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Laughter and humour for personal development: A systematic scoping review of the evidence

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Abstract

Introduction: The accessibility of laughter and humour make them attractive choices for self-care, and integrative medicine. There is a growing body of literature, but both fields are fragmented and the overall evidence has not been systematically reviewed. The relationship between health and personal development is increasingly recognized. This review scopes the evidence for laughter and humour interventions from the perspective of their potential benefits on personal development.

Methods: A systematic scoping review used Joanna Briggs guidelines and the Preferred Reporting Items for Systematic Reviews Scoping Review extension (PRISMA-ScR). All-population laughter and humour interventions described in primary and secondary research from 1970, and in English, were searched in Web of Science and PubMed/Medline.

Results: Analysis of 240 primary research articles (*k*), and 11 systematic reviews (*K*), identified $k = 564$ discrete articles with studies involving 574,611 participants (*n*). Twelve large studies (n >15,000) contributed 77% of participants. Classification analysis found more research relating to humour ($k = 445$, $n = 334{,}996$) than laughter ($k = 119$, $n = 239{,}615$) and identified diverse personal development outcomes associated with Biological, Psychological, Social, Environmental, and Behavioural (BPSE-B) factors.

Conclusion: This review presents growing evidence for the diverse applications and benefits of laughter and humour. Multiple opportunities for self-care and interventional applications are described. The consideration of personal development outcomes may support tailored applications according to specific needs and objectives. An umbrella Personal Development

Theory of laughter and humour, inclusive humour and laughter definitions, and a humour-laughter-affect model are proposed to unify the fields.

Key words: laughter; humor; humour and laughter interventions; systematic scoping review; personal development

1. Introduction

The laughter and humour literature is growing; recent research points to wide-ranging health benefits including improvements to anxiety, sleep, and depression [1], relationship satisfaction [2], stress [3], pain [4], and diabetes and cardiovascular function [5]. Laughter and humour's low risk and high accessibility make them attractive for complementary therapies and self-care; nevertheless there is a need for clearer evidence [6, 7]. This review considers the evidence from a new and wider perspective: its potential benefit to personal development.

Investigating laughter and humour by assessing its personal development function serves to unify research and explore recent evidence. It is a relevant perspective, as a two-way link between personal development and health has been stated. The World Health Organization (WHO), in its Ottawa Charter [8], highlighted the need for good health to support personal development. WHO also actively promotes the application of self-care health initiatives throughout the life cycle [9], and they are increasingly proposed as a solution to alleviate global health challenges [10]. Holistic medical approaches are also progressively highlighting the importance and benefits of personal development on health [11].

Despite various theories of laughter and humour, a need for a unified theory of laughter, and theories connecting laughter and humour have been stated [12, 13, 14]. All-embracing theories are challenging due to the numerous meanings, perceptions, and experiences of humour and laughter. These are influenced by individual differences, culture, and demographics, and also reflect multidisciplinary perspectives, including from sociology, psychoanalysis, philosophy, and political science, according to Arthur Asa Berger [15]. Humour and laughter type also varies, for example whether it is involuntary (i.e. spontaneous), or voluntary (i.e. simulated or purposeful, for example when we self-induce laughter, or train our sense of humour) [13, 14], as do the associated benefits and challenges according to context.

A personal development function of laughter was suggested following an intervention with solo laughter that revealed diverse benefits [16], and this review investigates this. Personal development has been described as the way in which we meet our psychosocial needs from birth throughout life [17]. Both laughter and humour can support psychosocial and biological needs throughout the life cycle, e.g. health, social bonding, and learning [18]. We can harness laughter and humour early on: babies laugh at 17 days [19], and humour perception can occur at seven months [20].

A challenge of this review is that the domains of laughter and humour are fragmented [14], with both fields generating definitions few agree on [21]. Humour researchers tend to view laughter as a reaction to humour [24], however laughter experts have reported that only up to 20% of laughter is humour-associated [25]. While Provine [22] saw laughter as essentially a social signal, others note its benefits as a solo activity [16, 23]. Furthermore, due to their similarities, laughter and humour are often confounded or conflated; the need for a ‘common language’ has been stated [15]. Clarity as to the functions both serve, and how they are defined, may extend discourse, exploration and discovery potential in both areas.

This review scopes and maps the laughter and humour research to assess their potential benefits for personal development. The psychosocial definition of personal development [17] was extended to consider Biological, Psychological, Social and socio-economic, Environmental, and Behavioural (BPSE-B) outcomes to reflect growing consensus of the need for a holistic and synergistic view of the multiple factors impacting health [26].

Research objectives were to: (1) systematically scope the humour and laughter literature for evidence of their individual and joint benefits on personal development needs in order to highlight overall and recent research relevant to self-care and therapeutic applications; (2) explore theory to address the need for clearer definitions and unify the fields.

2. Methods

2.1. Design

A scoping review was chosen due to its suitability for exploring knowledge gaps and clarifying concepts [27]. The review followed the Joanna Briggs Institute (JBI) 'Guidance for conducting systematic scoping reviews' [28], and the Preferred Reporting Items for Systematic Reviews Scoping Review extension (PRISMA-ScR) checklist [29]. Results for the PRISMA-ScR checklist are described in Table 1. Both primary research and secondary research evidence was considered within a framework designed to explore personal development (Figure 1).

Table 1: PRISMA-ScR Checklist

Section	Item[1]	Included	Explanation if excluded
Title	1. Title	√	
Abstract	2. Structured summary	√	
Introduction	3. Rationale	√	
	4. Objectives	√	
Methods	5. Protocol and registration	x	The International prospective register of systematic reviews (PROSPERO) no longer supports scoping reviews
	6. Eligibility critera	√	
	7. Information sources	√	
	8. Search	√	
	9. Selection of sources of evidence	√	
	10. Data charting process	√	
	11. Data items	√	
	12. Critical appraisal of individual sources of evidence	x	Not mandatory for scoping reviews. It was also not feasible: the inclusion of reviews meant that the primary sources of evidence were not always directly consulted[2]
	13. Synthesis of results	√	
Results	14. Selection of sources of evidence	√	
	15. Characteristics of sources of evidence	x	See explanation for point 12
	16. Critical appraisal within sources of evidence	x	See explanation for point 12
	17. Results of individual sources of evidence	x	See explanation for point 12
	18. Synthesis of results	√	
	19. Summary of evidence	√	
	20. Limitations	√	
	21. Conclusions	√	
Funding	22. Funding	√	

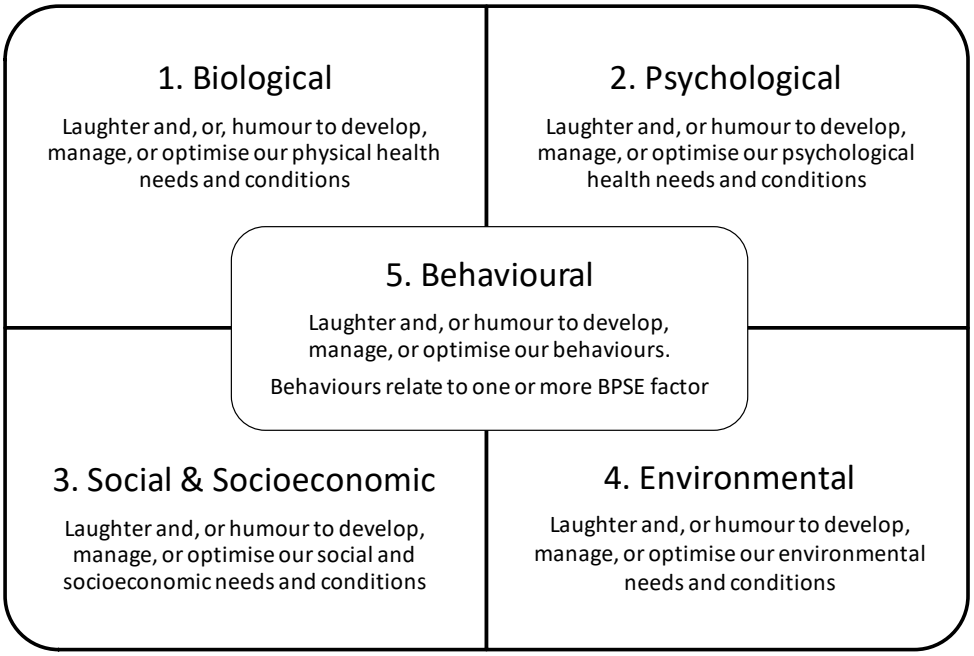
Note: 1. Details in PRISMA-ScR [29] https://www.equator-network.org/reporting-guidelines/prisma-scr/ ; 2. This is a compound scoping review in that it included both primary and secondary research

2.2. Evaluation framework

Personal development was defined in this research as a way to develop, manage, or optimise our Biological, Psychological, Social, Environmental, and Behavioural (BPSE-B) needs and conditions throughout the life cycle. The humour and laughter BPSE-B personal development framework (Figure 1) supported the evaluation of this research. Articles were classified for

illustration purposes according to one or more of the five potential personal BPSE-B outcomes. Data extraction and classification methodology is detailed in Sections 2.4. and 2.5.

Figure 1. Humour and laughter BPSE-B personal development framework



2.3. Search Strategy

Searching commenced in April 2019 to identify relevant articles, published in English since 1970, in Web of Science (WOS, core collection) and PubMed/Medline. A wide search strategy was used: Population (all), Interventions (laughter and humour), Comparison (none), Outcome (as guided by Figure 1), Study design (all) (PICOS [30]). Boolean searches featured humo* and, or, laugh* in the titles along with terms relating to methodology (e.g. intervention*, treat*, therap*, review) and personal development (e.g. develop*, learn*, growth, coping, self-help, resilience, stress, self-management, well-being, strategy). Search results (k = 2,739) were imported into the Rayyan systematic review application [31] for

duplicate resolution and data management. Complementary searches in Google Scholar and Scopus up until July 2019 added 27 articles.

2.4. Screening and data extraction

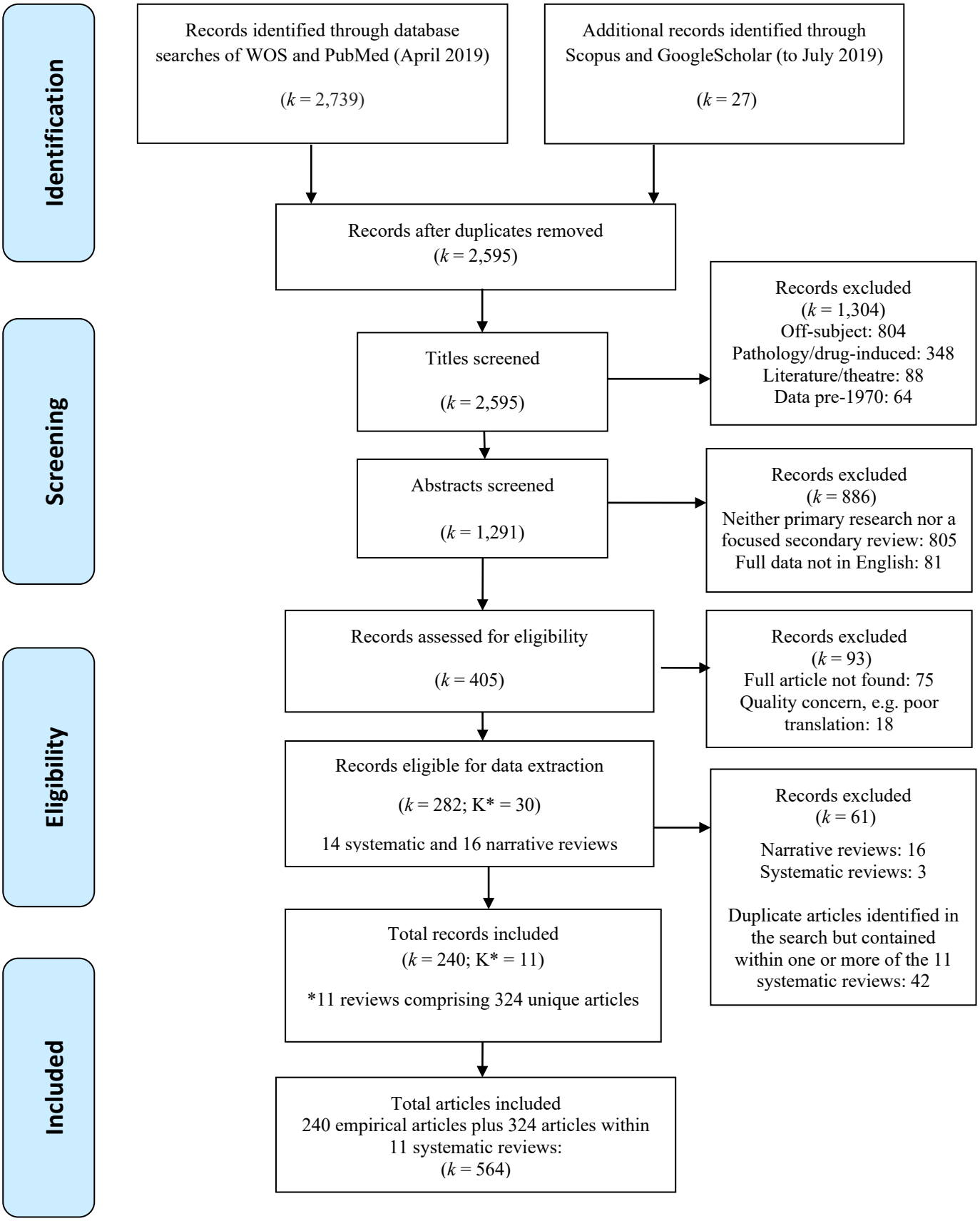
Title screening excluded 1,304 articles, and abstract screening a further 886, as shown in the PRISMA [32] flow diagram (Figure 2). Fourteen systematic reviews and meta-analyses were identified and appraised (Table 2); eleven were included due to their homogeneity and minimal overlap, adding k = 324 after duplicate resolution between the reviews. Sixteen narrative and literature reviews (Table 3) were considered but excluded mainly due to a lack of transparency. Critical appraisal of sources of evidence, optional for scoping reviews [27] [28], was not undertaken. Data extraction followed JBI methodology [28] was undertaken for 251 records (240 primary research, k; 11 secondary research, K).

2.5. Classification of data

The 240 primary research articles and eleven systematic reviews (comprising 324 unique articles), corresponded to k = 564, and n = 564,611. Classification, largely subjective, was undertaken to explore the data. Estimates as to the split between:1) humour and laughter research; 2) research design; 3) participant age profiles; 4) participant health status profiles; and 5) BPSE-B personal development outcomes are presented in Results (Section 3.5).

Figure 2. PRISMA Flow Diagram

Note. k = primary research (used for all records until distinction is made), K = reviews.



3. **Results**

3.1. Overview

This systematic scoping review included 564 articles with 574,611 participants. It considered 14 systematic reviews (Table 2), of which 11 were included; and 16 narrative reviews (Table 3). The majority of participants (77%) identified in this scoping review were associated with twelve large sample research studies, each with over 15,000 participants (Table 4). Subjective classification enabled the research to be explored. Most appeared to be related to humour: humour: k = 445, n = 334,996; laughter: k = 119, n = 239,615.Scoping review results are presented using tables (Tables 5 – 12) and figures (Figure 3).

3.2. Systematic reviews and meta-analyses

Eight of the 14 laughter and humour systematic reviews and meta-analyses had been published since 2018 (Table 2). Most relate to humour (eight); three to laughter and humour, one to laughter yoga, and two to clowns. Humour systematic reviews range from humour in the workplace, to humour in those with intellectual disabilities. Laughter systematic reviews explore the benefits of laughter on mental and physical health and well-being. Some reviews covered the same territory: to minimise duplication three were excluded. Duplicate articles contained in the eleven systematic reviews were then removed to reveal 324 discrete primary research articles (k = 324 and n = 61,986).

Table 2. Overview of laughter and, or, humour systematic reviews and meta-analyses

Authors	Articles (*k*); participants (*n*)	Research focus	Key findings	Limitations exposed by the review
1. *Mesmer-Magnus et al., 2012[1] [33]	*k* = 49 *n* = 8,532	Positive humour in the workplace	Association to health & coping; decreased burnout & stress	Diverse humour definitions
2. *Mendiburo-Seguel et al., 2015[1][34]	*k* = 15 *n* = 5,052	Relation between humour styles and personality traits	Extraversion correlated to positive, and neurotiscm to negative humour	Missing information in some studies
3. Zhang et al., 2016[1,2] [3]	*k* = 8 *n* = 802	Effectiveness of preoperative clown interventions on psychological distress	Psychological stress in children and parents was reduced with clown therapy	Inconsistent results and bias in some studies
4. *Sridharan & Sivaramakrishnan, 2016[1,3] [35]	*k* = 18 *n* = 1,444	Therapeutic clowns in pediatrics	Hospital clowns reduce stress and anxiety in children and parents	Risk of bias and absence of reporting specific elements
5. Antonovici et al., 2016[2] [36]	*k* = 12 *n* = 2,112	Humour use in romantic relationships	Humour styles are linked to relationship quality	Need for studies using superior 'evaluation approaches'
6. *Hall, 2017[1] [2]	*k* = 39 *n* = 15,177	Humour in romantic relationships	Positive humour is associated with relationship satisfaction	Over-reliance on self-reports; need for clearer definitions and methodology
7. *Bressington et al., 2018 [37]	*k* = 6 *n* = 225	Laughter yoga interventions for mental health in adults	May be effective to improve depression and mental health	Inconsistent findings and sub-standard quality
8. *Chadwick & Platt, 2018[4] [38]	*k* = 32; *n* = na *k* = 26 *n* = 1,351	Social humour in people with intellectual disabilities	Humour is important for people with intellectual disabilities	Need for 'methodologically robust investigations'
9. Gonot-Schoupinsky & Garip, 2018[2] [6]	*k* = 5 *n* = 369	Laughter and humour for well-being in older adults	Interventions appear beneficial; evidence for role of laughter insufficient	Confounding factors; omission to measure participant laughter
10. *Linge-Dahl et al., 2018 [39]	*k* = 13 *n* = 759	Humour interventions and assessment in palliative care	Interventions had a positive effect and seem to be useful in palliative care	Diverse humour definitions and disparate methodologies

11. *Schneider et al., 2018[1] [40]	*k* = 37 *n* = 12,734	Associations of habitual humour styles with mental health	Certain humour styles may benefit mental health, and also aid therapy sessions	Reliance on correlation and inconsistent humour definitions between countries
12. *Walter et al., 2018[1] [41]	*k* = 89 *n* = 14,586	Humour and persuasion	Humour has a weak but significant effect on persuasion	Multidisciplinary data was often inconsistent
13. *van der Wal & Kok, 2019[1] [7]	*k* = 29 *n* = 1,986	Laughter-inducing therapies for all for mental and physical health	Therapies can improve depression; non-humorous laughter appears more effective	Overall poor quality and 'substantial risk of bias'
14. *Zhao et al., 2019[1] [1]	*k* = 10 *n* = 814	RCTs of laughter and humour in adults: depression, anxiety and sleep	Significant decrease in depression and anxiety; improved sleep quality	Need for improved quality of research, and follow-up

Note. *Included in the systematic scoping review. 1. Meta-analysis. 2. Not included in the systematic scoping review as articles they contain overlap with those in 11 reviews; 3. Numbers confirmed by authors. 4. Only articles giving participant numbers are included in systematic scoping review.

3.3. Narrative and literature reviews

Of the 16 narrative reviews identified, 12 pertained to humour, two to laughter, and two to both (Table 3). They provide rich detail. The long-standing link of humour research to personal development is reflected in McGhee's 1971 [42] narrative review that considers the development of the humour response in children. The risks of laughter and its association to pathology are also highlighted [56]. Some reviews provided overall article and participant numbers (which enable inclusion in a compound scoping review) but as their content overlapped with the systematic reviews, these were excluded.

Table 3. Overview of laughter and, or, humour narrative and literature reviews

Authors	Articles (*k*); participants (*n*)	Research focus	Key findings
1. McGhee, 1971 [42]	*k* = na[1] *n* = na[1]	A cognitive developmental review of children's humour	Humour response development, and role of fantasy merit attention
2. Shaughnessy & Wadsworth, 1992 [43]	*k* = 67 *n* = na[1]	Assessing humour in counselling and psychotherapy, 1970 to 1990	Humour receptiveness varies widely
3. Berk, 2001 [44]	*k* = na[1] *n* = na[1]	Psychophysiological benefits and risks of humour for older adults	Eight psychological and seven physiological benefits
4. Martin, 2001 [45]	*k* = na[1] *n* = na[1]	Humour, laughter, and physical health	Inconsistent evidence; rigorous research is needed
5. Bennett, 2003 [46]	*k* = na[1] *n* = na[1]	Humour in medicine	Wide range of benefits for patients and professionals
6. Bennett & Lengacher, 2006- 2007 [47] [48] [49] [50]	*k* = 55 *n* = na[1]	Evidence of how humour influences physiological and psychological well-being	The effects of humour on health needs more research, using controls, in clinical populations
7. Chinery, 2007 [51]	*k* = na[1] *n* = na[1]	Alleviating stress with humour in the perioperative environment	Strong connection between humour as a buffer to stress
8. McCreaddie & Wiggins, 2008 [52]	*k* = 88 *n* = na[1]	Purpose and function of humour in health, health care, nursing	Humour use is challenging; an evidence-based approach needed
9. Moore, 2008 [53]	*k* = na[1] *n* = na[1]	Therapeutic humour and laughter in nursing	Humour can benefit nurse-patient relationships, anxiety, and stress
10. Gelkopf, 2011 [54]	*k* = na[1] *n* = na[1]	The use of humour in serious mental illness	Many types of therapy available, but evidence is lacking
11. Mora-Ripoll, 2011 [55]	*k* = 9 *n* = 501	Potential health benefits of simulated laughter	Some evidence that simulated laughter is beneficial to health
12. Ferner & Aronson, 2013 [56]	*k* = 785 *n* = na[1]	Laughter and methodical investigation of risibility: therapeutic and harmful (MIRTH)	Of 785 articles: 85 related to laughter benefits, 114 to risks, and 586 to pathological laughter
13. Greengross, 2013 [57]	*k* = na[1] *n* = na[1]	A mini-review of humour and aging research	The elderly may enjoy humour more, but can find it challenging
14. Bennett et al., 2014 [58]	*k* = 12 *n* = 583	Laughter and humour therapy relevant to dialysis patients	Therapy may be relevant but requires further research
15. Pinna et al., 2018 [59]	*k* = 34 *n* = na[1]	Use of humour in palliative care	Role of humour in palliative care important; training needed
16. Pérez-Aranda et al. 2019 [4]	*k* = 41 *n* = na[1]	Humour, sense of humour and pain	Humour appears to increase pain tolerance

Notes. 1, na = not stated nor easy to extract from information given.

3.4. Large scale laughter and humour research

Twelve studies, each with over 15,000 participants, were identified; seven from Japan and three from Norway (Table 4). All were included contributing 77% of participants (n = 440,698). Four pertained to humour, three of which followed a cohort over 15 years. Research ranged from exploring the impact of humour on mortality and cardiovascular disease, to the effect of laughter frequency on all-cause mortality, and adjustments to disasters.

Table 4. Large sample laughter and humour research

Authors	Participants	Research focus	Key findings
1. Svebak et al., 2004. Health trust Nord-Trøndelagm (HUNT 1) [60]	65,333	Prevalence of sense of humour and relation to certain health indicators in Norway	Little evidence for a link between sense of humour and physical health found
2. Svebak et al., 2010. (HUNT 2) [61]	66,140	A 7-year follow-up to explore sense of humour on mortality, cardiovascular diseases, cancer, diabetes, and subjective health	Sense of humour associated to increased survival into retirement, independent of subjective health
3. Romundstad et al., 2016. (HUNT 3) [62]	53,558	A 15-year follow-up to explore sense of humour on mortality, cardiovascular diseases, cancer, infections and chronic obstructive pulmonary disease	Sense of humour positively associated with infection-related mortality, and with cardio-vascular disease in women
4. Hirosaki et al. 2018 [63]	52,320	Lifestyle factors and social ties associated with frequency of laughter after the Great East Japan Earthquake of 2011	Correlations of laughter frequency suggest laughter may enable positive adjustments after a disaster
5. Ruch et al., 2010 [64]	42,964	Humour as a character strength: findings on age-related changes, and satisfaction with life	Strong positive correlation between humour and life satisfaction indicators
6. Murakami et al., 2018 [65]	34,312	Included associations between radiation after Fukushima, risk perception and laughter frequency	Frequency of laughter reduced risk perception, and significantly associated with lower stress
7. Hayashi et al., 2015 [66]	26,368	Laughter and subjective health in community-dwelling older Japanese	Daily laughter may support general and mental health in older adults
8. Proyer et al. (2009) [67]	22,610	Multinational study relating to gelotophobia (the fear of being laughed at) measurement	Differences in reactions to GELOPH items reported in 73 countries

9. Hayashi et al., 2016 [68]	20,934	Cross-sectional study of laughter and cardiovascular disease among older Japanese adults	Daily laughter is associated with lower cardiovascular disease prevalence
10. Imai et al., 2018 [69]	20,006	Included measuring relationship between equivalised income and the frequency of laughter	A significant relationship between equivalised income and the frequency of laughter
11. Li et al., 2018 [70]	19,001	Exploring evidence for the saying 'laugh and grow fat' in Chinese	Significant positive relationship between happiness and BMI
12. Sakurada et al., 2019 [71]	17,152	Associations of frequency of laughter with all-cause mortality and cardiovascular disease	Frequency of laughter is protective for all-cause mortality and cardiovascular disease

3.5. Presentation of classification findings

Classification of the data body (k = 564, and n = 564,611), described in Section 2.5., enabled the exploration of subjective comparisons between humour and laughter research. Most articles (79%) and participants (58%) appeared to relate to humour: humour: k = 445, n = 334,996; laughter: k = 119, n = 239,615. Comparisons of humour and laughter research by research design and participant age and health status are summarised (Table 5), and according to potential personal development outcomes associated with the research (Table 6).

Table 5. Comparisons of humour and laughter research by design and participant status

Design and Participant Types		**Humour**[1]		**Laughter**[2]	
Category	Description	% articles[3]	% participants[3]	% articles[3]	% participants[3]
Research Design	Cross-sectional	46.8%	31.6%	13.0%	84.7%
	Longitudinal	5.6%	57.0%	3.4%	7.3%
	Interventional	31.7%	8.5%	75.6%	3.4%
	Observational/Qualitative	15.9%	2.9%	8.0%	4.5%
	Total	100.0%	100.0%	100.0%	100.0%
Age	Infants and children	5.4%	0.5%	6.3%	0.4%
	Adolescents	2.8%	1.5%	1.5%	0.4%
	Students	10.3%	4.2%	13.7%	0.7%
	Adults[4]	65.6%	71.7%	57.2%	59.1%
	60 plus	15.8%	22.2%	21.3%	39.3%
	Total	100.0%	100.0%	100.0%	100.0%
Health Status	Healthy	23.9%	11.2%	40.3%	6.6%
	With a specific condition	18.3%	1.5%	16.8%	0.8%
	Mixed/general	57.8%	87.2%	42.9%	92.6%
	Total	100.0%	100.0%	100.0%	100.0%

Note. 1. Estimations based on $k = 445$, $n = 334{,}996$; 2. Estimations based on $k = 119$, $n = 239{,}615$; 3. These percentages reflect the whole data set and not individual articles as many were perceived as relating to both laughter and humour, and e.g. to more than one age group, therefore where necessary and known, articles and participant numbers were apportioned accordingly using a range of assumptions; 4. Neither students nor those aged 60 plus.

Table 6. Comparisons of humour and laughter research by personal development outcomes

Personal development outcomes		**Humour**[1]		**Laughter**[2]	
BPSE-B	BPSE-B Factor	% articles[3]	% participants[3]	% articles[3]	% participants[3]
B	Biological	6.4%	56.1%	34.1%	26.4%
P	Psychological	41.0%	21.4%	39.2%	26.8%
	Social	20.8%	12.7%	13.1%	9.8%
S	Economic	0.3%	0.4%	1.0%	5.0%
	Educational	14.1%	4.1%	1.7%	0.2%
E	Environmental	4.7%	0.9%	1.3%	16.0%
B	Behavioural	12.7%	4.4%	9.6%	15.8%
	Total	100.0%	100.0%	100.0%	100.0%

Note. 1. Estimations based on $k = 445$, $n = 334{,}996$; 2. Estimations based on $k = 119$, $n = 239{,}615$. 3. These percentages reflect the whole data set and not individual articles as many were perceived as relating to more than one BPSE-B factor, therefore where necessary and known, articles and participants were apportioned accordingly.

3.6. Descriptive overview of selected research

Research allocation by Biological, Psychological, Social, Environmental, and Behavioural (BPSE-B) factor is illustrative. Examples of recent primary research, with varied objectives, samples, and methodologies, are highlighted for each BPSE-B factor in tables 7 to 11.

3.6.1. Table 7. Biological outcomes

Humour			**Laughter**		
Authors	Participants (*n*); design	Key findings	Authors	Participants (*n*); design	Key findings
1. Stewart & Thompson, 2015 [72]	*n* = 53 Longitudinal	Comedians ranked as funniest by researchers died earlier	1. Ohira et al., 2015 [77]	*n* = 4,780 Cross-sectional	Laughter frequency may be associated with diabetes
2. Amir & Biederman, 2016 [73]	*n* = 40 Intervention using fMRI	Differential neural activity when creating humour in seasoned comedians	2. Manninen et al., 2017 [78]	*n* = 12 Cross-over	Social laughter resulted in endogenous opiod release
3. Bains et al., 2017 [74]	*n* = 32 Intervention	Mirthful laughter can decrease inflammation	3. Fujiwara & Okamura, 2018 [79]	*n* = 90 Randomized trial	Listening to laughter improved autonomic nervous system recovery
4. Moshtag Eshg et al. 2017 [75]	*n* = 40 Clinical trial	Reduced blood pressure in haemodialysis patients	4. Fujisawa et al., 2018 [80]	*n* = 120 RCT	Effects on cortisol dynamics longer lasting with humour-induced than simulated laughter
5. Kim et al. 2018 [76]	*n* = 26 Intervention	Alleviation of atopic dermatitis	5. Law et al., 2018 [81]	*n* = 72 Intervention	Laughter, particularly self-induced, had similar cardiovascular effects as exercise

3.6.2. Table 8. Psychological outcomes

Humour			Laughter		
Authors	Participants (*n*); design	Key findings	Authors	Participants (*n*); design	Key findings
1. Tumkaya, S. 2007 [82]	*n* = 283 Cross-sectional	Significant negative relationship of burnout to affiliative and self-enhancing humor	1. Kuru Alici et al. 2018 [87]	*n* = 50 Intervention	Decreased loneliness after 5-week laughter therapy in nursing residents
2. Fox et al., 2016 [83]	*n* = 1,234 Longitudinal	Psychosocial adjustment reflected in humour styles in children	2. Bressington et al., 2019 [88]	*n* = 50 Controlled intervention	Decreased depression after 4-week laughter yoga intervention
3. Friedler et al., 2017 [84]	*n* = 295 Controlled intervention	Clowns reduced anxiety in women undergoing IVF	3. Gonot-Schoupinsky & Garip, 2019 [16]	*n* = 22 Intervention	Increased well-being after one-minute laughter prescription over 1 week
4. Fritz et al., 2017 [85]	*n* = 236 Cross-sectional	Positive humor predicted reduced psychological distress	4. Morishima et al., 2019 [89]	*n* = 56 RCT	Significantly better cognitive function and reduced pain in cancer patients
5. Nakanishi, 2017 [86]	*n* = 1 Case study	Playful humour enabled a 15-year old to open up after 3 years of mutism	5. Rezaei et al. 2019 [90]	*n* = 32 Controlled intervention	Laughter therapy improved quality of life perceptions in nursing residents

3.6.3. Table 9. Social, socioeconomic, and educational outcomes

Humour			Laughter		
Authors	Participants (*n*); design	Key findings	Authors	Participants (*n*); design	Key findings
1. Karakuş et al., 2014 [91]	*n* = 440 Cross-sectional	Self-enhancing humour was associated to perceived social support	1. Smoski, & Bachorowski, 2003 [96]	*n* = 204 Intervention	Significantly more antiphonal laughter (i.e. after a social partner's laugh) with friends than strangers
2. Lehmann-Willenbrock & Allen, 2014 [92]	*n* = 352 Longitudinal	Humour patterns were related to team performance	2. Cueva et al., 2006 [97]	*n* = 259 Cross-sectional	94% viewed laughter as important to support adult learning
3. Bieg & Dresel, 2018 [93]	*n* = 985 Cross-sectional	Affiliative teacher humour related to course content supports learning	3. Kashdan et al. 2014 [98]	*n* = 174 Diary study	Laughter supports intimacy and social bonding; strong link to enjoyment
4. Bolkan et al., 2018 [94]	*n* = 180 Two interventions	Students exposed to lessons with humorous content performed worse	4. Esseily et al., 2016 [99]	*n* = 53 Intervention	Laughing at a humorous situation facilitated learning in infants
5. Hewer et al., 2019 [95]	*n* = 57 Ethnographic	Humour as a social lubricant, coping mechanism, and to negotiate power	5. Addyman et al., 2018 [100]	*n* = 20 Intervention	Laughter in infants is a flexible social signal rather than a response to humor

3.6.4. Table 10. Environmental outcomes

Humour			Laughter
Authors	Participants (*n*); design	Key findings	
1. Vivona, 2014 [101]	*n* = 14 Qualitative	Humour reduced stress in crime scene investigations	Two large sample studies, summarised in Table 4 (Hirosaki et al. 2018 [60] and Murakami et al., 2018 [62])
2. Brcic et al., 2018 [102]	*n* = 66 Qualitative	Astronauts were more likely to use positive, rather than negative, types of humor in space	
3. Cherry et al., 2018 [103]	*n* = 219 Cross-sectional	Humour was associated with resilience in those affected by both hurricanes Katrina and Rita	

3.6.5. Table 11. Behavioural outcomes

Humour			Laughter		
Authors	Participants (*n*); design	Key findings	Authors	Participants (*n*); design	Key findings
1. Ventis et al., 2001 [104]	*n* = 40 Controlled intervention	Humour was effective to treat arachnophobia (fear of spiders)	1. Beckman et al., 2007 [109]	*n* = 33 Intervention	Self-induced laughter increased workplace self-efficacy, and self-regulation
2. Chang et al., 2015 [105]	*n* = 1,252 Cross-sectional	Creativity was associated with high scores in all humour styles	2. Wilson et al. 2007 [110]	*n* = 1 Case study	Laughter was used by a dementia sufferer to convey information
3. Leow et al., 2016 [106]	*n* = 406 Intervention	A reduction in psychotropic medication use in nursing homes	3. Walker, 2013 [111]	*n* = 12 Observational	1-year olds deployed laughter as an interactional resource
4. Sim, 2016 [107]	*n* = 33 Intervention	A reduction in behaviour issues in children with chronic conditions	4. Papousek et al., 2014 [112]	*n* = 1,440 Intervention	A fear of being laughed at appears to be associated with anger and aggression
5. Yue et al., 2016 [108]	*n* = 325 Cross-sectional	Adult playfulness associated with self-enhancing and affiliative humor	5. Gray et al. 2015 [113]	*n* = 112 Controlled intervention	Social laughter increased intimate self-disclosure

3.7. Humour and laughter theory findings

An objective of this research was to explore theory to address the need for clearer definitions and unify the fields. Following the assessment of scoping review findings, the similarities, differences, and relationships between different types of laughter and humour were therefore considered. This enabled the creation of unifying, comparative definitions (see Section 3.7.3).

3.7.1. Laughter and humour similarities

Fifteen unifying characteristics were identified as found in Table 12.

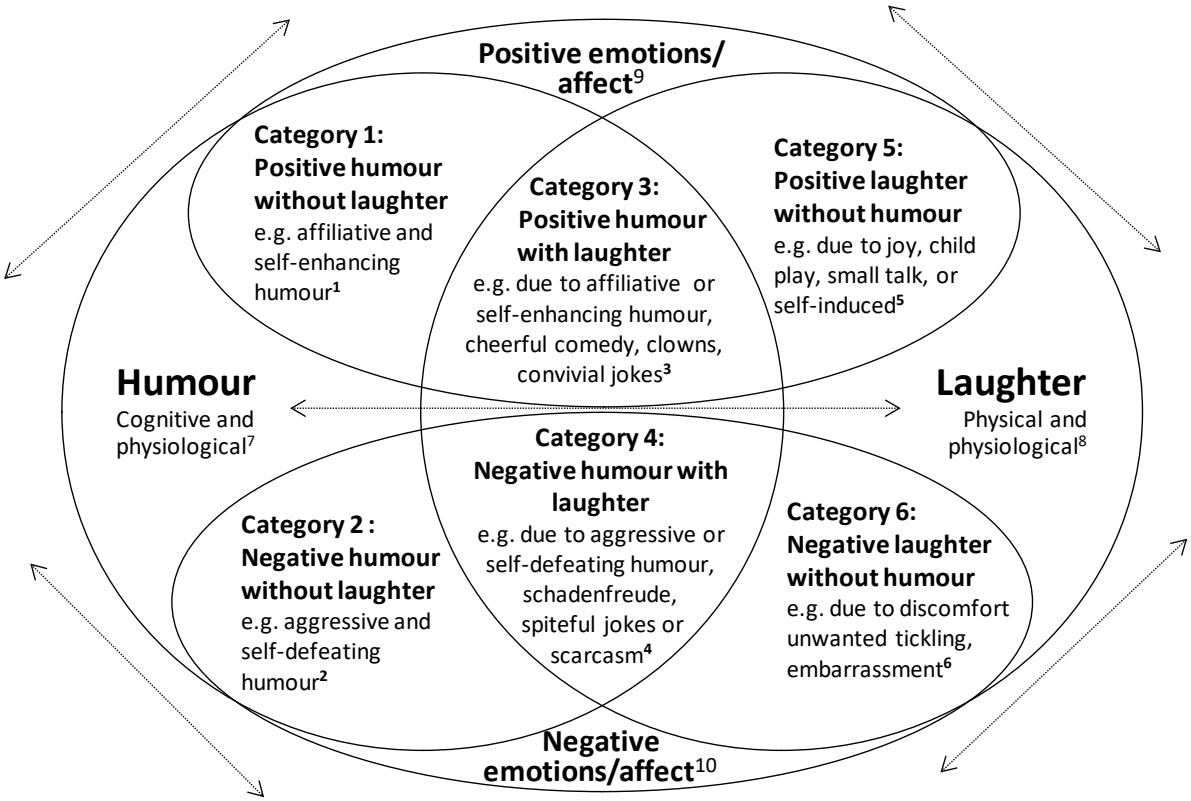
Table 12. Shared characteristics of laughter and humour

Characteristic	**Laughter**	**Humour**	**Reference examples**
1. Universal; likely innate	√	√	[114]; [115]
2. Contagious	√	√	[114]; [116]
3. Can produce physiological and psychosocial benefits	√	√	[117]; [118]
4. Can beneficially occur alone	√	√	[16]; [73]
5. Can be involuntary/spontaneous or voluntary/purposeful	√	√	[13]; [14]
6. Passive listening is beneficial	√	√	[79]
7. Able to be self-induced	√	√	[16]; [73]
8. Trainable	√	√	[119]; [120]
9. Associated with cheerfulness and playfulness	√	√	[15]
10. Associated with smiling and able to induce the Duchenne smile, a mark of genuine pleasure	√	√	[4]; [121]
11. Can occur due to pathology, be harmful, and pose a risk	√	√	[56]; [122]
12. Able to be drug-induced	√	√	[123]; [124]
13. Influenced by and adaptable to context and location	√	√	[125]; [126]
14. Influenced by individual differences	√	√	[127]; [128]
15. Influenced by cultural differences	√	√	[129]; [130]

3.7.2. The humour-laughter-affect model

Differences between laughter and humour were explored and six categories were identified. The humour-laughter-affect (HuLA) model (Figure 3) identifies six categories of humour and laughter: 1) positive humour without laughter; 2) negative humour without laughter; 3) positive humour with laughter; 4) negative humour with laughter; 5) positive laughter without humour; 6) negative laughter without humour.

Figure 3. Humour-laughter-affect (HuLA) model



Note. 1./2. Four humour styles [131]; five (cynicism, irony, nonsense, satire, wit) [128]; 3./4. Humour-induced laughter is 'mirthful laughter' [132]; mirthful and non-mirthful laughter can be spontaneous [133] or self-induced; 5. Most social laughter is humour-independent [25]; joyful self-induced laughter using the Laughie [16]; 6. May also include pathology [56]; 7. [115]; 8. [134]; 9./10. A range of definitions and measures may apply; humour associated with negative affect can benefit creativity [105], 'harsh humour' can benefit therapy [135].

Key. Arrows show given or potential bi-directional cause and effect relationships, e.g. happy people have positive, and unhappy people have negative humour styles [136].

3.7.3. Unifying humour and laughter definitions

These definitions are proposed not to replace existing definitions, for example those of Martin [45], Provine [22], and Ruch [120], but to add a new perspective. They are specifically worded to compare and contrast humour and laughter, and thus extend insight into their similarities and differences to support joint and multidisciplinary research in both fields.

3.7.3.1. Humour definition

Humour is predominantly a cognitive process, often involving perceptions of funniness, occurring alone or socially. It can be created, appreciated, reminisced, arise spontaneously, or enacted e.g. clowns, and serves diverse personal development functions including social bonding. It may be induced by a range of emotions, playfulness, and, or, laughter, or induce these. It is influenced by motives, circumstances, and cultural and individual differences.

3.7.3.2. Laughter definition

Laughter is predominantly a physical behaviour, occurring alone or socially. It is often used as a form of verbal expression or communication. It can be spontaneous, provoked, or self-induced, and serves diverse personal development functions including social bonding. It may be induced by a range of emotions, playfulness, and, or, humour, or induce these. It is influenced by motives, circumstances, and cultural and individual differences.

Discussion

To our knowledge this is the first compound systematic scoping review (it includes both primary and secondary research), and the widest review of the laughter and humour literature. Diverse examples of laughter and humour research relating to BioPsychoSocioEnviro-Behavioual (BPSE-B) factors relevant to personal development were identified. These findings have important implications for the development of tailored interventions according to needs, populations, and outcomes. Humour and then laughter findings are discussed within each BPSE-B factor, prefaced by theory; then in relation to overall theoretical insight.

4.1. Biological

Current humour therapies are etymologically if not theoretically linked to the concept of balancing 'humours' for bodily health advocated from Hippocrates to Richard Burton [137]. Theories relating laughter and humour to biology are reflected in the relief theory of laughter that originated with Herbert Spencer [138], who claimed 'laughter is a display of muscular excitement'. William Fry, the pioneer of gelotology (the study of laughter) considered laughter affected the 'whole physical being' [132], and demonstrated mirthful laughter (humour-induced) benefitted blood pressure [139] and cardiovascular function [140].

Berk [44] saw laughter as a response to humour, with seven physiological benefits akin to exercise: 1) improves mental functioning, 2) exercises and relaxes muscles, 3) improves respiration, 4) stimulates circulation, 5) decreases stress hormones, 6) increases immune defences, 7) increases endorphin production. The biochemical changes and analgesic qualities of laughter, when combined with tears (as in belly laughter and depicted in a popular emoji) may be particularly beneficial to alleviate tension, anger, fear, and loss [142]. It has been proposed that the physiological benefits of laughter underlie all three key laughter and humour theories (relief, incongruity, and superiority [141].

4.1.1. Biological: Humour research

Recent evidence for a link between humour and physical health appears strong. A large sample health survey of the general population aged 20 plus (n = 65,333) [60] found a clear association between sense of humour and increased survival to retirement after a seven year assessment of mortality levels [61]. Results in this same population (n = 53,558) after 15 years confirmed this positive association up until the age of 85 [62].

Recent research supports the use of humour to manage, or optimise our psychological needs and conditions. Humour-induced (or mirthful) laughter following a humorous video reduced heart rate and inflammation levels (n = 32) versus a distress video [74]. An eight-week humour therapy, twice weekly, clinical trial reduced blood pressure in haemodialysis patients (n = 40) [75]. A four-week humour intervention using physiological measures reduced stress in children aged 6 to 12 (n = 26) suffering atopic dermatitis [76].

Investigations into brain activity exploring the cognitive processes during solo humour creativity (n = 40) points to differential neural activity in more seasoned comedians [73]. The authors investigating this have proposed that neural correlates of mirth involve opiod activity in the brain as a consequence of linking remote ideas [143]. This would indicate that the physiological consequences of humour can result in feel-good mirth even without laughter.

4.1.2. Biological: Laughter research

Large-sample evidence suggests a strong link between laughter and physical health. Daily laughter frequency was associated with lower cardiovascular disease in older adults (n = 20,934) [68], and was protective for all-cause mortality and cardiovascular disease (n = 17,152) [71]. A significant association between self-reported laughter frequency and the incidence of diabetes mellitus in women (n = 4,780) has been reported [77]. The homeostatic

effect of laughter on diabetic cardiovascular function has been found to greatly enhance life quality for those with type two diabetes [5]. With an estimated 415 million diabetes sufferers globally in 2015, and numbers expected to rise [144], this insight is relevant.

A physiological source of pleasure, in the form of endogenous opiod release, was reported after research studying positron emission tomography (PET) brain scans in healthy males (n = 12) using 'social laughter' (watching comedy clips in groups) [78]. Physiological benefits of listening to other people's laughter were reported in a randomized control trial (n = 90) with five minutes found to improve autonomic nervous system recovery [79].

Findings vary as to the superior benefits of simulated (self-induced) laughter over mirthful (humour-induced) laughter, as well as its enjoyment [16]. A systematic review found non-humorous laughter attained higher effect sizes [7]. A randomised control trial (n = 120) reported salivary cortisol decreases in simulated and humour groups but longer effects for mirthful laughter [80]. Conversely, the cardiovascular effects of simulated laughter were more pronounced than for humour-induced when compared to a control in a 6-minute intervention (n = 72) [81].

4.2. Psychological

A long tradition associates laughter and humour to psychological outcomes. Superiority theory, which involves amusement at the expense of others, is traced to Plato, Aristotle, and Roman educators, who also considered their application to prepare people for 'rational discussion'; Quintilian classified laughter as cheerful, bitter, malicious, or inoffensive, and noted it 'dispels melancholy', hatred and anger [145]. Humour is integrated in psychotherapeutic approaches used by Freud, Adler, Erikson, and Ellis [146] and Frankl [147]). The use of humour to resolve internal dialogues is recommended by Berger who lists 45 techniques to generate humour [148]. HOPE Berk [44] found evidence for eight

psychological benefits of humour and laughter: to reduce 1) anxiety, 2) tension, 3) stress, 4) depression, 5) loneliness; and to 6) improve self-esteem, 7) restore hope and energy, and 8) provide a sense of empowerment and control.

4.2.1. Psychological: Humour research

The benefits of humour on life satisfaction appear strong. An online investigation of humour as a character strength across the lifespan (n = 42,964) found a robust positive correlation to life satisfaction, and an engaged and pleasurable life [64]. Humour type matters: a systematic review (k = 37, n = 12,734) found aggressive humour unrelated to mental health, while self-defeating humour was negatively correlated [40]. Self-defeating humour was associated to the highest levels of psychosocial maladjustment in longitudinal research in pre-adolescents (n = 1,234) [83]. Self-enhancing humour can moderate stressful life events and reduce psychological distress according to cross-sectional research in healthy adults (n = 286) [85]. Affiliative and self-enhancing humour predicted low levels of emotional exhaustion and depersonalisation (n = 283) using the Maslach Burnout Index [82].

Humour interventions can support psychological needs in a range of stressful circumstances. A systematic review found the use of humour in palliative interventions to be beneficial (k = 13, n = 759) [39]. Clown interventions reduced stress and anxiety in hospitalised children and their parents [35] (k = 18, n = 1,444), and in women undergoing in vitro fertilization (n = 295) [84]. The use of humour as a coping mechanism is often highlighted: it was found to be effective with positive humour, but not with negative humour [149]. Humour has also been successfully employed to treat a teenage girl who had been mute for three years [86].

4.2.2. Psychological: Laughter research

Meta-analyses of the effects of laughter on psychological health are promising. Laughter interventions can result in significant decreases in depression and anxiety [1] (k =10, n = 814), and laughter-inducing therapies may improve depression (k = 29, n = 1,986) with simulated laughter potentially more effective [7]. A systematic review of laughter yoga interventions, an approach developed by Dr. Madan Kataria, found they may support mental health in adults (k = 6, n = 225) [37]; an eight-week randomized control trial in adults (n = 50) suffering anxiety, stress, and clinical depression provides additional evidence for the benefits of laughter yoga on mental health [88].

Laughter therapy was found to reduce loneliness in nursing home residents (n = 50) over a 5-week intervention [84]. Quality of life, and cognitive function improved in cancer patients (n = 56), and pain reduced in a randomized control trial using laughter therapy [86]; with similar effects reported in research using 12 sessions of laughter therapy in nursing residents over four week intervention [87].

The frequency of laughter is increasingly investigated: daily laughter supported general and mental health in community-dwelling older Japanese (n = 26,368) [63]. A study in Japanese adults (n = 52,320) found three-quarters did not laugh each day [65]. Prescribing laughter is recommended by the medical community, including as at tool for Lifestyle Medicine [150], and the Laughie one-minute laughter prescription was developed as a convenient way to prescribe laughter. The Laughie was found to increase well-being by 16% in healthy adults used three times a day for a week (n = 22) [16].

4.3. Social and socioeconomic

Humour and laughter have been defined as social phenomena by Martin [45] and Provine [22]. Some researchers see humour as playing a 'fundamental role in shaping interpersonal perceptions and hierarchies within groups' [151]. Scott et al. consider laughter to be a social emotion [152]. A social evolutionary theory views laughter and humour as facilitating teamwork within 'small hominid groups' due to laughter's 'playful emotional contagion' [13]. Humour functions as both a social control and facilitator in the native Mexican Zinacantecos: ridicule is used to deter and punish the violation of social norms; joking is used in 'socially ambiguous situations' to put people at ease [153]. The Wheel Model of humour highlights the cumulative and circulatory effect in which humour can impact people to transmit positive emotions within social groups [154]. A 'social functional account of laughter' suggests the acoustics of laughter convey reward, dominance, and affiliation [155].

4.3.1. Social: Humour research

Relationships often benefit from humour, but as Norman Cousins [156] affirmed: 'One man's humor is another man's ho-hum.' A meta-analysis (k = 39, n = 15,177) exploring humour in romantic relationships found six humour types positively associated to relationship satisfaction, and five negatively associated, with associations to relationship satisfaction much larger in partner-perceived humour than in self-reported humour [2]. Social humour was found to serve valuable 'social, developmental, and emotional wellbeing functions' in a systematic review of people with intellectual disabilities and their carers (k = 26, n = 1,351) [38]. An ethnographic study (n = 57) concluded humour has important social functions as a social lubricant, a coping mechanism, and a way to negotiate power [95].

A substantial body of research relates to the benefits and risks of humour at work. A systematic review exploring positive humour in the workplace (k = 49, n = 8,352) highlights

increased work satisfaction, performance and team cohesion, and decreased work withdrawal, burnout and stress, but states successful humour entails both sender and receiver finding the same thing humorous [33]. Individual and cultural differences in humour exist and these must be considered for appropriate usage [127], [129]. A two-year longitudinal study (n = 352) found a close association between humour patterns and team performance [92].

Evidence for the potential of humour to support education is inconsistent. Bieg & Dresel [93] found that course-work related humour supported cognitive, motivational, and socio-emotional learning functions in adolescents (n = 985). Bolkan et al. [94] conducted two interventions with students (n = 180) and found those exposed to and tested on humorous material performed worse. A systematic review (k = 89, n = 14,586), found a significant albeit weak effect of humour on persuasion [41]. Instructional Humor Processing Theory distinguishes humour approaches that may be more effective for learning [157].

4.3.2. Social: Laughter research

Social laughter can be observed at an early age. Laughter was found to be a flexible social signal that plays an important role in establishing bonds in infants (n = 20), and less a response to humour while watching cartoons: they laughed on average eight times as much in pairs or groups than alone [100]. 'Antiphonal' laughter, or laughter responding to another persons' laughter, appears to reinforce positive shared interactions (n = 204) [96]. A student diary study (n = 162) documenting social interactions and laughter over two weeks found laughter benefited all involved and predicted positive emotions, intimacy and enjoyment in subsequent interactions [98].

In view of the link between wealth and health [158]), recent evidence for an association of laughter frequency to income may stimulate interest in daily laughter. A significant positive relationship between equivalised income and laughter frequency was reported in Japan (n =

20,006): correlations of laughter frequency to equivalised income and social interactions were positive excepting for 'relatively poor men' who laughed less frequently regardless of their social interactions [69].

Laughter may benefit learning: 94% of Alaska Native Community health professionals (n = 259) identified laughter as learning-supportive, with feedback including 'memories are made when you laugh' [97]. Laughter appears to be a learning stimulant. It facilitated learning in 18-month infants (n = 53): those who laughed while observing a task demonstration were more likely to be able to reproduce the task [99].

4.4. Environmental

Environmental mastery, or 'competence in managing the environment', is one of the six elements of Ryff's well-being model [159]. Research using this model found that humour appreciation predicted personal development (n = 823) [160]. The impact of climate change on public health [161] elevates the importance of applying humour and laughter to respond to these challenges. Humour and laughter have been successfully used to traverse unusual or harsh environments. Victor Frankl [147] recounted how humour helped him survive the concentration camps; and humor was protective for the resilience of prisoner of wars (POWs) in Vietnam [162]. During the COVID19 pandemic a UK medical doctor who admitted being scared stated the importance of 'laughs' [163], and humour was adopted as a defence mechanism by COVID19 caregivers (n = 20) in China [164], reflecting the benefits of laughter and humour in difficult environments.

4.4.1. Environmental: Humour research

Humour and joking can play an important role in reducing stress in high pressure environments. Crime investigators (n = 14) effectively used humour to cope with their stress

and facilitate team work according to qualitative research [101]. Humour is also an effective coping strategy in spaceflight as recounted by active and retired astronauts and cosmonauts (*n* = 66) [102]. With intentions to colonize Mars this is good to note. New research also points to the ability of humour to buffer the stressful effects of natural disasters. A cross-sectional study of Louisiana residents (*n* = 219), who lived through and lost homes or property in hurricanes Katrina and Rita in 2005, suggests humour supported resilience in those exposed to both natural disasters [103].

4.4.2. Environmental: Laughter research

Large sample studies provide convincing evidence of the protective factor of laughter for well-being following environmental disasters. A positive correlation between daily laughter frequency and positive adjustment was reported after the Great East Japan earthquake of 2011 (*n* = 52,320) [63]. Laughter frequency was significantly associated with lower levels of stress relating to radiation risk perception following the Fukushima tragedy (*n* = 34,312) [65].

4.5. Behavioural

Laughter and humour can impact diverse behavioural outcomes, ranging from increased creativity, to medication reduction, and improved sleep. How we use laughter and humour can be impacted by a factors associated with behavioural variations, such as age, personality, phobias, and cultural differences, and it is relevant to consider research investigating this to appropriately tailor interventions individually, and evaluate their outcomes. Younger people may laugh more. Observational research (*n* = 10,412) in the United States revealed that those aged 0 – 15, followed by those aged 16 to 30, laughed most [165]. A systematic review (*k* = 15, *n* = 5,052) found personality affected humour style: extraversion correlated to positive humour, while neuroticism correlated to negative humour [34].

Two phobias, coulrophobia (fear of clowns) [166] and gelotophobia (fear of laughter) also merit attention. Gelotophobia may be associated with anger, aggression and poor emotional regulation with 8% of one sample (n = 1,440) affected [112]. Significant cultural differences in gelotophobic behaviour were suggested in research using the GELOPH measure across 73 countries (n = 22,610): in Thailand 80% considered an item relating to becoming suspicious if others laugh in their presence of high relevance, while in Finland only 8.5% did [67].

4.5.1. Behavioural: Humour research

Humour can be effective in supporting a range of behavioural changes, in diverse populations. A six-week humour intervention reported reduced problematic behaviour in children (n = 33) with diabetes and atopic dermatitis [107]. Humour therapy was found to be just as effective as traditional desensitization for arachnophobia (the fear of spiders) (n = 40) [104]. A significant reduction in the use of psychotropic medication was reported following a 12-week humour intervention in 33 Australian nursing homes (n = 406) [106].

Humour is closely associated with the beneficial behaviours of creativity and playfulness. Humor appears to enable creativity due to its cognitive and emotional perspectives, and humour training can facilitate creativity [167]. Creativity is one area where negative humour styles may be helpful. Cluster analysis showed ‘general humor endorsers’ who scored high across all humour styles, including those considered negative, were the most creative (n = 1,252 [105]. A close association between adult playfulness and self-enhancing and affiliative humour (n = 325) has been demonstrated [108].

4.5.2. Behavioural: Laughter research

Laughter can encourage specific behaviours that support and develop social bonding. For instance, self-disclosure increased significantly (compared to controls) when followed by social laughter (n = 112), despite those making intimate disclosures being unaware of this phenomenon [113]. Laughter is also a communication tool, including for those unable to use words. A case study with a 97 year-old dementia sufferer pointed to their use of laughter to effectively convey information and communicate affiliation [110]. Observational research suggests one year-olds deploy laughter as an 'interactional resource' after transgressions (n = 12) [111].

Laughter also benefits a range of valuable non-social behaviours, including exercise, sleep, and pain reduction. Laughter's association to sleep improvement was highlighted in a meta-analysis (k = 10, n = 814) [1]. Cousins [156] reported 10 minutes of belly laughter (induced by watching comedy) resulted in two hours of pain-free sleep. The Laughie laughter prescription was viewed by participants as an alternative way of practicing sport [16]; Berk [41] also compared laughter's benefits to those of aerobic exercise.

Laughter may also increase behaviours associated with autonomy. An intervention with health centre employees (n = 33) consisting of 15 minutes of humour-independent purposeful laughter over 15 days found it increased self-efficacy and self-regulation [109]. Laughter is also closely linked to playfulness. Panksepp and Burgdorf [168] see laughter as an indicator of joyful, positive affect occurring 'most abundantly during playful social interactions'; a behaviour we appear to share with 'laughing rats'.

5.6. Advancing laughter and humour theory

This review aimed to unify both fields, and therefore inclusive comparative definitions of humour and laughter (Section 3.7) were formulated to address inconsistencies found in the literature. The humour-laughter-affect (HuLA) model (Figure 3) unifies humour and laughter, but also clearly delineates six categories, only two of which involve both laughter and humour (Figure 3). When using the HuLA model, interpersonal dynamics, circumstantial variation, and individual differences should be considered.

A personal development theory (PDT) of laughter and humour appears to be supported by this research, as an umbrella theory under which existing theories can all find a place. Its aim is not to critique existing theory, but to address the need for an overriding theory which can unify both fields, reflects all of the evidence, and may stimulate new research initiatives.

5. Limitations

This scoping review is systematic, but not comprehensive: only two databases were systematically searched. Critical appraisal of research quality was not undertaken. Quality concerns highlighted by the systematic reviews (Table 2) and evidence levels of the primary research presented merit more consideration. Secondary research increased the review scope, but by including overall systematic review findings individual studies within those reviews were not individually assessed or discussed. Classification of research including according to BPSE-B factors is illustrative, and can be disputed due to the subjective nature of such a task.

6. Conclusions

This scoping review evaluated the findings from 251 articles (primary research articles, k = 240; systematic reviews, K = 11), thus enabling a large body of research (k = 564, n = 574,611) to be considered. Different types of laughter and humour were found to benefit

personal development outcomes relating to Biological, Psychological, Social and socio-economic, Environmental, and Behavioural factors (BPSE-B). Evidence was found in a range of populations (healthy and with specific conditions; all ages), settings, and circumstances. Although laughter and humour is not always helpful, including when it does not make others feel good, multiple ways in which it has been appropriately harnessed to benefit different aspects of personal development in a range of situations are discussed. Insight into how and when interventions can be tailored to individual needs is valuable to promote the therapeutic potential of laughter and humour including for self-care and integrative medical prescriptions. The application of different types of humour and laughter, free and accessible resources, to benefit personal development in varied populations across the life cycle, and in a range of environments, is of interest. A humour-laughter-affect model, inclusive definitions, and a Personal Development Theory of laughter and humour are proposed to support and advance humour and laughter research.

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