[1]](#footnote-1). A librarian with extensive database search experience was also consulted to ensure suitable databases and search terms were used. On these bases, articles for psychological constructs (mental toughness, resilience, hardiness, grit, psychological flexibility, sisu, mental fitness and gender norm toughness) that were published in the past 200 years prior to 7th July 2015 were retrieved from the following databases in order: 1) PsycINFO, 2) EbscoHealth (Medline, CINAHL, SportDISCUS), and finally, 3) Google Scholar (see Table 4 below for the search terms that were entered into the databases). Search terms differed between constructs according to the number of results returned and degree of saturation reached in extracted definitions. Auckland University of Technology’s library (course reserve department) was manually searched for textbook definitions of material toughness and online library dictionaries were used to ascertain definitions of ‘mental’ and ‘toughness’.

## Inclusion and exclusion criteria

The inclusion and exclusion criteria for this study enabled a systematic identification of the most popular definitions of constructs that had been endorsed by researchers and their peers within each field of enquiry. In particular, these included a) full-text and peer-reviewed articles published in an English journal were considered for psychological constructs, hard copy text-books were considered for definitions of material toughness, and online dictionaries were considered for ‘mental’ and ‘toughness’ definitions; b) sources were included if they contained a new definition that had not been featured in articles previously reviewed in the search procedure. These definitions were required to be original, directly quoted and/or paraphrased with citations; c) articles and their definitions were included if they were directly quoted by a secondary source (i.e., literature review or study introduction section) even if the full-text version of the original source was unavailable or contained in a source other than a peer-reviewed journal article (e.g., a book).

### Table 4.

## *Search strategy and article selection statistics*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Search one: PsycINFO** | | | **Search two: EbscoHealth** | | **Search three: Google Scholar** | | **Total results returned** | **Total articles that met inclusion criteria** | **Total definitions extracted** |
| **Construct** | **Search Terms** | **Results returned** | **Search terms** | **Results returned** | **Search terms** | **Results returned** |
| Mental fitness | "mental\* fit\* " (keyword) AND concept\* OR model OR defin\* OR construct OR perce\* OR understand\* OR mean\* (keyword) | 3 | "mental\* fit\*" (title) AND Concept\* OR model OR defin\* OR construct OR perce\* OR understand\* OR mean\* (all text) NOT periodical (all text) | 15 | "mental\* fit\* " (in title) AND concept conceptualising model definition defining construct perception understanding meaning (with at least one of the words) | 3 | 21 | 1 | 1 |
| Mental toughness | "mental\* tough\*" (keyword) | 192 | "mental\* tough\*" (keyword) AND "concept\* or model\* or defin\* or construct\* or perce\* or underst\* or mean\* (all text) | 148 |  |  | 340 | 10 | 13 |
| Resilience | resilience (title) AND concept\* or model\* or defin\* or construct\* or perce\* or underst\* or mean\* (title) AND Review or Overview (title) | 15 | resilience (title) AND concept\* OR model\* OR defin\* OR construct\* OR perce\* OR underst\* OR mean\* (all text) AND review OR overview (title) | 31 |  |  | 46 | 6 | 35 |
| Hardiness | hardy or hardiness or existential courage or "hard\* person\*" (title) AND concept\* or model\* or defin\* or construct\* or perce\* or underst\* or mean\* or what or criti\* or review or overview (title) | 97 | hardy or hardiness or existential courage or "hard\* person\*" (title) AND concept\* or model\* or defin\* or construct\* or perce\* or underst\* or mean\* or what or criti\* or review or overview (title) | 126 |  |  | 223 | 27 | 31 |
| Sisu | sisu (keyword) | 3 | Sisu (keyword) OR sisu (title) OR sisu (subject terms) OR sisu (abstract) AND psyc\* or person\* (all text) NOT Sisu (author) or periodical (all text) | 12 |  |  | 15 | 3 | 3 |
| Grit | Grit (title) | 44 |  |  |  |  | 44 | 13 | 13 |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| **Search one: PsycINFO** | | | **Search two: EbscoHealth** | | **Search three: Google Scholar** | | **Total results returned** | **Total articles that met inclusion criteria** | **Total definitions extracted** |
| **Construct** | **Search Terms** | **Results returned** | **Search terms** | **Results returned** | **Search terms** | **Results returned** |
| Psychological flexibility | “psychological\* flexib\*” (title) AND concept\* or model\* or defin\* or construct\* or perce\* or underst\* or mean\* or what or criti\* or review or overview (keyword) | 52 |  |  |  |  | 52 | 23 | 23 |
| Gender norm toughness | tough\* AND gender or norm\* or masculin\* or male (title) | 94 |  |  |  |  | 94 | 15 | 15 |

## Procedure

**Literature review.** An overview of the literature search procedure is presented in Figure 1 below.

Databases searched

Search one: PsycINFO

Search two: EbscoHealth

Search three: Google Scholar

(see Table 4 above)

Results returned

Articles screened for inclusion / exclusion

Articles included

Articles excluded

Definitions extracted

Additional databases searched if was saturation not reached

Duplicates removed

## Figure 1.Article selection and definition extraction process

Search terms were first entered into PsycINFO. Once duplicate articles were removed, the articles were screened for eligibility status by first examining titles and abstracts and then sections of full-text for further information. Full-text, peer-reviewed articles that contained new definitions that were original, quoted or paraphrased were identified and retained for final inclusion. This procedure was repeated through EbscoHealth (Medline, CINAHL, SportDISCUS), and finally, Google Scholar until no new definitions were being offered in subsequent articles. Search strategies differed between constructs due to differences in the magnitude and diversity of definitions offered in each field (see Table 4 above).

**Content analysis of definitions.** Definitions obtained from the systematic literature review were then content analysed to extract their constituent features. Initially, definitions from each construct were colour-coded to ensure traceability back to their original source. Definitions were then broken into higher-level categories to improve data manageability. For example, the definition by Jones et al. (2002; see Table 1 above) was allocated to higher-level categories of *descriptor* (“the natural or developed psychological edge”), *context* (“many demands (competition, training, lifestyle)”), *personal characteristics* (“cope better than your opponents”), *cognitions, behaviours and emotions under given contexts* (“be more consistent and better than your opponents in remaining determined, focused, conﬁdent, and in control under pressure”).

Within these higher-level categories, following Fehr’s (1988) prototype analysis coding procedure, definitions were further broken down to ascertain more specific features. For example, within the higher-level category of *cognitions, behaviours and emotions under given contexts*, Jones et al. (2002) definition was further broken into *maintains consistency and stability under stressful or pressurised situations, maintains determination under stressful and pressurised situations, maintains focus and concentration under stressful or pressurised situations, maintains confidence under stressful or pressurised situations and maintains control under stressful or pressurised situations*. In breaking down the higher-level categories into their constituent features, some words were readily identified as a single linguistic unit (e.g., courage), whereas phrases were separated into more than one linguistic unit if they represented more than one feature (e.g., “persisting or changing behaviour” was separated into two units: “persisting behaviour” and “changing behaviour”). To maintain nuances and richness of data, a conservative approach was taken when allocating units to feature categories, for example, ‘achieve personal goals’ was not attributed to the same category as ‘thriving and success’; similarly, ‘enhance health’ was separated from ‘maintain health’.

The results of the content analysis was confirmed by second and third raters who are Psychologists with experience in emergency and trauma, and thus had previous working knowledge of a majority of the psychological constructs involved in this study. In this confirmation process, the second rater was presented with the raw data and the final higher-level categories and features for review and confirmation. Where the second rater disagreed with any coding of the data, the third rater was available to provide a resolution[[2]](#footnote-2). Once the coding was confirmed by the second and third raters, each definition and its associated features were plotted in a series of tables to visually identify conceptual areas of overlap and divergence according to the aims of the study.

# Results

Excluding dictionary definitions of ‘mental’ and ‘toughness’, a total of 164 definitions were systematically extracted from academic databases. These comprised of resilience (*n* = 35), hardiness (*n* = 31), psychological flexibility (*n* = 23), toughness (*n* = 21), gender norm toughness (*n* = 15), mental toughness (*n* = 13), grit (*n* = 13), material toughness (*n* = 9), sisu (*n* = 3) and mental fitness (*n* = 1). From content analysis of these definitions, five higher-level categories were identified: in particular, most definitions started with a descriptor (which identifies the nature of the construct, e.g., personality trait, state), and proceeded with one or more personal characteristics (the intrinsic qualities of the individual, e.g., self-belief or confidence), the behaviour of these characteristics under stress (which describes what happens to these qualities when the individual is under stress or pressure, e.g., maintenance of confidence under stress and pressure), their specific contexts (the environments involved, e.g., situations that are challenging and demanding) and subsequent outcomes (the resultant product associated with the constructs, e.g., enhances performance).

From these higher-level categories, 84 features were extracted (see Table 5 below) which comprised of a total of 695 linguistic units (i.e., words or phrases). Overall, definitions of mental toughness included the most number of features (*n* = 37 features), followed by definitions of hardiness (*n* = 34 features), resilience (*n* = 32 features), gender norm toughness (*n* = 21 features), psychological flexibility (*n* = 16 features), grit (*n* = 11 features), sisu (*n* = 10 features) and mental fitness (*n* = 6 features).

These features were then plotted in Tables 6 – 8 below to gain a visual representation of the conceptual similarities and differences between constructs. As illustrated in Table 6 below, mental toughness definitions were compared and contrasted according to the number of times a feature was mentioned by definitions (i.e., feature frequencies). On the other hand, as illustrated by Table 7 - 8, mental toughness was compared and contrasted with its related constructs (resilience, hardiness, grit, psychological flexibility, sisu and mental fitness), its constituent terms (‘mental’ and ‘toughness’) and related applications of toughness (material toughness and gender norm toughness) according to the number of times a feature was mentioned by a construct (i.e., feature frequencies) as well as the total number of constructs that mentioned a feature.

### Table 5.

*Summary of higher-level categories and their constituent features derived from the content analysis of definitions*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Theme 1: Descriptor** | | **Theme 2: Contexts** | | **Theme 3: Personal characteristics** | | **Theme 4: Cognitions, behaviours and emotions under given contexts** | | **Theme 5: Outcomes** | |
| **#** | **Feature name** | **#** | **Feature name** | **#** | **Feature name** | **#** | **Feature name** | **#** | **Feature name** |
| 1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16  17  18 | Capacity, measure or amount  Personality trait, characteristic or tendency  State  Expectation or norm  Resistance resource, buffer and/or mediator of stress  Resource  Force or demand  A process  A regulation process  Ability, skill or competence  Psychological edge or strength  Group and/or pattern of behaviours  Value, ideal or belief  Group and/or pattern of emotions  Group and/or pattern of attitudes  Group and/or pattern of cognitions  Learned or developed  Intrinsic or inherent | 19  20  21  22  23  24  25  26  27  28  29 | Facing opposition / competition  Performing under pressure  Situations that are challenging and/or demanding  Experiencing adversities, tragedies and trauma  Facing risks  Experiencing stressors or stress  Pursuing goals or values / within achievement contexts  Experiencing disruptive events  Experiencing significant change  Experiencing unwanted psychological influences or events, i.e., difficult thoughts, feelings, sensations, images or memories  Faced with situational prospects or potential opportunities | 30  31  32  33  34  35  36  37  38  39  40  41  42  43  44  45  46  47  48  49  50 | Courage  Competitiveness  Low anxiety and/or calmness  Openness and curiosity  Passion for long-term goals  Self-belief and confidence  Aggressiveness  Hardness / absence of softness or sentimentality  Determination  Stoicism or emotionally detached  Skill or competence  Difficult to influence / stubborn  Commitment  Perceptions of control  Effective coping / appraisals  Perceptions of challenge  Mindfulness / acceptance  Physical and emotional strength  Independence from others  Masking emotions: invulnerability and concealing pain  Endurance, discomfort tolerance and stress tolerance | 51  52  53  54  55  56  57  58  59  60  61  62  63  64  65  66 | Maintains consistency or stability under stressful or pressurised situations  Maintains consistency in behaviour or effort towards goals and values, e.g. persistence, under stressful or pressurised situations  Maintains determination under stressful or pressurised situations  Maintains focus and concentration under stressful or pressurised situations  Maintains confidence under stressful or pressurised situations  Maintains control under stressful or pressurised situations  Maintains views and opinions under stressful or pressurised situations  Maintains coping under stressful or pressurised situations  Maintains meaning or purpose under stressful or pressurised situations  Maintains interest and passion for goals under stressful or pressurised situations  Maintains emotions and mood under stressful or pressurised situations, for example, can remain calm  Maintains motivation under stressful or pressurised situations  Adapts to stressful or pressurised situations  Behavioural flexibility: Modifies behavioural responses under / to stressful or pressurised situations  Cognitive flexibility: Cognitively re-appraises stressful or pressurised situations  Reconstructs meaning of stressful or pressurised situations | 67  68  69  70  71  72  73  74  75  76  77  78  79  80  81  82  83  84 | Achieves personal goals  Generative experiences  Thriving and success  Additional protective or coping skills  Positive emotions  Improved or enhanced health status  Educational attainment  Vocational success  Completed or carried out plans  Creation of opportunities  Faciliates search for meaning  Enhances performance  Meets psychological needs  Maintenance of psychological wellbeing and functioning  Maintenance of physiological wellbeing and functioning  Overcomes obstacles  Avoidance of maladaptive outcomes and negative trajectories  Recovery, or ability to return to a prior state and continue on |

### Table 6.

*Agreement / disagreement within definitions of mental toughness*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Authors** | **Features** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 21 | 20 | 51 | 22 | 25 | 44 | 67 | 13 | 14 | 15 | 17 | 18 | 19 | 24 | 78 | 2 | 10 | 16 | 35 | 43 | 54 | 56 | 11 | 12 | 38 | 53 | 55 | 1 | 6 | 7 | 31 | 32 | 52 | 58 | 61 | 62 | 82 |
| a |  |  | x |  |  |  |  |  |  |  |  |  | x |  | x |  | x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| b | x | x | x |  |  | x |  |  |  |  | x | x | x |  |  |  |  |  | x | x | x | x | x |  | x | x | x |  |  |  |  |  |  |  |  |  |  |
| c |  |  |  | x |  |  |  |  |  |  |  |  | x |  |  |  |  |  | x | x |  | x |  |  |  |  |  |  |  |  | x | x |  |  | x |  |  |
| d | x |  |  |  |  | x |  |  |  |  |  |  |  | x |  | x | x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| e | x | x | x |  |  | x |  |  |  |  | x | x | x |  |  |  |  |  | x | x | x | x | x |  | x | x | x |  |  |  |  |  |  | x |  |  |  |
| f |  | x | x | x | x |  | x | x | x | x |  |  |  |  |  |  |  |  |  |  | x |  |  |  |  |  |  |  |  |  |  |  | x |  |  | x | x |
| g | x | x | x | x | x | x | x | x | x | x | x | x |  |  |  |  |  | x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| h | x |  | x | x | x | x | x | x | x | x | x | x |  |  |  |  |  | x |  |  |  |  |  | x |  |  |  |  |  |  |  |  |  |  |  |  |  |
| i | x | x |  | x | x | x |  | x | x | x |  |  |  |  |  |  |  | x |  |  |  |  |  | x |  |  |  |  |  |  |  |  |  |  |  |  |  |
| j | x | x |  |  |  |  |  |  |  |  |  |  |  | x |  | x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| k |  |  |  |  |  |  |  |  |  |  |  |  |  |  | x | x |  |  |  |  |  |  |  |  |  |  |  |  | x | x |  |  |  |  |  |  |  |
| l |  | x |  |  | x |  | x |  |  |  |  |  |  | x | x |  | x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| m | x |  | x | x | x |  | x |  |  |  |  |  |  | x | x |  |  |  |  |  |  |  |  |  |  |  |  | x |  |  |  |  |  |  |  |  |  |
| Total | 8 | 7 | 7 | 6 | 6 | 6 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Total % | 62 | 54 | 54 | 46 | 46 | 46 | 38 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 15 | 15 | 15 | 15 | 15 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| *Note.* **Definitions**: a = Loehr (1994, p. 5), b = Jones et al. (2002, p. 209), c = Clough et al. (2002, p. 38), d = Fletcher (2005, p. 158), e = Thelwell et al. (2005, pp. 328 - 329), f = Gucciardi et al. (2008, p. 278), g = Gucciardi et al. (2009, p. 67), h = Coulter et al. (2010, p. 715), i = Mallett and Coulter (2011, p. 191), j = Clough and Strycharczyk (2012, p. 1), k = Mahoney et al. (2014, p. 234), l = Hardy et al. (2013, p. 70), m = Gucciardi et al. (2014, p. 28). **Features** (numbering corresponds to Table 5): **21** = situations that are challenging and/or demanding; **20** = performing under pressure; **51** = maintains consistency or stability under stressful or pressurised situations; **22** = experiencing adversities, tragedies and trauma; **25** = pursuing goals or values / within achievement contexts; **44** = effective coping / appraisals; **67** = achieves personal goals; **13** = value, ideal or belief; **14** = group and/or pattern of emotions; **15** = group and/or pattern of attitudes; **17** = learned or developed; **18** = intrinsic or inherent; **19** = facing opposition / competition; **24** = experiencing stressors or stress; **78** = enhances performance; **2** = personality trait, characteristic or tendency; **10** = ability, skill or competence; **16** = group and/or pattern of cognitions; **35** = self-belief and confidence; **43** = control; **54** = maintains focus and concentration under stressful or pressurised situations; **56** = maintains control under stressful or pressurised situations; **11** = psychological edge or strength; **12** = group and/or pattern of behaviours; **38** = determination; **53** = maintains determination under stressful or pressurised situations; **55** = maintains confidence under stressful or pressurised situations; **1** = Capacity, measure or amount; **6** = resource; **7** = force or demand; **31** = competitiveness; **32** = low anxiety and/or calmness; **52** = maintains consistency in behaviour or effort towards goals and values, e.g. persistence, under stressful or pressurised situations; **58** = maintains coping under stressful or pressurised situations; **61** = maintains emotions and mood under stressful or pressurised situations, for example, can remain calm; **62** = maintains motivation under stressful or pressurised situations; **82** = overcomes obstacles. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

### Table 7.

*Mental toughness features shared with other constructs*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Construct** | 52 | 10 | 1 | 2 | 21 | 11 | 24 | 25 | 43 | 53 | 13 | 22 | 38 | 44 | 7 | 14 | 15 | 16 | 17 | 31 | 35 | 51 | 56 | 61 | 78 | 82 | 6 | 12 | 18 | 19 | 20 | 32 | 54 | 55 | 58 | 62 | 67 | **Total** |
| Resilience | X | X | X | X | X |  | X |  | X |  |  | X |  | X | X |  |  |  |  |  |  | X | X | X |  | X |  |  |  |  |  |  |  |  |  |  |  | **14** |
| Hardiness | X | X | X | X | X | X | X | X | X |  | X |  |  | X |  |  | X |  | X |  |  |  |  |  | X |  |  |  |  |  |  |  |  |  |  |  |  | **14** |
| Grit | X | X |  | X |  | X |  | X |  |  |  | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **6** |
| Psychological flexibility | X | X | X |  | X |  |  | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **5** |
| Sisu | X | X |  | X |  | X |  |  |  | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **5** |
| Mental fitness |  |  | X |  | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **2** |
| **Total** | **5** | **5** | **4** | **4** | **4** | **3** | **2** | **3** | **2** | **1** | **1** | **2** | **0** | **2** | **1** | **0** | **1** | **0** | **1** | **0** | **0** | **1** | **1** | **1** | **1** | **1** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |  |
| Gender norm toughness | X | X |  |  |  |  |  |  | X | X | X |  | X |  |  |  |  |  |  | X | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **8** |
| ‘Toughness’ | X |  |  |  |  |  |  |  |  | X |  |  | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **3** |
| Material toughness |  | X | X | X |  |  | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **4** |
| ‘Mental’ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | x |  | x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **2** |
| **Total** | **2** | **2** | **1** | **1** | **0** | **0** | **1** | **0** | **1** | **2** | **1** | **0** | **2** | **0** | **0** | **1** | **0** | **1** | **0** | **1** | **1** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |  |
| **Total (all constructs)** | **7** | **7** | **5** | **5** | **4** | **3** | **3** | **3** | **3** | **3** | **2** | **2** | **2** | **2** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |  |

*Note.*Size of ‘x’ denotes the % frequency of the feature in the corresponding construct definitions. For example, feature 52 was mentioned by a greater percentage of grit than resilience definitions, and thus, the size of ‘x’ for grit is larger than that of resilience. Similarly, the size of the feature number denotes the % frequency of the feature in definitions of mental toughness. For example, more definitions of mental toughness mention feature 21 than feature 52.

**Features** (numbering corresponds to Table 5): **52** = maintains consistency in behaviour or effort towards goals and values, e.g. persistence, under stressful or pressurised situations; **10** = ability, skill or competence; **1** = Capacity, measure or amount; **2** = personality trait, characteristic or tendency; **21** = situations that are challenging and/or demanding; **11** = psychological edge or strength; **24** = experiencing stressors or stress; **25** = pursuing goals or values / within achievement contexts; **43** = perceptions of control; **53** = maintains determination under stressful or pressurised situations; **13** = value, ideal or belief; **22** = experiencing adversities, tragedies and trauma; **38** = determination; **44** = effective coping / appraisals; **7** = force or demand; **14** = group and/or pattern of emotions; **15** = group and/or pattern of attitudes; **16** = group and/or pattern of cognitions; **17** = learned or developed; **31** = competitiveness; **35** = self-belief and confidence; **51** = maintains consistency or stability under stressful or pressurised situations; **56** = maintains control under stressful or pressurised situations; **61** = maintains emotions and mood under stressful or pressurised situations, for example, can remain calm; **78** = enhances performance; **82** = overcomes obstacles; **6** = resource; **12** = group and/or pattern of behaviours; **18** = intrinsic or inherent; **19** = facing opposition / competition; **20** = performing under pressure; **32** = low anxiety and/or calmness; **54** = maintains focus and concentration under stressful or pressurised situations; **55** = maintains confidence under stressful or pressurised situations; **58** = maintains coping under stressful or pressurised situations; **62** = maintains motivation under stressful or pressurised situations; **67** = achieves personal goals.

### Table 8.

*Remaining features not shared between mental toughness and other constructs*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Construct** | **50** | **5** | **30** | **47** | **63** | **64** | **69** | **8** | **27** | **29** | **36** | **37** | **41** | **57** | **59** | **65** | **68** | **71** | **75** | **81** | **3** | **4** | **9** | **23** | **26** | **28** | **33** | **34** | **39** | **40** | **42** | **45** | **46** | **48** | **49** | **60** | **66** | **70** | **72** | **73** | **74** | **76** | **77** | **79** | **80** | **83** | **84** | **Total** |
| Resilience |  | x |  |  | x | x | x | x | x |  |  |  |  |  | x |  | x | x |  | x |  |  |  | x | x |  |  |  |  |  |  |  |  |  |  |  |  | x |  | x | x |  |  |  | x | x | x | **18** |
| Hardiness | x | x | x | x | x | x | x |  | x |  |  |  |  |  | x | x | x | x | x | x |  |  |  |  |  |  |  |  |  |  | x | x |  |  |  |  | x |  | x |  |  | x | x |  |  |  |  | **20** |
| Grit | x |  |  |  |  |  | x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | x |  |  |  |  |  |  |  | x |  |  |  |  |  |  |  |  |  |  |  | **4** |
| Psychological flexibility | x |  |  |  | x | x |  | x |  | x |  |  |  |  |  | x |  |  | x |  |  |  | x |  |  | x | x |  |  |  |  |  | x |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **11** |
| Sisu | x |  | x | x |  |  |  |  |  |  |  |  | x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **4** |
| Mental fitness |  |  |  |  | x |  |  |  |  | x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | x |  |  |  | **3** |
| **Total** | **4** | **2** | **2** | **2** | **4** | **3** | **3** | **2** | **2** | **2** | **0** | **0** | **1** | **0** | **2** | **2** | **2** | **2** | **2** | **2** | **0** | **0** | **1** | **1** | **1** | **1** | **1** | **1** | **0** | **0** | **1** | **1** | **1** | **0** | **0** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** |  |
| Gender toughness | x |  | x | x |  |  |  |  |  |  | x | x |  | x |  |  |  |  |  |  | x | x |  |  |  |  |  |  | x | x |  |  |  | x | x |  |  |  |  |  |  |  |  |  |  |  |  | **12** |
| Toughness | x | x |  | x |  |  |  |  |  |  | x | x | x | x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **7** |
| Material toughness |  | x |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 |
| **Total** | **2** | **2** | **1** | **2** | **0** | **0** | **0** | **0** | **0** | **0** | **2** | **2** | **1** | **2** | **0** | **0** | **0** | **0** | **0** | **0** | **1** | **1** | **0** | **0** | **0** | **0** | **0** | **0** | **1** | **1** | **0** | **0** | **0** | **1** | **1** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |  |
| **Total (all constructs)** | **6** | **4** | **4** | **4** | **4** | **3** | **3** | **2** | **2** | **2** | **2** | **2** | **2** | **2** | **2** | **2** | **2** | **2** | **2** | **2** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** |  |

*Note.*Size of ‘x’ denotes the % frequency of the feature in the corresponding definition. The parent term ‘mental’ is excluded from this table; see footnote 3 for further details.

**Features** (numbering corresponds to Table 5): **50** = endurance, discomfort tolerance and stress tolerance; **5** = resistance resource, buffer and/or mediator of stress; **30** = courage; **47** = physical and emotional strength; **63** = adapts to stressful or pressurised situations; **64** = behavioural flexibility: is able to modify behavioural responses under / to stressful or pressurised situations; **69** = thriving and success; **8** = a process; **27** = experiencing significant change; **29** = faced with situational prospects or potential opportunities; **36** = aggressiveness; **37** = hardness / absence of softness or sentimentality; **41** = difficult to influence / stubborn; **57** = maintains views and opinions under stressful or pressurised situations; **59** = maintains meaning or purpose under stressful or pressurised situations; **65** = cognitive flexibility: cognitively re-appraises stressful or pressurised situations; **68** = generative experiences; **71** = positive emotions; **75** = completed or carried out plans; **81** = maintenance of physiological wellbeing and functioning; **3** = state; **4** = expectation or norm; **9** = a regulation process; **23** = facing risks; **26** = Experiencing disruptive events; **28** = Experiencing unwanted psychological influences or events, i.e., difficult thoughts, feelings, sensations, images or memories; **33** = Openness and curiosity; **34** = Passion for long-term goals; **39** = Stoicism or emotionally detached; **40** = Skill or competence; **42** = Commitment; **45** = Perceptions of challenge; **46** = Mindfulness / acceptance; **48** = Independence from others; **49** = Masking emotions: invulnerability and concealing pain; **60** = Maintains interest and passion for goals under stressful or pressurised situations; **66** = Reconstructs meaning of stressful or pressurised situations; **70** = Additional protective or coping skills; **72** = Improved or enhanced health status; **73** = Educational attainment; **74** = Vocational success; **76** = Creation of opportunities; **77** = Faciliates search for meaning; **79** = Meets psychological needs; **80** = Maintenance of psychological wellbeing and functioning; **83** = Avoidance of maladaptive outcomes and negative trajectories; **84** = Recovery, or ability to return to a prior state and continue on

This analysis identified a number of areas of agreement and disagreement within mental toughness. As shown in Table 6 below, the majority of definitions agree that mental toughness is associated with *stability or consistency* in *challenging and demanding situations*, and in particular, when *performing under pressure*; however, researchers disagree on the specific psychological aspect or outcome that is held consistent under stressful or pressurised situations (e.g., *behaviour / effort, confidence, coping, emotions / mood, motivation or determination*). Low frequencies were also found for various descriptors of mental toughness (e.g., *capacity, measure or amount; psychological edge or strength*), the personal characteristics of mentally tough people (e.g., *competitiveness, self-belief / confidence, low anxiety / calmness*) and the outcome of *overcomes obstacles.*

Next we delineated mental toughness from its conceptual neighbours by investigating the conceptual overlap (i.e., shared features) and divergence (i.e., unique features) between mental toughness and its related constructs. As illustrated in Table 7 and 8 below, although the neighbouring constructs possessed a large number of features outside of mental toughness, in general, they overlapped with mental toughness on their most frequently-mentioned features. In particular, with the exception of mental fitness, the biggest area of overlap occurred along the feature of *maintains consistency in behaviour or effort towards goals and values* (e.g., endurance, persistence, perseverance and continuing to move on). This feature was common in definitions of grit, psychological flexibility and sisu, with lower endorsements by definitions of mental toughness, resilience and hardiness. To a lesser extent, *ability, skill or competence* was also another main source of overlap.

Conceptual differences between mental toughness and its related constructs were also identified. From Table 7 below, the first source of divergence was the features that were unique to mental toughness (*n* = 16). In particular, *performing under pressure* was frequently noted in mental toughness definitions but was not supported by any of its conceptual neighbours*.* From Table 8 below, the second source of conceptual differences were those features that were unique to the group of related constructs (i.e., not included in definitions of mental toughness). Here the most highly endorsed feature excluded from mental toughness was *adaptation to stressful or pressurised situations* (e.g., adapting well to a variety of stressors, flexibility in behaviour and an ability to shift perspective), which was followed by *endurance, discomfort tolerance and stress tolerance*.

Given that sufficient grounding in its constituent terms of ‘mental’ and ‘toughness’ is also helpful for clarification of mental toughness, the present review considered mental toughness alongside its semantic roots and related applications of toughness (see Table 3 above). As above, *maintains consistency in behaviour or effort towards goals and values* and *ability, skill or competence* represented common conceptual ground. Pertaining specifically to its constituent terms, mental toughness shared *group and/or pattern of emotions,*  and *group and/or pattern of cognitions* with ‘mental’; and *maintains consistency in behaviour or effort towards goals and values, e.g. persistence, under stressful or pressurised situations; maintains determination under stressful or pressurised situations* and *determination* with ‘toughness’.

Although these sources of conceptual inheritance were identified, disconnect between these terms were found along features that were unique to mental toughness (*n* = 23), and also, unique to ‘toughness’, gender norm toughness and material toughness (*n* = 14). Due to their high frequency of mention, the major areas that were unique to mental toughness were *situations that are challenging and/or demanding; maintains consistency or stability under stressful or pressurised situations; and performing under pressure.* On the other hand, *endurance, discomfort tolerance and stress tolerance; physical and emotional strength; aggressiveness, hardness / absence of softness or sentimentality; and maintains views and opinions under stressful or pressurised situations* were features unique to ‘toughness’ and gender norm toughness; further, *resistance resource, buffer and/or mediator of stress* was unique to ‘toughness’ and material toughness. The only feature endorsed solely by ‘toughness’ without concurrent support from gender norm toughness or material toughness was the feature of *difficult to influence / stubborn.*

# Discussion

Although researchers agree on the benefits of mental toughness (e.g., Crust, 2007; Gerber et al., 2013a, 2013b; Gucciardi et al., 2014), conceptual understanding of the construct remains problematic (Connaughton et al., 2008; Sheard, 2013). This confusion may stem from the numerous disparate definitions of mental toughness, ‘fuzzy’ conceptual borders with related constructs and a degree of disconnect with its constituent terms. Our review aimed to elucidate these areas of confusion by systematically drawing together conceptual information from mental toughness, related constructs (see Table 2 above), its constituent terms (i.e., ‘mental’ and ‘toughness’) and its related applications (e.g., material toughness and gender norm toughness; see Table 3 above). Because the progression of empirical and practical knowledge relies on solid conceptual foundations, addressing these areas of conceptual confusion represents a valuable step towards a robust theory of mental toughness.

Although conceptual confusion within mental toughness may be primarily attributed to the number of divergent conceptualisations of mental toughness (Andersen, 2011; Connaughton et al., 2008; Jones et al., 2002; Gucciardi et al., 2014; Sheard, 2013), until now, these divergent strands of knowledge had yet to be systematically consolidated. From our systematic analysis, findings showed that agreement largely occurs along features of *maintaining* *stability or consistency* in *challenging and demanding situations*, and in particular, when *performing under pressure*. These findings suggest that, similar to resilience, mental toughness may “reflect an ability to maintain a stable equilibrium” (Bonnano, 2004, p. 20) or avoidance of “the negative trajectories associated with risks” (Fergus & Zimmerman, 2005, p. 399).

Within the feature of *maintaining stability or consistency*, however, the specific internal states (Jones et al., 2002; Thelwell et al., 2005) or external outcomes (Coulter et al., 2010; Gucciardi et al., 2009; Gucciardi et al., 2014; Loehr, 1994), or both (Gucciardi et al., 2008), that are held stable or consistent represent a large source of disagreement between definitions. A plausible explanation for this disagreement is the context-specific nature of mental toughness (Andersen 2011; Bull, et al., 2005; Fawcett, 2011). For example, maintenance of focus and concentration may be required for a “final putt” in golf whereas maintenance of determination and motivation may be more pertinent for endurance sports (Bull et al., 2005, Ryba et al., 2009). Similarly, consistency in external outcomes, such as performance and goal attainment, may not apply to all contexts requiring mental toughness, such as those that may threaten one’s normal functioning (e.g., serious injury, death of a loved one, failing a course; Gucciardi et al., 2014). In conjunction with the observations of the present review, therefore, the key psychological aspect that is kept stable or consistent may be difficult or even impossible to specify without reference to specific contexts and/or on a case-by-case basis. Nonetheless, ‘consistency’ is a good place to start (Andersen, 2011) and although future research is warranted to specify and succinctly encapsulate the object(s) of stability or consistency, this finding represents an important foundation for further conceptual development of mental toughness.

Beyond these features, further disagreement was found along various descriptors (*capacity, measure or amount; psychological edge or strength*), personal characteristics (*competitiveness, self-belief / confidence, low anxiety / calmness*) and the outcome of *overcomes obstacles.* Although the diversity of these features among definitions likely reflects the complex nature of mental toughness (Connaughton, Thelwell, & Hanton, 2011), admittance of only the most fundamental and inclusive elements is necessary for ensuring robust empirical progression. To this end, future research may minimise conceptual diversity by delineating these features along their centrality or importance to mental toughness, and in doing so, researchers may be better equipped to identify those features to include or exclude from future definitions.

Another conceptual issue addressed in the present review is the relationship between mental toughness and its related constructs (see Table 2 above). With strong theoretical links, it is important that we understand their common function as well as the incremental validity of mental toughness within this group (Gucciardi et al., 2014). To the best of our knowledge, the nature of this relationship had yet to be systematically addressed. Our findings suggested that the common function of this group was an *ability, skill or competence* to *maintain behaviour and effort towards goals and values.* Although mostly characterised by persistence or endurance, this feature also represented continued efforts to move on with one’s life after difficulties or setbacks (e.g., [of resilience] “continue to move on in a positive manner”; Jackson, Firtko, & Edenborough, 2007, p. 3). Although other psychological or behavioural processes are likely to be involved, a maintenance of behaviour and effort may contribute towards the core purpose of these constructs: that is, surviving and thriving despite adversity, difficulties or failures (Gucciardi et al., 2014; Jackson et al., 2007; Maddi, 2012; Duckworth, Kirby, Tsukayama, Berstein, & Ericsson, 2010).

On the other hand, *performing under pressure* was a major source of conceptual uniqueness for mental toughness. This finding aligns with its major role in performance (Connaughton et al., 2008; Denison, 2007; Gould, Hodge, Peterson, and Petlichkoff, 1993; Holland, Woodcock, Cumming, & Duda, 2010), and subsequently, the primary use of mental toughness in performance-related contexts (e.g., sporting, military, business and education; Gucciardi et al., 2014). However, beyond their definitions, high levels of performance under pressure is not exclusive to mental toughness (e.g., hardiness; Raab, Lobinger, Hoffman, Pizzera, & Labourde, 2015; psychological flexibility; Gardner & Moore, 2007) and given that researchers have predominantly used athlete populations to develop definitions of mental toughness (e.g., Gucciardi et al., 2008; Gucciardi et al., 2009; Jones et al., 2002; Coulter et al., 2010), this unique performance-related feature may instead reflect a conceptual bias towards performance contexts. On this basis, future investigation of lay perceptions of mental toughness (where performance is not the primary focus) is required to confirm this feature as a source of incremental validity.

An unexpected finding from this comparison between mental toughness and its related constructs was that *adaptation* is not included in mental toughness definitions, which is otherwise endorsed by a number of its related constructs. Although a number of researchers have suggested that adaptation may be an attribute or outcome of mental toughness (e.g., Gerber et al., 2013a, 2013b; Gucciardi et al., 2008), based on current definitions of mental toughness, these findings suggest that adaptation may not be a central process. As such, the role or centrality of adaptive capacities in mental toughness may be a viable avenue for future research.

The final conceptual issue we addressed was the connection between definitions of mental toughness, its constituent terms and related applications (see Table 3 above). Given that this alignment had not been systematically addressed before, we highlighted existing features that retain the core meaning of its constituent terms, as well as those that may be superfluous or omitted from current definitions of mental toughness.

With respect to conceptual inheritance from ‘mental’, Gucciardi et al. (2014) suggested that both terms imply “a quality that resides within an individual” (2014, p. 28). From systematic analysis of these definitions, however, mental toughness intersected with ‘mental’ along the more specific features of *cognitions,* and to a lesser extent, *emotions.* These findings suggest, therefore, that mental toughness may infer the qualities of toughness to predominantly thinking but also feeling. Although ‘tough feeling’ is not included, this finding aligns with the model of mental toughness by Bull et al. (2005), which involves ‘tough thinking’ as the necessary process for making use of one’s skills and abilities at crucial moments in a competitive environment. The authors suggest that ‘tough thinking’ is “captured in the term ‘self-awareness’” (2005, p. 223), and according to their model, ‘tough thinking’ involves two noteworthy branches of cognition: Robust self-conﬁdence (overcoming self-doubts, feeding off physical condition and maintain self-focus) and thinking clearly (good decision-making, keeping perspective and honest self-appraisal). ‘Tough thinking’ also extends to a number of cognitive attributes of mental toughness, such as remaining fully focused, regaining psychological control, not being adversely affected by others, and accepting competition anxiety (Bull et al., 2005; Jones et al., 2002). Thus, drawing from the meaning inherent in ‘mental’, these findings may assist future research in delineating and defining the core of mental toughness (i.e., ‘tough thinking’ or self-awareness) and its subsequent causes, processes and outcomes (Hardy, Bell & Beattie, 2013).

Turning to the other half of its label, Gucciardi et al. (2014) also suggested that mental toughness may intersect with ‘toughness’ along “the notion of being able to withstand or endure challenging or adverse situations” (2014, p. 28). From our systematic analyses, however, findings showed that mental toughness aligned with ‘toughness’ along *ability, skill or competence* to *maintain behaviour and effort towards goals and values* as well as *determination* and *maintenance of determination under stressful and challenging situations.* Alongside concurrent alignment with gender norm toughness (see Table 7 above), and strong existing physiological (Dienstbier, 1989, 2015; Kirby, Morrow, & Yih, 2014) and theoretical (e.g., “challenge”; Clough et al., 2002) evidence, these findings suggest that “uncompromising determination” (Toughness, n.d.), and its subsequent maintenance of behaviour and effort, is likely to be a major component of mental toughness that has been inherited from its parent term ‘toughness’. Although these findings do not support those by Gucciardi et al. (2014), however, their conclusions may still be warranted.

In particular, the authors suggest that “the notion of being able to withstand or endure challenging or adverse situations” (2014, p. 28) may be inherent in mental toughness, although, from our systematic evaluation, *endurance, discomfort tolerance and stress tolerance* was not explicitly featured in mental toughness definitions. However, given that this feature was endorsed by the majority of its conceptual relations (see Table 8 above) and qualitative and empirical evidence links mental toughness to greater endurance and discomfort tolerance (e.g., Burke & Orlick, 2003; Crust & Clough, 2005), it is suggested that current definitions of mental toughness may have omitted *endurance, discomfort tolerance and stress tolerance* as an important feature. Further research would do well to further investigate this feature as a main component of mental toughness.

On the other hand, mental toughness definitions may contain superfluous features that are not justified by its constituent terms. Previously, these features have been noted as high performance and/or goal attainment (Gucciardi et al., 2014). In line with these suggestions, *performing under pressure* and a number of other performance-related outcomes (e.g., *achieves personal goals*) were features of mental toughness that were not aligned with ‘toughness’ or its applications. These findings align with previous criticisms of an excessive focus on outcomes in mental toughness definitions (Gucciardi et al., 2009a). On the other hand, *maintains consistency or stability under stressful or pressurised situations* and *situations that are challenging and/or demanding* were also sources of conceptual uniqueness; however, these features may be semantic variations vis-à-vis conceptual deviations from ‘toughness’ and its applications. For example, *maintains consistency or stability under stressful or pressurised situations* may be closely related to the ‘toughness’ feature of *difficult to influence / stubborn*; and “strain, hardship, or severe labour” (Toughness, n.d.) may be classified within mental toughness features such as *situations that are challenging and/or demanding*. Thus, considering the above, and in line with suggestions by Gucciardi et al. (2014), these findings suggest performance-related features may be disconnected from ‘toughness’ and thus superfluous to requirements for adequately defining mental toughness.

To conclude, our findings offered several important insights into the conceptualisation of mental toughness. In particular, mental toughness may primarily involve *maintaining* *stability or consistency* in *challenging and demanding situations*, and in particular, when *performing under pressure*. When compared with its conceptual neighbours, *maintenance of behaviour and effort* may represent common conceptual ground. Within this group, however, mental toughness may particularly apply to the context of *performance under pressure* but may not include the process of *adaptation*. When compared with its constituent terms and related applications, mental toughness may primarily involve qualities of toughness in thinking and/or feeling, and in particular, maintenance of determination and subsequent behaviour and effort towards goals or values. Findings also suggested that *endurance, discomfort tolerance and stress tolerance* may be an important feature previously omitted by mental toughness definitions, whereas performance-related features in current definitions may provide an unnecessary contextual limitation. It is our hope that these findings provide guidance for future efforts aimed at clarifying the construct of mental toughness.

## Study limitations

Limitations of our review include the subjective opinions involved in the research, the uneven size of each research field, and the use of definitions as the only source of conceptual information.

As with any form of qualitative data, the present research involved researcher’s subjective opinions in content analysing definitions. By extracting definitions exactly as they appeared in research articles, as well as using two experienced raters (with a third to make judgments on any disagreements), the present research endeavoured to mitigate this limitation. However, we acknowledge that biases and differences in conceptual understanding may still exist.

From the present literature review, uneven numbers of definitions were extracted for each construct. These uneven numbers may have impacted the amount of features endorsed by constructs and their corresponding feature frequencies. As the extent of overlap and/or divergence with mental toughness was evaluated along these criteria, it may be necessary for future studies to control and/or compensate for the uneven size of research fields.

Finally, the present review only relied on conceptual information from definitions. Although the use of definitions was necessary to draw parameters around the amount and content of information considered here, additional conceptual information from these bodies of literature (e.g., models, empirical evidence) may have provided further conceptual insight. Thus, future research may expand on the present study by considering a number of sources of conceptual information beyond construct definitions.

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1. The PRISMA recommendations by Moher et al. (2009) present best-practice guidelines for conducting and reporting systematic literature reviews. [↑](#footnote-ref-1)
2. Due to a post-analysis decision to include the term ‘mental’ for providing further conceptual clarity, the definition for the term ‘mental’ (see Table 3 above for the definition used in this analysis) was content analysed by the lead author and allocated to existing features where possible (i.e., no new features were added from the term ‘mental’). [↑](#footnote-ref-2)