Critical Commentary

The Psychology of Laughter Prescription:

Contributions to the Research Literature on Laughter and Humour.

By Freda Gonot-Schoupinsky

BA, MBA, MSc (Hons)

Submitted in partial fulfilment for the award of Doctor of Philosophy by Publication

(Retrospective)

Declaration

I hereby confirm that this work is my individual effort.

All quotations, references and sources of information have been properly acknowledged in the manuscript.

Freda Gonot-Schoupinsky

Freda Gonot-Schoupinsky

July 5th., 2023

Dedication and Acknowledgements

To my dear husband, Xavier Gonot-Schoupinsky, who has been at my side throughout

this adventure, and has inspired me, and been a source of joyful laughter.

And to my dearly beloved father, Alan Roy Katritzky,

who left this world before I started my journey yet is always in my thoughts.

There are so many to acknowledge and thank.

As well as my immediate family, I want to highlight a few wonderful people I met
due to my research and had the pleasure of interacting with these last few years:

Arthur Asa Berger, Mark Weeks, Merv Neal,
Joe Hoare, Ros Ben-Moshe, and Madan Kataria.

Importantly, I also want to thank my two supportive and inspiring Supervisors:

Jerome Carson who was so enthusiastic, and dynamic, and without whom
this work would almost certainly not have been completed; and
Gill Brown who encouraged me to communicate my knowledge more clearly.

Abstract.

A growing body of evidence, highlighting multiple benefits of laughter for health and well-being, has resulted in physician calls for laughter prescription. As a pragmatist, I was inspired to explore how these foundations could be converted into action. Here I present and critique my six-year laughter and humour research journey. My purpose is to substantiate the potential of laughter prescription with evidence-based, theoretical, and practical insight.

Central to my research is the one-minute Laughie (Laugh Intentionally Everyday) laughter prescription. Here I introduce this original contribution, contextualise laughter prescription, and present my first- and second-wave research. The latter, inspired by my critical literature review (Chapter 3), includes the Laugh-Health and Laugh-Thrive models. My critical commentary covers theoretical and applied research, reviews, commentaries, case studies, and citizen science research, motivated by the independent use of the Laughie in the "Laughie Challenge Australia". My third-wave research, currently underway, includes the book '*The Positive Psychology of Laughter and Humour*.'

Pragmatic autoethnography, an approach I conceived, allows me to convey findings, experiences, and recommendations in accordance with my research paradigm. My five research contributions, include the development of a feasible laughter prescription modality; the demonstration that laughter and humour differ in nature, impact, and outcome and thus merit treatment as co-equals; pioneering research in solitary laughter; prototypal citizen science research; and a range of original ancillary methodologies.

I am the first to have engaged deeply with theoretical and applied laughter prescription. My contributions raise the profile of laughter prescription and demonstrate why we should consider to "laugh for a reason". They also highlight the need to address conflational, measurement, mindset, and modality challenges within laughter prescription research, and value the hitherto dismissed topic of solitary laughter. Overall, I hope my research will encourage insight into laughter prescription, and its exploration, expert usage and practice.

Table of Contents

Chapter 1:   Making a case for laughter prescription.

1.1. Introduction.

The topic of laughter prescription, namely laughter prescribed by the medical and allied health communities, social prescribing, and self-prescription, is surprisingly complex. Here, my mission, as a psychologist, specialised in health psychology, is to suggest why it merits attention. I introduce my laughter prescription (the Laughie), the "research problem" and research gaps I address, and clarify my purpose, aims, objectives, and methodology. To contextualise the topic, I also provide a chronological timeline of laughter prescription history. Finally, I introduce my five contributions to knowledge.

1.2. Why and how can we prescribe laughter?

The idea of prescribing laughter may seem incongruous. But while we know how to laugh, some rarely do (Tamada et al., 2021). Laughter, a complex motor behaviour (Gerbella et al., 2021), can ameliorate affect in people of diverse ages, lifestyles, physical and mental abilities and conditions, support communication and social bonding, and manifest physiological outcomes comparable to physical exercise (Dunbar et al., 2011; Gonot-Schoupinsky et al., 2020). The medical community has called for laughter prescription (Louie et al., 2014). Yet, despite laughter's accessibility, low-risk, and potential for immediate impact, take-up is slow. Why this is, and how to overcome it, constitutes my "research problem". The elements I tackle are insufficient evidence and guidance for laughter prescription *per se*, and pervasive "mindset" barriers governing how laughter should be undertaken.

With depression the leading cause of disability worldwide, antidepressants associated with major side-effects (Kelly et al., 2022), exercise effective as treatment (Heissel et al., 2023), and the knowledge that laughter is exercise (Berk, 2001), laughter prescription merits attention. Laughter prescription provides a pragmatic way to guide, motivate, and monitor those who choose laughter as a mood enhancing remedy. When considered in a "what works best" evaluation of current evidence, risk, cost, time, ability, infrastructure, personal choice, and enjoyment, laughter is attractive for self-care, social prescribing, and non-pharmacological medical prescription. Here, I share my research within this exciting new "territory" of laughter prescription, and introduce my "niche" (Swales, 1990), of a one-minute intentional laughter prescription for health and well-being.

1.2.1. Intentional strategic laughter for health and well-being.

Darwin ([1872] 1896, p. 198) observed that laughter is primarily the expression of "joy or happiness" but could be used strategically to mask other emotions (Farley et al., 2022). The idea that *"emotion follows upon the bodily expression",* proposed by the pragmatist and father of American psychology William James (1890, p. 449), shows us that laughter, and emotions that accompany it, can be intentional. Intentional laughter is at the core of Laughter Yoga developed by the medical doctor Madan Kataria, both to reduce his own stress levels, and, as he recently told me, to prescribe laughter to his patients (Kataria et al., 2023). My laughter prescription, the Laughie (Laugh Intentionally Everyday) one-minute laughter prescription (Gonot-Schoupinsky & Garip, 2019), builds on these ideas, and was also inspired by Foley et al. (2002), who reported that one minute of "forced laughter" increased positive affect. As a pragmatist, that finding interested me.

1.2.2. What is a Laughie?

The Laughie was conceived in response to medical community interest in laughter prescription (Louie et al., 2014). A Laughie is one minute of recorded laughter. The recording is designed as a handy way (using a Smartphone) to prompt and time laughter, is quick (one-minute) and flexible (it can be used alone or with others; no need to attend a group, or even leave bed). Recording a Laughie can be challenging, and as such can be seen as a mastery experience (Bandura, 1977; Bandura, 1990). Purposeful laughter has been shown to enhance personal efficacy (Beckman et al., 2007).

The Laughie can be recorded in audio or audio-visual formats. The user records one minute of their joyful and or playful laughter on a smart phone. The recording acts as a prompt to encourage laughter and may be contagious. It also acts as a timer. Users can laugh along with their recording, either alone or with others, and also share their recordings. These two steps are demonstrated by Merv Neal of Laughter Yoga Australia: How to create a Laughie by Merv Neal - YouTube (Neal, 2023a) and How to laugh with your Laughie by Merv Neal - YouTube (Neal, 2023b). The two-step Laughie (recording one minute of laughter, later laughing with it), may take practice, and the support of a trained facilitator is recommended. Purposeful laughter may not immediately, or ultimately, appeal. But its physiological impact, and often also the positive emotions that ensue, can be beneficial.

1.3. Research gaps in laughter prescription.

Laughter prescription *per se* is a research gap, as it has not previously been explicitly explored in detail. Despite the prescription intentions behind Laughter Yoga (Kataria et al, 2023), this has not, to my knowledge, been investigated in research. Just as how a question is formulated can affect the answers given (Ross et al., 2019), how we formulate the rationale of an intervention may affect the results. To gain evidence for laughter prescription,

we also need to deconstruct it. This reveals conflational, mindset, measurement, and modality gaps.

1.3.1. Conflational issues.

Academic interest has traditionally focused on humour, with laughter viewed as a reaction to humour (Martin & Kuiper, 2016). Conflation between laughter and humour is widespread (Milner Davis, 2020, p. vii), despite evidence to the contrary. Kataria (1999) demonstrated that humour is not needed for impactful laughter, and Provine (1996) noted that most laughter interactions do not involve humour. To prescribe laughter we need to be clear whether our active ingredient is laughter, or humour and laughter. This distinction has prescriptive (e.g., what is better, for whom), and research (e.g., how do we measure the impact) implications.

An omnipresent view within academia is that laughter is fundamentally social (Scott et al., 2014; Wood & Niedenthal, 2018). Laughter is thus conflated with social interaction. The problem with this is that it diminishes consideration of laughter as a healthy and enjoyable solitary activity. I view laughter, in the context of laughter prescription, as an exercise that can be enjoyed alone. To understand the ramifications of prescriptive laughter, insight into laughter's impact when people are alone is relevant. The same applies to humour, which is also rarely viewed as a solitary activity (Berger & Gonot-Schoupinsky, 2023).

Inclusion of physical activity in laughter interventions presents another confounding factor (Gonot-Schoupinsky & Garip, 2018). Stretching, joint movements, clapping, and dancing are purposefully incorporated in Laughter Yoga (Kataria et al., 2023). For evidence-based research, these factors are challenging to disentangle, but we must be aware of them.

1.3.2. Mindset issues.

"Western" thinking tends to view humour as superior to laughter, and historically laughter has been viewed quite negatively (Martin & Ford, 2006, p. 9), with even Hippocrates advising physicians that uncontrolled laughter was "vulgar" (Potter, 1995, p. 301). This is revealed in laughter typology: "spontaneous", "genuine", "mirthful", if humour is involved, "fake", "intentional", "simulated", "purposeful", "forced", usually if it is not. For many the idea of laughter without humour is incompatible. Rod Martin, who developed the Humor Styles Questionnaire (HSQ), even stated, *"I agree that laughter sometimes occurs outside of humor, but that may be an anomaly"* (Martin & Kuiper, 2016). "Eastern" views appear different. For example, in India, according to Kataria, laughter is primarily associated with joy, play, festivals and social gatherings (Kataria et al., 2023). As mentioned, solitary laughter is largely overlooked.

1.3.3. Measurement issues.

In my systematic review (Gonot-Schoupinsky & Garip, 2018) I critique how interventions fail to report on how long participants laughed, and the quality of that laughter, and often even if they did laugh. Laughter research without measurement is hard to interpret. Curiously, as humour perception cannot be easily observed, humour measurement, albeit with self-report questionnaires, has been more evolved. Most humour measures include questions that relate to laughter. For example, in the Humor Styles Questionnaire (Martin et al., 2003), of the 32 questions, 11 relate to laughter (e.g., "I usually don't laugh or joke around much with other people"). This situation is likely to change, following the publication (as preprint in June 2023) of "a novel tool to investigate human laughter behaviour". The 30-item 7-point Likert-scale Laughter Production and Perception Questionnaire (LPPQ; Mueller et al., 2023) explores 1) Laughter frequency (e.g., "I rarely laugh when I am on my own"); 2) Laughter understanding (e.g., "I can tell when someone is laughing to stop me getting angry at them");

3) Laughter usage (e.g., "I often laugh deliberately to show that I like someone"); and 4) Laughter liking (e.g., "hearing laughter makes me nervous").

While measuring laughter by self-report is useful, it can present clear limitations. Laughter is a dynamic physical behaviour. It varies widely not only between individuals, but also according to age, motivation, context, and culture (Gonot-Schoupinsky et al., 2020a). In Chapter 3, I relay how Japan has led the way in studies exploring correlations of laughter frequency to health conditions using self-report (mainly in the form of a single-item) to gauge laughter frequency (e.g., Inoue et al., 2022). Such a simplistic measure cannot provide insight into laughter type, quality or length (time laughed). As such, comparisons of laughter frequency are inexact, which is a challenge for evidence-based research. One of the intended functions of the Laughie is that it facilitates the measurement of laughter by capturing, prompting, and encouraging, one-minute of laughter to simplify comparative research.

Laughter measurement is gaining attention due to interest in capturing its essence (to include vocal emissions, facial expressions, and body movements) in "affectively aware technology" (Cossentino et al., 2015). Physical laughter measurements include aspects of; 1) acoustics, 2) respiration, 3) phonation, 4) facial expression and 5) whole body movements, and consider laughter episodes, laughter bouts, laughter frequency (the Fundamental Frequency of laughter is higher than that of speech), and pulmonary ventilation measures (Cossentino et al., 2015). My interest in laughter measurement is, to date, less ambitious. However, I view as fundamental that the "amount" of laughter be systematically gauged in evidence-based research in order to encourage accurate comparisons (a key intended function of the Laughie). In addition, I also consider it important to measure experiential laughter enjoyment, including because enjoyment has been shown to positively impact exercise

persistence (e.g., Rodrigues et al., 2020). To this end, I have designed Laughie Creation Lists, Laughie Checklists, and the 20-item Laughie Experience Questionnaire (see Portfolio). Finally, as the perceptions of an intervention can affect its outcomes (Forneris et al., 2009), I am increasingly interested in the notion of measuring the perceived impact of the Laughie prescription on a range of outcomes. To explore this, I conceived a Post-Intervention Perceived Impact Measure (PIPIM) - the Positive Psychology One-off Post-intervention measure (PPOP) (see Portfolio).

1.3.4. Modality issues.

A fundamental issue concerns the type of laughter, and how much, to prescribe. Louie et al. (2014) suggested 30 minutes of belly laughter. My view is that could be hard to sustain. I see laughter prescription as a way to gently, and habitually, introduce regular laughter into people's lives. Certain laughter regimes seem excessive and unhelpful. The "Mystic Rose Meditative Therapy" of Osho (the late Bhagwan Shree Rajneesh) involves "laughing for no reason" continuously for three hours a day over seven days, once a year (Itzler, 2022).

1.4. Critical commentary aims, purposes, objectives, and contents.

My aims are to present and critique my laughter and humour research contributions (Table 1.1.). These address my research problem/s of the how, why, when, to whom, by whom, with what purpose, and what of, laughter prescription. I also mention other contributions (Table 1.2) inspired by, and that inspired, this work. Citations are shown in Figure 1.1.

My purpose is to substantiate the potential of laughter prescription to promote well-being in the healthy (as a self-prescription) and in those with health conditions (as a prescription recommended and, or, supported by the medical and allied health communities). I also

outline my contributions to knowledge and intend to demonstrate doctorateness (Nygaard & Solli, 2021).

Chapter objectives are:

Chapter 1: Introduce the Laughie laughter prescription, highlight research gaps, present methodology, contextualize my research, and introduce five contributions to knowledge.

Chapter 2: Present, analyse and critique my "first-wave" laughter and humour research completed prior to my PhD studies.

Chapter 3: Conduct a critical literature review to unearth additional evidence for the benefits of laughter prescription.

Chapter 4: Present, analyse and critique my "second-wave" laughter and humour research undertaken during my PhD studies.

Chapter 5: Discuss and critique real-world applications, challenges, examples of laughter prescription, and highlight caveats.

Chapter 6: Discuss and critique my overall research, present my "third-wave" research plans, five contributions to knowledge, and the limitations of my research.

1.4.1. Articles and citations.

Table 1.1. Laughter and humour articles/chapters (n = 18; 2 accepted, 1 under review).

Authors	Publication Type/Topic	Inclusion/ where
1. Gonot-Schoupinsky & Garip, 2018.	**Systematic review:** Laughter and Humour Interventions.	Background MSc.
2. Gonot-Schoupinsky & Garip, 2019a.	**Mixed methods pilot study:** Prescribing Laughter.	Background MSc.
3. Gonot-Schoupinsky et al., 2020a.	**Scoping review:** Laughter and humour for personal development.	Chapter 2
4. Gonot-Schoupinsky et al., 2020b.	**Protocol for RCT:** Prescribing laughter for mental health.	Chapter 2
5. Gonot-Schoupinsky & Garip, 2021a.	**Book chapter:** Covid-Pandemic and laughter and humour.	Chapter 2
6. Gonot-Schoupinsky & Garip, 2021b.	**Popular book chapter:** Laughter and Humour.	(Chapter 2)
7. Gonot-Schoupinsky & Ben-Moshe, 2021.	**Popular book chapter:** Laughter and Humour.	(Chapter 2)
8. Gonot-Schoupinsky, 2021a.	**Popular online article:** How to laugh more?	(Chapter 2)
9. Gonot-Schoupinsky, 2021b.	**Commentary:** Creativity and humour.	Chapter 2
10. Sharma et al., 2022.	**Quasi RCT:** Impact of laughter prescription on creativity.	Chapter 2
11, Neal & Gonot-Schoupinsky, 2022.	**Case Study:** Merv Neal.	Chapter 4
12. Berger & Gonot-Schoupinsky, 2023.	**Case Study:** Arthur Asa Berger.	Chapter 4
13. Ben-Moshe & Gonot-Schoupinsky, 2023.	**Case Study:** Ros Ben-Moshe.	Chapter 4
14. Kataria et al., 2023.	**Case Study:** Madan Kataria.	Chapter 4
15. Morrison et al., 2023.	**Case Study:** Mary Kay Morrison.	Chapter 4
16. Gonot-Schoupinsky et al., Accepted for publication.	**Invited Collaborative autoethnography (ICAE):** The Laughie Challenge.	Chapter 4
17. Gonot-Schoupinsky et al., Under review.	**Scoping review:** Solitary Laughter.	Chapter 4
18. Hoare & Gonot-Schoupinsky, Accepted for publication.	**Book chapter:** Laughter and mental health.	Chapter 6

Table 1.2. Non-laughter and humour articles (n = 13).

Authors	Publication Type/Topic	Inclusion/where
1. Gonot-Schoupinsky & Garip, 2019b.	**Methodology:** FRAME-IT planning and evaluation framework.	Portfolio
2. Gonot-Schoupinsky & Garip, 2019c.	**Methodology**: DQA Differential Qualitative Analysis.	Portfolio
3. Gonot-Schoupinsky & Gonot-Schoupinsky, 2020.	**Pilot Study:** Coffee.	No
4. Gonot-Schoupinsky, 2021c.	**Methodology:** Compound Review Preprint.	Portfolio
5. Gonot-Schoupinsky, 2021d.	**Commentary:** Luxury Markets.	No
6. Gonot-Schoupinsky, 2021e.	**Commentary - Article:** Luxury Markets.	No
7. Gonot-Schoupinsky 2021f.	**Commentary:** Coffee.	No
8. Gonot-Schoupinsky 2021g.	**Commentary:** Coffee	No
9. Carvalho Neto et al., 2021.	**Scoping review:** Coffee.	No
10. Gonot-Schoupinsky et al. 2022a.	**Theory**: Engage-Disengage.	Portfolio
11. Gonot-Schoupinsky et al. 2022b.	**Methodology:** STAIR/STAIR*.	Portfolio
12. Gonot-Schoupinsky, 2022.	**Methodology:** Pragmatic Autoethnography. (PAE).	Portfolio
13. Gonot-Schoupinsky et al., 2023.	**Methodology:** Positive Autoethnography. (PosAE).	Portfolio

Figure 1.1. Scopus and Google Scholar citations (30/6/23).

Source: Elsevier/Scopus, 2023; Google Scholar, 2023.

1.4.2. Critical commentary methodology.

I conceived pragmatic autoethnography (PAE, Gonot-Schoupinsky, 2022) to address the need for epistemological diversity in autoethnography. This enables its use as a qualitative methodology in fields such as positive psychology (Gonot-Schoupinsky et al., 2023). Autoethnography is subjective, experiential (Ellis et al., 2011), and creative (Grant, 2023), in-line with my pragmatic paradigm, yet its inherent constructionist perspective (McIlveen, 2008) is not. Here, I apply PAE for the first time as a narrative critical commentary approach.

The notion that pragmatism considers "the humblest and most personal experiences" (James, 1981, p. 38), reflects my holistic, person-centred values. Pragmatism favours pluralistic methods to investigate, "what works" (Kaushik & Walsh, 2019). James ([1907] 1981, p. 38) saw pragmatism as "a mediator and reconciler" between "going by principles" and "going by facts" (p. 10), or "what works best" (p. 38). Despite inevitable critiques against pragmatism (e.g., Hampson & McKinley, 2023), its focus on action (pragma in Greek) renders it particularly appropriate to investigate laughter, given James' "primacy of action", namely that actions lead to emotions (Caruana, 2020).

1.4.3. Portfolio contents.

The portfolio contains:

1. Ten ancillary contributions (my fifth contribution);

2. A general history of laughter and humour;

3. Details on four items mentioned in the Critical Commentary;

4. Curriculum vitae;

5. Testimonials;

6. Press and related material;

7. Published Articles: Table 1.1.; Table 1.2. (1,2,4,10-13).

1.5. A hundred years of laughter prescription.

A brief history of laughter and humour is found in the Portfolio. Laughter prescription is a somewhat divisive topic in the medical community. This was anticipated when James Walsh, the head of the Medical School at Fordham University, was lampooned in an anonymous review in *The Journal of American Medicine* (JAMA, 1928) of his book *Laughter and Health*:

> *"Dr. James J. Walsh, eminent as a medical historian...attempts to establish laughter as a major item in preventive medicine... Dr. Walsh assumes that...we may laugh away constipation."*

Today, propositions considered as alternative-, complementary-, traditional-, lifestyle-, integrative-, or positive medicine, are often attacked as pseudoscience. These labels present a dilemma therefore, but until laughter is viewed more favourably by the medical community, alignment to one or more can be necessary for publication.

Nevertheless, the journalist Norman Cousins (1915-1990) did manage to publish his experience of "self-curing" with laughter in *The New England Journal of Medicine* in 1976. In *Anatomy of an Illness*, Cousins (1979) recounted how, on hearing he had a slim chance of surviving his 1964 ankylosing spondylitis diagnosis, he self-medicated with large amounts of Vitamin C and laughter induced by watching funny films. Cousins (p. 43) states:

"I made the joyous discovery that ten minutes of genuine belly laughter had an anaesthetic effect and would give me at least two hours of pain-free sleep".

There are several problems with Cousins' account, including the potential confounding effects of Vitamin C, and many were incredulous a layman could publish in a prestigious medical journal (Holden, 1981). Cousins' recovery has been attributed to the placebo effect, and Harrington (2006) notes Cousins himself raised that possibility. Yet, inspired by Cousins, Laurence Peter (1919-1990), a Doctor of Education and comedian Bill Dana (1924-2017)

wrote *The Laughter Prescription* (1982). Leaning on the science building up at the time, they relate how laughter produces natural painkillers in the form of endorphins, and benefits attention, relaxation, and attitude (Peter & Dana, 1982, p. 9).

The psychiatrist William Fry (1924-2014), who coined "gelotology" (the study of laughter), started investigating the effects of mirthful (humour-induced) laughter on physiology, blood pressure, and cardiovascular outcomes in the 1960s. By the 1980s, Fry (2006, p. 126) reported the potential for humour and mirthful laughter (note his conflation) to stimulate immune mechanisms and increase blood hormone (epinephrine, nor-epinephrine, dopamine) levels.

Annette Goodheart (1935-2011), a therapist with a PhD in psychology, published *Laughter Therapy: How to laugh about everything in your life that isn't really funny,* in 1994. Goodheart (1994, p. 86), recommended laughter to release emotions as catharsis, to "fake it till you make it" (p. 125), and that you do not need a reason to laugh (p. 30).

In 1995, Madan Kataria conceived laughter yoga, starting with five people in a Mumbai Park. He was the first to popularise intentional humour-free laughter. In, *Laugh for No Reason,* Kataria (1999, p. 12) writes;

> *"This unique idea proves that anyone can laugh for 15-20 minutes without depending upon jokes, humour, or comedy. It combines Laughter Exercises; make believe Laughter and Yoga breathing (pranayama), which turns into genuine laughter when practiced in a group."*

Another physician, Hunter Doherty "Patch" Adams (portrayed by Robin Williams in the eponymous 1998 film, "Patch Adams"), meanwhile was popularizing medical clowning. In *Gesundheit,* Adams (1998, p. 67) writes:

"...humor is vital in healing the problems of individuals, communities, and societies...Wearing a rubber nose wherever I go has changed my life."

Humour self-prescription, as a stress management coping technique, was recommended in a commentary in the *Journal of Health Education* (Black, 1999). The psychologist and laughter researcher Robert Provine (1943-2019), stated (Provine, 2000, p. 207):

"*The advantageous cost/benefit ratio of laughter is such that there is no need to await FDA approval...The promise of improved mood and quality of life without notable negative side effects is reason enough to implement experimental laughter or humor programs in health-care settings".*

Yet, apart from Mathieu's (2008) 15-minute "laughter prescriptions" to promote happiness and humour in senior centres, Provine's words were not heeded. Noting the reluctance of the medical community to embrace laughter, Strean (2009), advocated for laughter prescription in a medical journal:

"One might expect that there would be growing application of laughter and humour... They are easy to prescribe and there are no substantial concerns with respect to dose, side effects, or allergies."

Despite a need for randomized control trials, Strean (2009) claimed laughter's therapeutic efficacy was already demonstrated in geriatrics, oncology, critical care, psychiatry, rehabilitation, rheumatology, home care, palliative care, hospice care, terminal care, and general patient care. He relates medical doctor Michael Miller's vision of physicians

recommending 15 to 20 minutes of laughter a day. Miller, a University of Maryland Medical Center cardiologist, "prescribes" one good belly laugh a day, viewing laughter that induces tears as particularly physiologically beneficial (Miller, 2019; Shiffman, 2020).

Ramón Mora-Ripoll, another physician, has advocated for laughter prescription, and self-induced laughter (Mora-Ripoll, 2010, 2011, 2013, 2017). Mora-Ripoll (2013) stated:

"Laughter techniques can be easily implemented and cost-effective in traditional clinical settings for health and patient care. Laughter... is a sound prescription as a wonderful way to enhance health."

After employing laughter therapy in dialysis, Bennett et al. (2014) called for laughter prescription guidelines. "The laughter prescription", published by future M.D. Dexter Louie, and M.D.s Karolina Brook and Elizabeth Frates, provides some. Louie et al. (2014), were confident of sufficient evidence for laughter to be employed to "*help prevent diseases, reduce costs, and ensure a healthier population, with no downsides, side-effects or risks*":

"...laughter produces psychological benefits such as improving affect, depression, anxiety, and stress...laughter may also have serious positive physiological effects for those who engage in it on a regular basis. Providers who prescribe laughter to their patients in a structured way may be able to use these natural, free, and easily distributable positive benefits."

Louie et al. (2014) suggested laughter be prescribed using "FITT" for example Frequency (once a week), Intensity (belly laughing), Time (30 minutes), and Type (your favourite sit-com), and that prescriptions be dispensed in practices, tailored to patient preferences of humour, if humour is used, or laughter yoga, and done in groups or alone.

1.6. Introducing my contributions to knowledge.

My research is the first to explicitly investigate laughter prescription theoretically, in applied research, and in a "real-world" context. My contributions include:

1) Conceiving, developing, testing, refining, and observing the one-minute Laughie (Laugh Intentionally Everyday) laughter prescription over five plus years;

2) Deconstructing laughter/laughter prescription to explore, understand, communicate its purpose, application, content, and conflational, mindset, measurement and modality challenges;

3) Pioneering exploration in a previously dismissed field: laughing alone/solitary laughter for health and well-being;

4) Supporting prototypal ethnographic citizen science laughter prescription research with a laughter practitioner;

5) Conceiving a range of original methodological contributions to support my research and address gaps. (Ten are presented in the Portfolio).

1.7. Conclusions: Key findings.

In this Chapter I have attempted to engage the reader with the one-minute Laughie and contextualise how it fits within the territory of laughter prescription. My interest in laughter prescription was inspired by Louie et al.'s (2014) advocacy for medical laughter prescription as a practical, adequately tested, low-risk way to harness laughter's psychological and physiological benefits. How a laughter prescription is best delivered, has not previously been investigated in any detail, thus presenting a gap in the literature. There are a range of conflationary, mindset, measurement, and modality issues to consider. The Laughie one-

minute laughter prescription is designed as a practical way to prescribe, guide and monitor laughter. The Laughie is conceived as an alternative to Laughter Yoga, which emphasises at least 15 minutes of group laughter, and as an alternative to modalities that rely on humour.

Chapter 2:   First-wave laughter and humour research.

2.1.   Introduction.

In this chapter I present and critique my "first-wave" laughter and humour research. This research predated my PhD, and the critical literature review in Chapter 3. Following my foundational MSc research, I became an independent researcher and conceived a range of theoretical contributions including the Personal Development Theory (PDT) of laughter and humour. Keen to continue my Laughie research using a larger sample and a randomized control trial design, I spent four weeks at Zayed University, United Arab Emirates, investigating laughter prescription in university students. I gained valuable experience and published a protocol. Following that work, I wrote three book chapters and a popular article, before committing to supporting Laughie research in Ahmedabad University, India.

2.2.   Foundational MSc research.

My two MSc research papers (Table 1.1.) are foundational. My systematic review of laughter and humour interventions for older adults (Gonot-Schoupinsky & Garip, 2018), concluded that if an intervention purports to be about laughter, it needs to measure if and how much people laugh, and minimise confounders. To address this, in 2017, I conceived the laughter-only Laughie laughter prescription.

The Laughie was designed to facilitate laughter measurement, and be practical and quick to boost mood, used alone or with others. My mixed methods feasibility study (n = 21; ages 25-93; healthy adults), revealed overall self-reported well-being increased 16% following Laughie usage 3 times a day for one week (Gonot-Schoupinsky & Garip, 2019a). The

research had several limitations; participants were known to me, or introduced by friends, and the small sample did not include a control group.

That research revealed isolating laughter from humour was challenging. Participants often preferred to use "internal" humour (e.g., thinking of funny incidences) to laugh. One claimed they could only laugh after arousal with joke books ("external humour"). I specifically asked people to explore Laughie usage alone and with others. Therefore, confounding factors were minimised, but not eliminated, including because the idea of using the Laughie in different situations (e.g., while washing dishes) is inherent in its versatility, and its appeal.

Following Laughie testing many questions and research avenues were apparent. With my new status of "independent researcher," I published two general methodological contributions 1) FRAME-IT (Feasibility, Reach-out, Acceptability, Maintenance, Efficacy, Implementation, Tailorability; Gonot-Schoupinsky & Garip, 2019b); 2) Differential Qualitative Analysis (DQA; Gonot-Schoupinsky & Garip, 2019c) that are presented in the Portfolio.

2.3.   Scoping review: Laughter and humour for personal development.

My purpose with this review (Gonot-Schoupinsky et al., 2020a) was to systematically scope the laughter and humour literature for evidence of individual and joint benefits on personal development needs, and their relevance for self-care and therapeutic applications. I also wanted to bring more clarity to distinctions between humour and laughter. Although the term "personal development" is rarely used within academia, it struck me as important to use a term that was expansive and could bridge academic and popular thinking. The review used Joanna Briggs Institute (Peters et al., 2015) *Guidance for conducting systematic scoping*

reviews and the Preferred Reporting Items for Systematic Reviews Scoping Review extension (PRISMA-ScR; Tricco et al., 2018), checklist.

2.3.1. BPSE-B: A holistic health framework.

Personal development has not been clearly defined in academic literature. I defined it 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 BPSE-B framework (Figure 2.1.) explicitly extends the BPS (BioPsychoSocial) Model (Engel, 1977) to embrace "Environmental" factors, and, notably to acknowledge that "Behaviour" can impact each factor. My aim in proposing BPSE-B is to develop what I see as an arguably static or passive BPS model into a more dynamic, interactional framework. BPSE-B is employed in a paper on healthy aging (Gonot-Schoupinsky et al., 2022a; Portfolio). Here I use it to classify the reviewed literature by one or more of the categories, as detailed in Figure 2.1.

Figure 2.1. The BPSE-B framework and laughter-/humour-induced personal development.

1. Biological
Laughter and, or, humour to develop, manage, or optimise our physical health needs and conditions

2. Psychological
Laughter and, or humour to develop, manage, or optimise our psychological health needs and conditions

5. Behavioural
Laughter and, or humour to develop, manage, or optimise our behaviours.
Behaviours relate to one or more BPSE factor

3. Social & Socioeconomic
Laughter and, or humour to develop, manage, or optimise our social and socioeconomic needs and conditions

4. Environmental
Laughter and, or humour to develop, manage, or optimise our environmental needs and conditions

Source: Gonot-Schoupinsky et al. 2020a.

2.3.2. Scoping review results.

A total of 240 primary research articles (k), and 11 systematic reviews (K), were assessed, representing $k = 564$ discrete articles. The research (cross-sectional, longitudinal, interventional, observational) involved 574,611 participants (n) most of whom were involved in twelve large studies ($n > 15,000$). More related to humour ($k = 445$, $n = 334,996$) than laughter ($k = 119$, $n = 239,615$). Diverse personal development outcomes were identified and classified according to Biological, Psychological, Social, Environmental, and Behavioural (BPSE-B) factors. In Table 2.1., I revisit the findings to summarise the BPSE-B outcomes of laughter and humour interventions identified. The Humour Laughter Affect model (HuLA, Figure 2.2.) was proposed to disentangle laughter and humour. Fifteen shared characteristics of laughter and humour were identified, underscoring why the two are so easily conflated, and leading to definitions presented shortly.

A critique of the BPSE-B classification is that it is illustrative and subjective. As laughter and humour are so similar and often involve each other, a strict classification is difficult, even in research involving intentional humour-free laughter. This is because people, as we have seen in the original Laughie research, may feel the need to think of something funny to evoke laughter. Much of the classification was done according to how the authors portrayed whether humour was more important.

Theory generation, which may concern the conception of frameworks such as the BPSE-B model and the Humour Laughter Affect (HuLA) model, is, I believe, useful if it can move thinking forward or solve problems. As a mixed methods researcher at heart, I support that pragmatism, "*endorses eclecticism and pluralism*" and that "*theories are viewed instrumentally*" (Johnson & Onwuegbuzie, 2004).

Table 2.1. Examples of comparative BPSE-B findings.

BPSE-B Factor[1]	Laughter	Humour[2]
Biological	• All-cause mortality • Cardiovascular disease and health • Inflammation • Diabetes • Beneficial hormone release • Cortisol dynamics • Autonomic nervous system • Respiration • Circulation • Immune defences	• Increased survival • Infection-related mortality • Cardiovascular disease and health • Inflammation • Beneficial hormone release • Blood pressure • Atopic dermatitis • Neural activity • Pain tolerance • Immune defences
Psychological	• Depression • Stress • Anxiety • Sleep quality • Anger, Fear, Loss • Quality of life • Loneliness	• Burnout • Stress • Anxiety • Coping • Palliative care • Life satisfaction • Mutism
Social and Socio-economic	• Social signalling and bonding • Intimacy • Social enjoyment • Income • Learning	• Relationship quality • Relationship satisfaction • Social support • Team performance • Learning
Environmental	• Great East Japan Earthquake • Fukushima (radiation risk)	• Space/astronauts; crime scenes • Hurricanes Katrina and Rita
Behavioral	• Communication tool • Autonomy and self-disclosure • Self-efficacy and self-regulation • Playfulness	• Creativity • Arachnophobia (fear of spiders) • Medication reduction • Playfulness

Note. 1. See Figure 2.1. 2. Humour was mentioned as a key factor.

2.3.3. HuLA: Humour Laughter Affect model.

The HuLA Model (Figure 2.2), depicts the dynamic relationships between laughter and humour and positive and negative affect. My purpose in conceiving HuLA was to lean on review results to explore and illustrate the relationships between humour, laughter, and positive and negative affect. HuLA reveals six categories of humour and laughter.

Figure 2.2. The Humour Laughter Affect Model (HuLA).
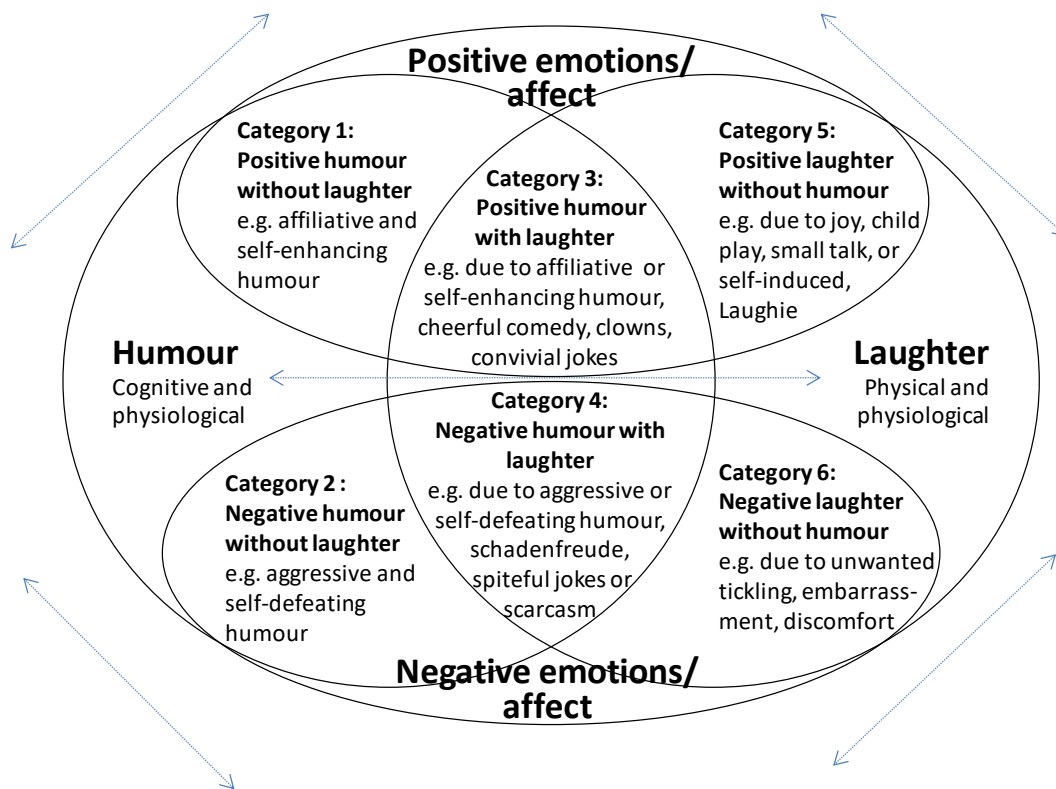
Source: Gonot-Schoupinsky et al. 2020a.

2.3.4. Concept definitions of laughter and humour.

Concept definitions are essential to pragmatic research (de Almeida, 2012). Following the scoping review, they were therefore proposed (Figure 2.3.), not to replace existing definitions (e.g., Provine, 1993; Martin, 2001; Ruch, 2008), but to offer comparative definitions of laughter and humour, that reflect research, and facilitate differentiation. Their purpose is to

unify and move forward laughter and humour thinking to support joint and multidisciplinary research, with flexible comparative working definitions.

Figure 2.3. Comparative concept definitions of humour and laughter.

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.

Source. Gonot-Schoupinsky et al., 2020a.

2.3.5. PDT: Personal Development Theory of laughter and humour.

Theory generation can move thinking forward. My proposition of the Personal Development Theory of laughter and humour (PDT) may be considered abductive, whereby "*abduction consists in studying facts and devising a theory to explain them*" (Peirce, 1997, p. 218). With hundreds of diverse theories (e.g., Holland, 2007) of laughter and humour, PDT is proposed to provide a viable umbrella theory under which existing theories can all find a place.

2.3.6. Scoping review reflections.

This review proposes a range of original theoretical contributions. A theory tied to the concept of personal development can be critiqued, as being inherently subjective. Nevertheless, evidence that laughter and humour impact personal development in multiple

ways, and across the lifecycle calls for, in my view, an explicit theory that serves to recalibrate mainstream thinking that designates laughter and humour as inherently social.

A new type of methodology, the "compound" review, was also used. It provides a transparent methodology for the systematic inclusion of both primary and secondary research (Gonot-Schoupinsky, 2021c; Portfolio). Dr. Gulcan Garip testifies my contribution at 85-90%.

2.4.   Protocol: Laughter prescription in university students.

I was keen to get back to applied research as "*theory is highly practical... but never the whole end*" (Dewey, 1910, pp. 139-143). With laughter beneficial for sleep (Zhao et al., 2019), I suggested a collaboration with a sleep expert at Zayed University, United Arab Emirates (UAE), who had been a peer during my MSc course. We agreed I would spend one month in the UAE exploring the impact of the Laughie prescription on well-being and sleep in university students, following participant recruitment. This Zayed university-funded feasibility study, was to be followed by an eventual randomised controlled trial. Three external advisors, including a statistician were invited to join the team.

2.4.1. Methodology, design and process.

Zayed University Research Ethics Committee approved the mixed-methods randomized controlled feasibility study, with 40 female university students (20 experimental) in July 2019 (ClinicalTrials.gov. ID: NCT04171245). The Consolidated Standards of Reporting Trials compliant research (CONSORT, Schulz et al., 2010) anticipated eleven measures (cited in the Portfolio): 1) Demographic questionnaire; 2) Health Personality Index (HPI, Portfolio); 3) Hospital Anxiety and Depression Scale (HADS); 4) Pittsburgh Sleep Quality Index (PSQI); 5) World Health Organization (WHO-5) well-being index; 6) Sleep actigraphy measures; 7)

Sleep Diary; 8) Laughie creation checklists (Portfolio); 9) Laughie checklists (Portfolio); 10) Laughie interview questionnaire; 11) Sleep interview questionnaire.

The intervention also incorporated two of my methodological contributions. FRAME-IT (Gonot-Schoupinsky & Garip, 2019b), was used for planning, and intended for evaluation purposes, and Differential Qualitative Analysis (DQA; Gonot-Schoupinsky & Garip, 2019c), for qualitative analysis. Analysis of covariance (ANCOVA) was envisaged to identify changes in HADS, PSQI, and WHO well-being.

Both groups tracked sleep using wrist actigraphy and sleep diaries throughout the intervention. The experimental group was shown how to record a Laughie (one minute of their joyful laughter) on their smartphone and prescribed to laugh with it three times a day for 14 days using smart laughter techniques (Figure 2.4.). Laughie usage advice was based on what had previously worked.

Figure 2.4. Smart laughter techniques for using the Laughie laughter prescription.

Note. 1. Record your natural joyful and playful laughter. 2. Make the Laughie an enjoyable experience: add visuals (e.g., laughing in front of a mirror), gestures (e.g., moving arms or legs); thinking (e.g., about joyful or amusing things to help you laugh); social (e.g., using your Laughie with others). 3. Practice. 4. Find a reason(s) to do it (e.g., health, happiness, joy, exercise, relaxation, meditation, energy).

Source: Gonot-Schoupinsky et al., 2020b (adapted).

2.4.2. Findings and critique.

A protocol (Gonot-Schoupinsky et al., 2020b) was published. During my one-month stay in October 2019, 75% of participants were recruited (recruitment was not completed on my arrival). Ten experimental participants completed the intervention. In our protocol we stated, *"The research will be completed once the protocol is published"*, but due to COVID-19 we were then in a different era. I interviewed participants who completed, and share three quotes that illustrate socio-cultural differences, and personal laughter preferences:

"I'm laughing because I need to laugh. Because it brings positivity to me, happiness... but my ancestors, my family, my grandmother and grandfather they used to tell us that a lot of laughter, like frequent laughter, can bring badness... like there will be something bad is going to happen." (Participant 2).

"I felt like laughing alone was better than with others, like I felt a little awkward with someone else." (Participant 4).

"I'm more comfortable listening to other people laugh than my own laugh." (Participant 7).

Despite randomization, participation was voluntary, thus the sample was self-selected. One problem, as our statistician sagely commented, was the omission to use Arabic translations. The intervention involved many questionnaires, and English was not the participants' first language. Other limitations included, I sensed, questionnaire response, and social desirability, bias. One participant insisted the prescription had a strong positive impact yet had an optimal pre-WHO-5 score. Researcher bias was I sensed negative, due, I believe, to a lack of collaborator training. The humour-free modality of the Laughie is not intuitive for some people, including researchers. Laughter facilitators, and those overseeing interventions, need, I contend, modality knowledge, and enthusiasm, to support participants.

The protocol was published in a Q2 journal, relating to Clinical Trials. Dr. Gulcan Garip estimated my overall contribution at 50%.

2.4.3. Reflections on overall study limitations.

Research, particularly when it involves international placements, is expensive and time-consuming. It requires expert planning, design, and execution. When Plan A did not materialise (participant recruitment was not complete on my arrival and a professional video explaining the Laughie to participants was not made), I was unprepared. The ability to navigate academic hierarchy, and its vagaries, can be complex, and outcomes can be unpredictable. Research collaborations consist of individuals who each have their own rationale for being involved, and priorities will differ. It is important to adjust expectations and ensure that a practical Plan B or C is in place. With four weeks in the UAE, I should have focused my resources on completing the research in that time. Given the circumstances, a two-week intervention was misplaced. Had a less ambitious one-week intervention been undertaken, the research would likely have been completed.

2.5.   Book Chapter: Laughter, humour and positive psychology.

Following my applied UAE research, I responded to invitations to write three book chapters, a book insert and a popular article (Table 1.1.; 5-9). My peer-reviewed chapter (Gonot-Schoupinsky & Garip, 2021a), considers how laughter is treated within positive psychology. This topic piqued my interest following a comment from a positive psychology (PP) journal relating to my Laughie research: *"The field of PP* (sic) *and this journal has published articles on humor, but not necessarily laughter, the expressive component of humor".*

In the chapter I recommend laughter and humour have co-equal treatment, and a wider role, in positive psychology. Drawing on examples of COVID-19 humour that relate to each of the six virtues (wisdom, courage, humanity, justice, temperance, transcendence; Peterson & Seligman, 2004), I question the classification of humour as a character strength associated to transcendence. As humour was initially viewed as a virtue (Gillham & Seligman, 1999, p. 169), my observation that humour "transcends the virtue of transcendence", is unsurprising. Yet it highlights a need for humour, and as I argue laughter, to be freed from limiting perspectives, and to recognize, for example, that "negative" humour (e.g., induced by *schadenfreude* (Hofmann et al., 2017) can also result in psychophysiological benefits.

Humour-free laughter resolves the issue of negative humour entirely, but it is not recognized. It is curious, even concerning, that because the Laughie does not need humour (although it can be used), it is theoretically ostracised within current positive psychology thinking. As a pragmatist, I feel we have a responsibility to align theory with real-world experience, or at the very least to highlight issues with it when new knowledge becomes available. Nevertheless, as we have seen, the mindset that laughter without humour is an "anomaly" (Martin & Kuiper, 2016), is one that is ingrained.

2.6.   Quasi-RCT: Laughter prescription in university students in India.

This research (Sharma et al., 2022), followed contact (on ResearchGate) from a couple, associated with Ahmedabad University, suggesting a study on laughter and creativity. I replied that if the University ensured correct ethical processes, and they undertook data gathering and quantitative analysis, I could advise on the Laughie, and on research design and process. The stated purpose was to explore the feasibility and impact of a laughter prescription on creativity, well-being, affect, and academic efficacy in university students.

2.6.1. Methodology, design and process.

A feasibility study in the form of a randomized controlled trial was approved by Ahmedabad University ethics committee in January 2020. I recommended it be modelled on the UAE work, with a focus on their interest of creativity. FRAME-IT was used to guide the intervention; eight measures (cited in the Portfolio) were used: 1) Creation checklists; 2) Laughie checklists; 3) WHO-5 Well-being Index; 4) Applied Creativity Test (ACT; Portfolio); 5) Wallach-Kogan Creativity Test; 6) Kaufman Domains of Creativity Scale; 7) Pattern of Adaptive Learning Scales (PALS) Academic Efficacy; and 8) PALS Avoiding Novelty. Statistical analysis included paired t-tests, and mean differences using ANCOVA.

2.6.2. Findings and critique.

A one-minute laughter prescription used 3 times a day for one week significantly increased self-reported affect and WHO-5 well-being and benefitted various creativity parameters in university students aged 18 to 28 in India. Nevertheless, only 34 of the 70 participants completed the intervention according to instructions: n = 21 experimental (mean age = 21.5) and n = 13 control (mean age = 21.8). Fidelity was reported as reasonably high: 19 of the 21 participants laughed for the complete minute, at least 75% of the time. Analysis of the Laughie checklists showed users reported immediate increased affect following 86% of 441 (21x3x7) uses. Use of the ACT indicated increased everyday creativity in the laughter group.

These results suggest prescribing laughter, using the Laughie, may result in a range of positive benefits for students, but they cannot be generalised. Limitations to this research, exacerbated by the impending COVID-19 pandemic, included a non-pre-registered study, manual randomization, non-systematic blinding, and high, group-disproportionate attrition rates. My involvement, from afar, was advisory, not supervisory. I supported as I could, including with a participant video: https://youtu.be/556foAfCdt0. But as English is a third

language in Gujarat, I wonder if translations of the video and all documents and measures may have reduced attrition rates and improved overall communication.

The research was published in a Q1 creativity journal; my contribution was under 20%. I provided information about the Laughie, background support, measures including the ACT, and advised on, co-wrote, and edited the manuscript.

A second study, using a similar design, was also completed. It tested my bi-directional laughter-humour hypothesis, namely that laughter can result in humour (just as humour can result in laughter). It was rejected for publication. An abridged Abstract follows:

A convenience sample of healthy adults (n = 42) aged 18 to 45 (64.28% female; M = 26.41) were randomized to a control (n = 22) and experimental (n = 20) group. The latter laughed with their Laughie (a one-minute recording of their joyful laughter on their smartphone) 3x a day for one week. Measures: Perceived Stress Scale, Brief Resilience Scale, Coping Humor Scale (CHS), Situational Humor Response Questionnaire (SHRQ), Humor Style Questionnaire (HSQ), Laughie checklists. The laughter prescription was feasible, acceptable, and effective for reducing perceived stress, and increasing coping humour and immediate well-being during the pandemic. Self-induced laughter appears to be effective in enhancing beneficial humour.

2.6.3. Reflections on overall study limitations.

The invitation to join this collaboration, when what was being tested was the Laughie, seemed to present an opportunity, but necessitated more attention than I had initially envisaged. The planning, design, and execution of interventions are critical to their success and should never be rushed. My collaborators were enthusiastic to undertake, and publish, the intervention and planned more research. While this was admirable, and I initially welcomed it, as the collaboration progressed, I felt that intervention execution, and thus the

quality of the data, would have been improved with better understanding of the Laughie laughter prescription, and of the CONSORT check-list, which they had not previously employed. As mentioned, when reflecting on my work in the UAE, within collaborations individual motivation varies widely, as do resources, and experience levels. In hindsight, and even though I was only involved externally in this research, it would have been better to have insisted on online meetings prior to commencing the collaboration. In this way I could have better supported the planning and design, optimized understanding of the Laughie, and scheduled regular "check-ins" during the intervention.

2.7.   Conclusions: Key findings.

This chapter presented my first-wave, pre-PhD research, including my foundational MSc systematic review and Laughie laughter prescription research. I recounted my journey testing the Laughie on the ground in the UAE and advising on its use in India. During this time, I accomplished some important theoretical work (FRAME-IT, DQA, the HuLA model, BPSE-B, concept definitions of laughter and humour, the Personal Development Theory (PDT) of laughter and humour), had some enjoyable book chapter collaborations, and attempted, with limited success, to support applied RCT research in university settings. I applied to the University of Bolton to undertake a PhD, knowing that if I wanted to do more, I would need to be associated with a university.

Chapter 3:   Critical literature review.

3.1.   Introduction.

The purpose of this critical literature review was to scope the literature relevant to the topic of laughter prescription. Ten years had passed since Louie et al.'s (2014) recommendations for laughter prescription, and already three since my scoping review on laughter and humour for personal development (Gonot-Schoupinsky et al., 2020a). Therefore, on starting my PhD, I was keen to review the literature with the explicit purpose of refreshing and substantiating the evidence base for laughter prescription.

3.2.   Scoping review: Methodology, design, process.

A scoping review methodology was favoured due to its suitability for exploring knowledge gaps (Munn et al., 2018); PRISMA-ScR (Tricco et al., 2018) guidelines (Table 3.1) were followed. Searching commenced in July 2022 with the University of Bolton library that covers 100+ databases, including PubMed, PubMed Central, MEDLINE, PsycINFO, SCOPUS and JSTOR. To maximize information pertaining to laughter prescription, the only filter applied was "peer-reviewed"; PICO (Population, Intervention, Comparator, Outcome; Schardt et al., 2007) was not employed. Search terms were as follows:

1)"prescribing laughter"; 2) "prescribe laughter"; 3) "laughter prescription"; 4) "prescribing humour"; 5)"prescribe humour"; 6)"humour prescription"; 7)"laughter intervention"; 8)"therapeutic laughter"; 9)"laughter as medicine"; 10)"laughter is the best medicine"; 11)"psychology of laughter"; 12)"laughter therapy".

Searches 1-9 were replicated in Google Scholar to increase findings. The search strategy is detailed in the PRISMA diagram (Moher et al., 2015) in Figure 3.1. An *a priori* decision (inspired by my scoping review; Gonot-Schoupinsky et al., 2020a) was made to select – on the basis of recency, relevance, and quality - ten large-scale studies ($n > 8,000$), ten

systematic reviews, and ten randomized control trials (RCTs) to guide the organisation and synthesis of results.

Table 3.1: PRISMA scoping review checklist.

Section	Item	Included
Title	1. Title	√
Abstract	2. Structured summary	x
Introduction	3. Rationale	√
	4. Objectives	√
Methods	5. Protocol and registration	x
	6. Eligibility criteria	√
	7. Information sources	√
	8. Search	√
	9. Selection of sources of evidence	x
	10. Data charting process	√
	11. Data items	√
	12. Critical appraisal of individual sources of evidence	√
	13. Synthesis of results	√
Results	14. Selection of sources of evidence	√
	15. Characteristics of sources of evidence	√
	16. Critical appraisal within sources of evidence	√
	17. Results of individual sources of evidence	√
	18. Synthesis of results	√
	19. Summary of evidence	√
	20. Limitations	√
	21. Conclusions	√
Funding	22. Funding	x

Critical appraisal was broadly guided by a pragmatic checklist (Table 3.2). For RCT quality I also considered if the Consolidated Standards of Reporting Trials (CONSORT; Schulz et al., 2010) guidelines were followed.

Table 3.2. Critical Appraisal Checklist.

Result Validity	Items
Internal (reliability/accuracy)	Recruitment/assignment/attrition (selection bias)?
	Confounding variables?
	Measurements appropriate/ly used? Self-reports?
	Is laughter tracked and measured?
	Is fidelity measured?
External (generalisability)	Extent of generalisability?
	Pertinence for laughter prescription?

Figure 3.1. PRISMA Flow Diagram.
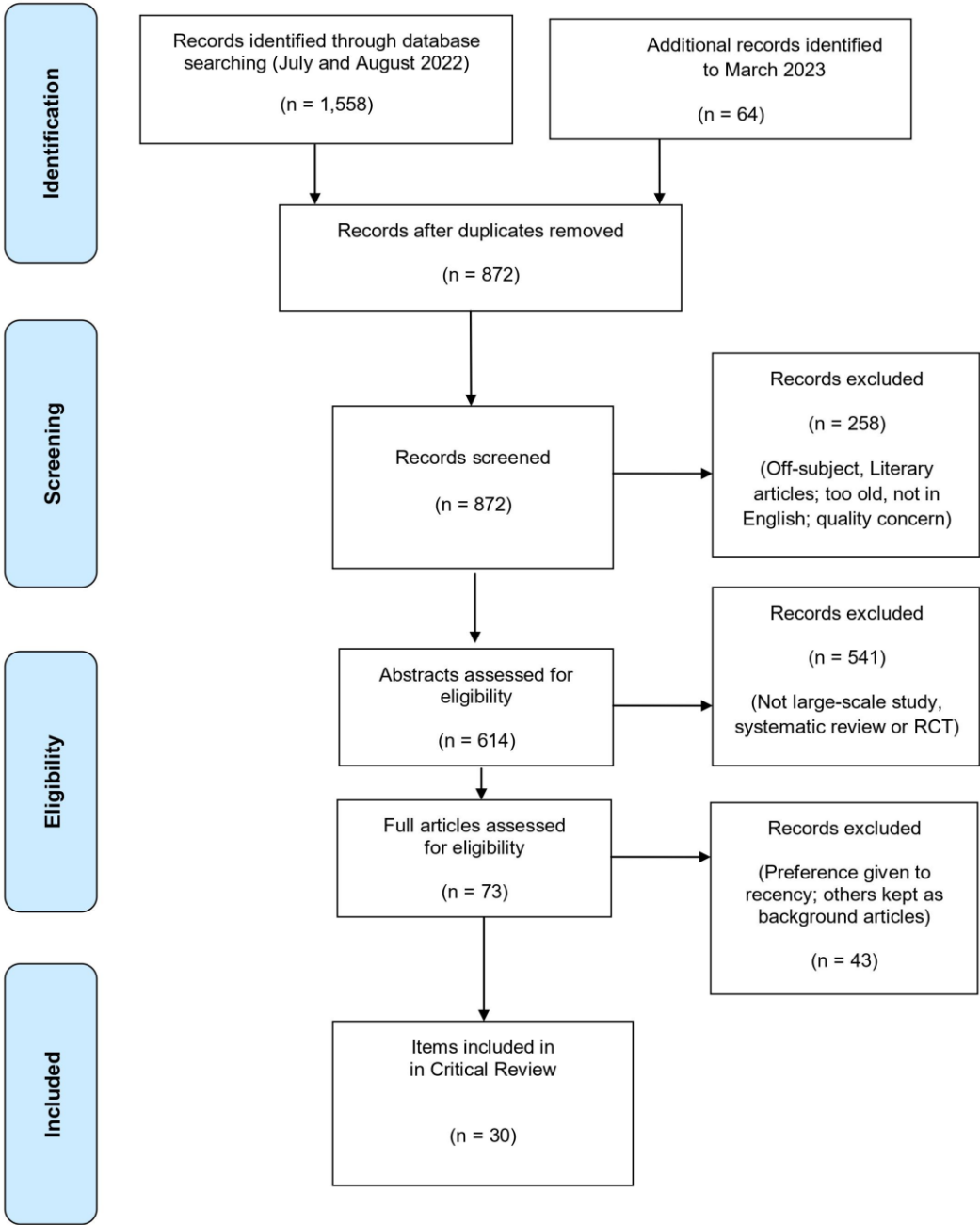
3.3. Results and findings.

Of the thirty articles identified: ten were large scale studies (k = 10, n = 197,268), ten systematic reviews (K = 10, k = >211, n = >19,423), and ten RCTs (k = 10, n = 972); where k = articles; K = systematic reviews; n = participants.

3.3.1. Large-scale studies.

An early cross-sectional (n = 65,333) study (Svebak et al., 2004) of Norwegian adults using Svebak's 3-item Sense of Humor Questionnaire (SHQ) with "Do you consider yourself to be a mirthful person?" to reflect "laughter expressiveness", found "laughter is the best medicine" was not supported. However, a reinvestigation of the same cohort (Svebak et al., 2010) stated, "*sense of humor appeared to increase the probability of survival into retirement*". Ruch et al. (2010) (n = 42,964) found humor to be *"robustly positively correlated with life satisfaction"*. Yet, none of these studies tracked laughter frequency. The Japanese, comfortable with the idea of laughter "as medicine" (Tamada et al., 2022), are so far the only investigators to conduct large-scale studies that consider laughter frequency.

Unsurprisingly, in a country with a rapidly aging population, these studies focus on older adults. Yet they often correlate laughter with different outcomes in the same cohort. Causal relationships are unclear in cross-sectional studies. Several Japan Gerontological Evaluation (JAGES) studies use only one self-report laughter item: "How often do you laugh out loud?" with four responses: almost every day, 1–5 days per week, 1–3 days per month; never or almost never (Inoue et al., 2022). This is simplistic and yields no insight into the type or context of the laughter (with or without humour, with others or alone), nor its quality or length. Furthermore, self-reported laughter can be inaccurate, and Haviva and Starzyk (2022) even contend, under-reported. Sometimes it is plainly unsuitable. For example, Wang et al. (2022) examine laughter frequency and dementia using self-reports.

Table 3.3. Ten examples of large-scale participant study findings.

Authors	Participants	Design/ Participant Details	Type of Laughter	Research focus	Key findings
Hayashi et al., 2015	26,368	JAGES[1] CS[2]	Not explored	Laughter and subjective health in community-dwelling older Japanese.	**General and mental health:** Daily laughter may support subjective health in older adults.
Hayashi et al., 2016	20,934	JAGES[1] CS[2]	Not explored	Associations of laughter frequency with heart disease and stroke.	**Heart disease and stroke:** Daily laughter associated with lower cardiovascular disease prevalence.
Sakurada et al., 2020	17,152	Adults 40+ PCS[3]	Not explored	Associations of laughter frequency with all-cause mortality and cardiovascular disease.	**All-cause mortality and cardiovascular disease:** Significantly higher in those with low laughter frequency.
Eguchi et al., 2021	41,432	Adults 30-89 CS[2]	Not explored	Association between laughter frequency and lifestyle diseases after Great East Japan Earthquake.	**Lifestyle Diseases:** Daily laughter associated with lower prevalence of disease especially in evacuees.
Hirosaki, et al., 2021	24,038	JAGES[1] CS[2]	Not explored	Association between laughter frequency and oral health in JAGES[1] cohort.	**Oral health:** Significant association between frequent laughter in those with 10+ teeth than in edentulous.
Tamada et al., 2021	14,233	JAGES[1] PCS[3]	Not explored	Association between laughter frequency and functional disability and death: 3-year JAGES[1] cohort follow-up.	**Functional disability:** risk 1.42 x higher in those who did not laugh most days. No all-mortality link found.
Tamada et al., 2022	12,571	JAGES[1] PCS[3]	Some[4]	Association between laughter and functional disability onset: 6-year JAGES[1] cohort follow-up	**Functional disability:** Laughing with others associated with reduced risk of FD.
Inoue et al., 2022	19,452	JAGES[1] CS[2]	Not explored	Association between laughter frequency and vision using JAGES[1] cohort.	**Vision:** Good eyesight has a positive effect on laughter frequency.
Wang et al., 2022	12,165	JAGES[1] CS[2]	Some[4]	Association between laughter and dementia: 6-year JAGES[1] cohort follow-up.	**Dementia:** Laughing with friends/children/grandchildren, and radio associated with decreased risk.
Yamamoto et al., 2022	8,923	University Students M = 20.1 CS[2]	Some[4]	The first study to explore the association between laughter and functional dyspepsia.	**Functional dyspepsia (FD):** Laughing with friends and family independently and inversely associated with FD.

Note. 1. Japan Gerontological Evaluation Study; community-dwelling independent adults, 65+; 2. CS=cross-sectional; 3. PCS=prospective cohort study; 4. With friends/family.

Additionally, results from these studies can be varyingly interpreted. For example, Hirosaki et al. (2021), found laughter frequency to be associated with higher oral health, and relate that stress, which laughter can reduce, is a risk factor for periodontal disease. Inoue et al. (2022), found visual impairment to be significantly and negatively associated with laughter frequency, and propose vision improvement may lead to more laughter. However they do not consider that laughter may strengthen eyesight, an arguable hypothesis as laughter involves the orbicularis oculi muscle (Hofmann et al., 2017). Neal (Neal & Gonot-Schoupinsky, 2022) relates several instances of eye issues improving with laughter therapy.

Tamada et al. (2021), showed a significant higher risk in functional disability onset in those who did not laugh most days. Following further investigation of the cohort, Tamada et al. (2022) state, *"laughing in a conversation with friends reduced the risk of functional disability by approximately 30% compared to laughing alone".* My interest in solitary laughter led me to explore this finding. While it reflects mainstream thinking, their results actually show superior outcomes in those who laughed both socially and alone (Table 2; Tamada et al., 2022). Yamamoto et al. (2022) were the only investigators to look at a young population. They revealed that only 64% of university students (n = 8,923) laughed out loud each day.

The large sample sizes of these studies favour outcome generalisation within the population studied, but the cross-sectional design enables flexible interpretations. Seven studies explore Japanese aged 65+ (JAGES cohort), and all studies used self-report to measure laughter frequency, predominantly using a single item. Despite the internal validity of these studies lacking in a range of areas, the overall results suggest that laughter prescription could be beneficial for older Japanese. We cannot be certain that these results are pertinent to support laughter prescription in populations outside of Japan, as cultural differences may reduce their relevance. However, they relate to physical and mental health problems that

challenge us globally including cardiovascular disease and functional disability. Moreover, as we will see, some of these results have been replicated in other populations.

3.3.2. Systematic reviews.

Several of the reviews in Table 3.4., (Stiwi & Rosendahl, 2022; van der Wal & Kok, 2019; Kuru Alici & Dönmez, 2020) cite my review (Gonot-Schoupinsky & Garip, 2018), but none have commented on my recommendation that primary studies need to measure laughter. It seems fundamental that research on laughter actually measures and reports if participants laugh and for how long.

That said, these reviews including those on laughter yoga (Bressington et al., 2018; Kuru Alici & Dönmez, 2020), do emphasize the need for higher quality research designs. Van der Wal and Kok (2019) reported that simulated laughter had more impact than "spontaneous" laughter, with effect sizes twice as large, on depression and anxiety. Stiwi and Rosendahl (2022), also reported larger effects of self-induced laughter on mental health, and additionally found group interventions more effective for physical, but not for mental health.

A review on humour in palliative care (Linge-Dahl et al., 2018) underscores the complexity of drawing conclusions from heterogeneous studies as interpretations of the ultimate goal of humour use differ. For some it is to make patients laugh, for others it is more about connection. Linge-Dahl et al. (2018) highlight the need for patients' sense-of-humour, and to not suffer from gelotophobia (the fear of laughter e.g., Ruch et al., 2014), although they do not state that this also applies to facilitators. Controlling for, and measuring, gelotophobia is omitted in most studies, including my own, but just as we cannot assume participants laugh in laughter studies, we cannot assume they enjoy laughter. Nor, as a systematic review in

the British Medical Journal states, that they enjoy clowns. According to Lopes-Júnior et al. (2020), hospital clowns "*provide humour, laughter, and play*". Yet clown interventions do not track laughter or, from what I have seen, explicitly encourage people to laugh. Until they do, they provide less direct evidence for laughter prescription.

Research interpretation is also a concern in systematic reviews. For example, Oliveira and Arriaga (2022), do not consider the dynamic impact of laughter on physiology (Fry, 2006, p. 125), on blood pressure and heart rate variability. They report significant blood pressure reductions in two hypertension studies, and although Bennett et al. (2015) found intradialytic hypotension episodes decreased post-laughter yoga, they do not mention this, or how hypotension may impact non-significant results.

Schneider et al. (2018) question whether, "A joke a day keeps the doctor away?" and conclude Yes, if it is not "self-defeating". We know that self-defeating humor is defined as, "I let people laugh at me or make fun at my expense more than I should" (Martin et al., 2003). However, the authors do not even mention laughter, and thus cannot properly discuss their "finding". If humour results in laughter, physiological benefits will ensue, and this merits discussion. But, until researchers embrace laughter as more than just a footnote to humour, such discussions cannot take place.

Sarink and García-Montes (2023) are cautious about the potential of "humorous interventions" on depression and anxiety. They recommend interventions use "surprise and confusion", which does not flow from their review, and is surprising and confusing in itself. They acknowledge their inclusion of primary and secondary data results in double-counting. The "compound review" methodology (Gonot-Schoupinsky, 2021b) addresses this issue.

Table 3.4. Ten examples of systematic reviews and meta-analysis findings.

Authors	Articles (*k*); Reviews (*K*); participants (*n*)	Research focus	Key findings	Limitations review exposes
Bressington et al. 2018	*k* = 6 *n* = 225	**Mental health**: Laughter yoga	Laughter yoga may improve depression and mental health.	Inconsistent findings and sub-standard quality.
Schneider et al. 2018	*k* = 37 *n* = 12,734	**Mental health:** Associations of habitual humour styles	Self-defeating humour negatively correlated with mental health; aggression unrelated.	Humour definitions are inconsistent; designs are weak.
Linge-Dahl et al. 2018	*k* = 13 *n* = 759	**Palliative care:** Humour usage and interventions	Humour was widely seen as appropriate and beneficial.	Humour definitions and methodologies too disparate.
Zhao et al. 2019	*k* = 10 *n* = 814	**Depression, anxiety and sleep:** Laughter randomised control trials	Significant decreases in depression and anxiety; improved sleep.	Research quality and follow-up needs improving.
van der Wal & Kok, 2019	*k* = 29 *n* = 366	**Mental and physical health:** Laughter inducing therapies	Laughter can improve depression; non-humorous laughter appears more effective.	Overall poor quality and "substantial risk of bias".
Lopes-Júnior et al. 2020	*k* = 24 *n* = 1,612	**Symptom management in paediatrics:** Hospital clowns	Hospital clowns reduced anxiety and improved psychological adjustment.	All trials showed some risk of bias.
Kuru Alici & Dönmez, 2020	*k* = 7 *n* = 366	**Physical function and psychosocial outcomes:** Laughter yoga in age 65+	Laughter yoga effective in improving physical function and psychosocial outcomes.	Higher-quality randomised control trials are needed.
Oliviera & Arriaga, 2022	*k* = 32 *n* = NA	**Blood pressure and heart rate variability (HRV):** Laughter	Variable including laughter associated with decreased blood pressure and decreased HRV.	Studies included mainly moderate or weak with risk of bias.
Stiwi & Rosendahl, 2022	*k* = 45 *n* = 2,547	**Somatic and mental health problems:** Laughter inducing interventions	Significant positive effects on mental, physical and physiological health.	Internal validity of studies seen as limited.
Sarink, & García-Montes, 2023	*k* = 8 *K* = 2 *n* = NA	**Psychotherapy – depression and anxiety:** Humour	Significant positive impact on anxiety and depression.	Study design concerns.

Systematic reviews favour outcome generalisation due to their inclusion of multiple studies. But those studies must exhibit internal validity. Study heterogeneity, and definitional inconsistencies, revealed in these reviews, can undermine results. AMSTAR (Assessment of Multiple Systematic Reviews; Shea et al., 2007) may have supported additional review assessment; curiously it omits to mention reviewer/researcher bias. Overall, these reviews were directionally positive about laughter-inducing therapies, and self-induced laughter where it was explored, to support mental and physical health, however there are still fundamental conflational, measurement and mindset issues at play.

3.3.3. Randomized control trials.

Ten years ago, laughter RCTs were "in short supply" (Louie et al., 2014). Now there are many, even one revealing that hearing laughter can support the parasympathetic nervous system and aid relaxation (Fujiwara & Okamura, 2018).

Six of the ten RCTs (Table 3.5) followed CONSORT guidelines. A 3-arm RCT (Tavakoli et al., 2019), compares the efficacy of laughter yoga to anti-anxiety medication (sertraline), in irritable bowel syndrome (IBS) patients. They found IBS symptoms and anxiety significantly reduced compared to the control and that laughter yoga yielded superior results to sertraline.

Two other Japanese studies teamed laughter yoga with *Rakugo* (traditional Japanese comic storytelling). Neither of them tracked spontaneous (*Rakugo*) laughter, or laughter yoga participant engagement differences. The first, in cancer-patients, used one questionnaire, and no physiological measure, potentially explaining insignificant results. Morishima et al. (2019) concluded: *"As laughter therapy has few, if any, harmful side effects, we propose that it can be implemented as a complementary therapy for cancer patients, even if the beneficial effects are subtle"*. Funakubo et al.'s (2022) 12-week RCT in adults at risk of metabolic syndrome reported significant improvements in BMI, stress, and subjective well-being.

Table 3.5. Ten examples of randomized control trial (RCT) findings.

Authors	Participants EG=Experimental CG = Control	Intervention	Type of Laughter	Research Focus	Key findings SiD = Significant Differences in Experimental group	Design Details
Morishima et al. 2019	61 cancer patients M = 55/56 (30 EG; 31 CG)	4x one-hour laughter yoga and Rakugo (7 weeks)	Self-induced; Mirthful	**Cancer quality of life:** Laughter yoga	SiD: Cognitive function, and pain using EORTC QLQ-C30.[1]	Crossover; pre-, post-. No follow-up. CONSORT: Yes.
Tavakoli et al. 2019	60 adults with IBS Age 18 to 50 (20 EG; 20 CG; 20 anxiety med.)	7x laughter yoga (2 months)	Self-induced	**IBS symptoms and Anxiety**: Laughter yoga	SiD:IBS Symptom Severity Scale (IBS-SSS), Beck Anxiety Inventory (BAI) to control; better than meds.	Three-arm design; no follow-up. CONSORT: No.
Tagalidou et al. 2019	37 with anxiety or depression M= 51 (19 EG; 18 CG)	7x 90mins (7 weeks); humour diary	Mirthful	**Depression, anxiety, adjustment disorder:** Humour training	SiD: None following full analysis.	Waitlist control; pre-, post-, one-month follow-up. CONSORT: No.
Özer & Ateş, 2021	68 adults on hemodialysis M = 63/60 (34 EG; 34 CG) Cluster: 2 centers	16x 30min laughter yoga (8 weeks)	Self-induced	**Hemodialysis endorphins, pain, sleep:** Laughter yoga	SiD: pain levels, sleep quality, Visual Analog Scale, Pittsburgh Sleep Quality Index.	Design with 3 measure points; no follow-up CONSORT: Yes.
Kugler et al. 2021	189 in-patients with chronic pain M = 62 (F); 59 (M) (109 EG; 80 CG)	4x one-hour (2 weeks)	Mirthful	**Pain, depression, quality of life:** Humour	Reduction in pain intensity in EG using Patient Health Questionnaire (PHQ-4).	Simple pre-post test design; as follow-up not valid CONSORT: Partial.
Çelik & Kılınç, 2022	120 Nurses in Covid-19 care M = 28.86 (60 EG; 60 CG)	8x laughter yoga (4 weeks)	Self-induced	**Stress, burnout, life satisfaction**: Laughter yoga	SiD: Perceived Stress Scale (PSS), Lifestyle Satisfaction Scale.	Simple pre-post test design; no follow-up. CONSORT: Partial.
Funakubo et al. 2022	235 metabolic syndrome at-risk M= 67 (117 EG; 118 CG)	12x 60-min laughter yoga, 30-m Rakugo; (12 weeks)	Self-induced; Mirthful	**Weight, stress, depression, pain, vitality:** Laughter yoga	SiD: mean body weight; BMI; well-being; optimism (LOT-R); Short Form Health (SF-8) partial.	Waitlist control; pre-post test; no follow-up. CONSORT: No
Armat et al. 2022	62 Retired women M = 58. (33 EG; 29 CG)	16x laughter yoga (8 weeks)	Self-induced	**Anxiety, depression:** Laughter yoga	SiD: Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI)	Design with 3 measure points; no follow-up CONSORT: No.
Eraydin & Alpar, 2022	80 Nursing students M = NA (40 EG; 40 CG)	10x online laughter therapy (5 weeks)	Self-induced	**Anxiety, life satisfaction, Well-being:** Online laughter	SiD: State-Trait Anxiety (STAI), Satisfaction with Life (SWLS), Psychological Well-being Scale (PWBS).	Simple pre-post test design; no follow-up. CONSORT: Yes.
Elsayed and Nagy (2023)	60 Elderly M = 66 (30 EG; 30 CG)	3x intervention plus aerobics; (control: aerobics) (6 weeks)	Self-induced	**Functional, cognitive, psychological well-being:** Laughter yoga	SiD: Six-minute walk test; Arterial blood pressure; BMI; Depression (Geriatric Depression Scale); Mini-Mental State Examination Functional Independence.	Simple pre-post test design; no follow-up. CONSORT: Yes.

Note. 1. European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire.

Two humour training RCTs produced insignificant results. Kugler et al. (2021) focused on chronic pain amelioration. They acknowledged the need to have examined the differential effects of humour and laughter, citing Gonot-Schoupinsky et al. (2020a). Tagalidou et al., (2019), focused on depression and anxiety. Their intention-to-treat analysis includes the Coping Humour Scale and GELOPH-15 (for gelotophobia). Participants critiqued an "unharmonic atmosphere," suggesting humour training programs can be challenging to manage.

A two-centre cluster RCT (n = 68) found laughter yoga significantly reduced pain and improved sleep-in haemodialysis patients (Özer & Ateş, 2021). Bennett et al.'s (2020) 10-center cluster RCT had previously reported it reduced depression, but not pain, in that population (n = 540).

Two Turkish RCTs investigated the impact of laughter yoga on nurses during the COVID-19 pandemic. Çelik and Kılınç (2022), reported online laughter yoga as an effective way to significant reduce burnout and perceived stress. Eraydin and Alpar (2022), found laughter yoga significantly reduced anxiety and increased perceived well-being in nursing students. These RCTs are important to highlight the adaptability of laughter therapy to a pandemic environment, and as an online modality. An Iranian laughter yoga RCT (Amrat et al., 2022) found it significantly ameliorated depression and anxiety in a retired sample, but an explanation as to why both depression and anxiety increased in the control group is needed.

The CONSORT-led 6-week Egyptian laughter yoga RCT in the elderly (n = 60) used an ingenious design as it enables us to contemplate the effects of laughter: the controls (n = 30) undertook the same aerobic exercise, minus laughter therapy. Elsayed and Nagy (2023) revealed significant changes in BMI, cognitive function, functional activity, blood pressure

and depression in both groups, "but in favour of the experimental group". Still, we cannot be sure this reflected the benefits of laughter itself.

While these RCTs represent fewer than 1,000 participants, and a range of internal validity issues, and laughter is still not measured systematically, overall, they do add implicit evidence for laughter prescription. The new designs used also offer promising research avenues. For example, online studies, with participant consent, can support laughter measurement. Mirthful and self-induced laughter can benefit cognitive function and pain, and support well-being, and optimism. Self-induced laughter can be more effective in alleviating IBS symptoms than medication, and benefit stress depression, anxiety, well-being, and perceived life satisfaction.

3.4.   Conclusions: Key Findings.

Critical examination of thirty articles (10 large-scale studies; 10 systematic reviews; 10 RCTs) reveals growing and compelling evidence to support laughter prescription. Yet, fundamental quality issues remain, including the need to track fidelity, quantify and qualify participant laughter, move away from self-reported laughter frequency, and address personal differences that may impact laughter effectiveness including gelotophobia, and humour preferences. Nevertheless, significant evidence now exists for laughter to benefit stress, anxiety, depression, cortisol levels, cognitive function, pain, well-being, optimism, Body Mass Index (BMI), life satisfaction, sleep, blood pressure, and IBS symptoms, in a range of populations, and in patients suffering diverse conditions. However, until measurement, conflation and mindset issues are addressed, and laughter prescription modalities explicitly investigated, the case for laughter prescription is implied, but not explicitly established.

Chapter 4:   Second-wave laughter and humour contributions.

4.1.   Introduction.

My second-wave, PhD, research builds on the literature review of Chapter 3, including making use of the literature identified, but not highlighted, in the review. It also embraces two other research strands: firstly, research that developed due to the "Laughie Challenge Australia", an independent initiative; and secondly, research that developed from contact with a laughter researcher at Nagoya University, Japan. This second-wave research therefore includes contributions that span: 1) Theory informed by the literature review; 2) Research relating to the "Laughie Challenge Australia"; 3) A series of case studies on laughter and mental health; and 4) A collaboration and review of solitary laughter.

4.2.   Theory generation.

Following the critical literature review I was keen to explore the "Why" of laughter prescription in more detail. Two conceptual models resulted: Laugh-Health and Laugh-Thrive.

4.2.1. Laugh-Health model.

The potential impact of laughter on physiology is wide-ranging. Laughter impacts abdominal muscles, the diaphragm, and upper-, mid-, and lower-facial muscles according to laughter type and intensity including the *zygomaticus major* and *orbicularis oculi*, and *risorius* that aids smiling (Ruch & Ekman, 2001). We have 30 facial muscles (Westbrook et al., 2022). Laughter benefits endothelial function (Miller & Fry, 2009), relevant as it is implicated in diabetes, arthrosclerosis, hypertension, and coronary artery disease. Thirty plus years of evidence shows laughter decreases cortisol (Berk et al., 1989; Ko et al., 2022; Kramer &

Leitao, 2023), a primary stress hormone, implicated in health and well-being, and epinephrine/adrenalin (Berk et al., 1989), helpful in the "fight or flight" response, otherwise detrimental.

The Laugh-Health model (Figure 4.1.) aims to unpick the theoretical relationship between laughter prescription, and its resulting mind-body dynamic interactive physiological impact. This exploratory model is intended to capture findings, to contemplate laughter's dynamic impact on physiology, including neuroimmunology, however it can be critiqued as simplistic.

Another motivator of this work was to capture the dynamic impact of laughter that can appear contradictory. For example, the "structural definition" of the experience of laughing and health (n = 20) as "a potent buoyant vitality sparked through mirthful engagements" (Parse, 1994), does not reflect the relaxing effect of laughter on muscles (Bennett, 2008), or its ability to aid sleep (Zhao et al., 2019). For Ruch (1993), the "affective response to humor" he terms "exhilaration," can result in "relaxed excitation". Laughter's dynamic effects appear manifold. A differential beneficial impact of mirthful laughter on rheumatoid arthritis according to disease levels (n = 64) has also been noted (Matsuzaki et al. 2006). Regulatory effects of laughter to benefit homeostatic abnormalities associated with Type 2 diabetes are also revealed (Noureldein & Eid, 2018).

The Laugh-Health model (Figure 4.1.) has many limitations. It leans on limited evidence, gives unequal attention to certain outcomes, and highlights benefits associated with laughter. Although the association/cause-effect pathways are not fully understood, laughter is also implicated in pathology. For example, dysfunctional neurotransmission associated with serotonin and glutamine, is implicated in pseudobulbar affect (Miller et al., 2011). Objective health measures would be most suitable to gain evidence for Laugh-Health.

Figure 4.1. Laughter and humour in homeostatic regulation: The Laugh-Health model.
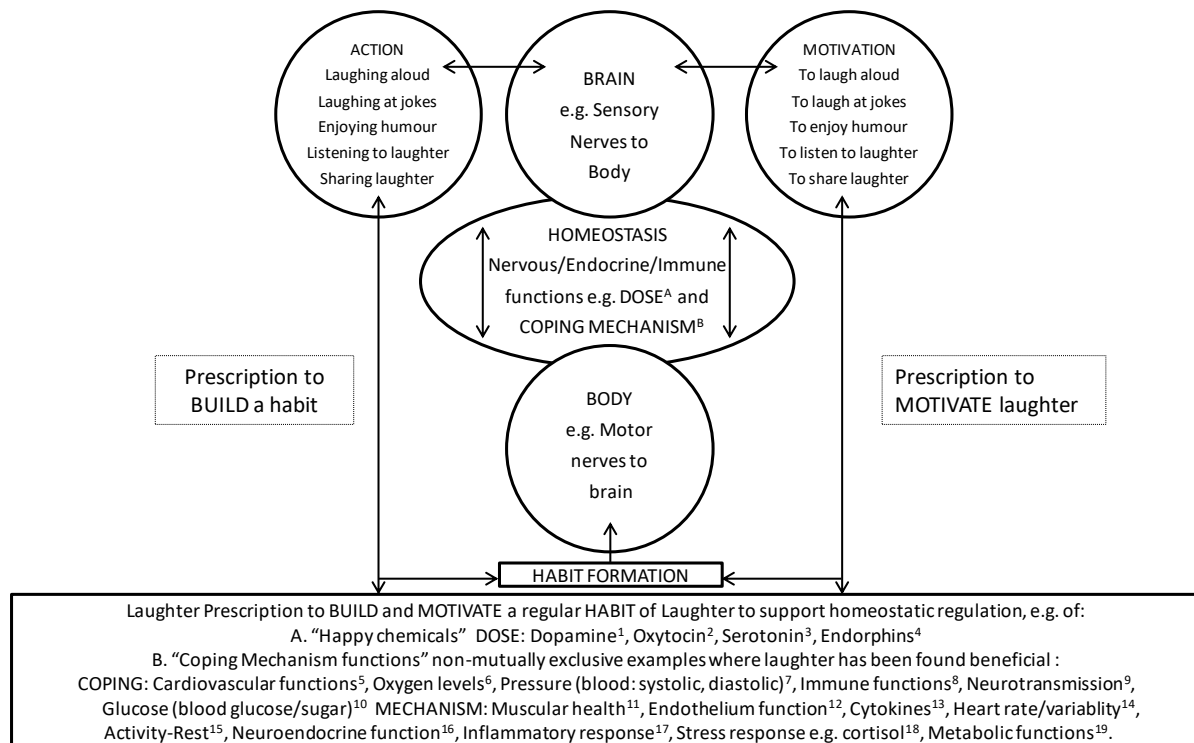
Notes to the Laugh-Health Model.

1. **D**opamine: Humour is associated with the dopaminergic reward system (Mobbs et al., 2003). Dopac, a dopamine catabolite, appears to be regulated by mirthful laughter ($n = 10$) (Berk et al., 1989).

2. **O**xytocin: The "cuddle hormone" can promote laughter and humour ($n = 58$) (Pfundmair, 2022). Whether the relationship is bi-directional is unclear.

3. **S**erotonin: Laughter therapy ($n = 64$) can increase serotonin (thought to be a mood stabilizer) levels, particularly in those with depression (Cha & Hong, 2015).

4. **E**ndorphins: Are released in mirthful laughter (Miller & Fry, 2009); social laughter ($n = 12$) can trigger endogenous opioids (endorphins) (Manninen et al., 2017), and reduce pain (Dunbar et al., 2011).

5. **C**ardiovascular functions: Laughter has similar benefits to aerobic exercise; the release of nitric oxide may lead to vessel dilation, lower platelet aggregation and lower inflammation (Miller & Fry, 2009).

6. **O**xygen: Oxygen consumption and blood oxygenation levels can increase (Buchowski et al., 2007; Brutsche et al., 2008), or drop following laughter (Boone et al., 2000); not mirth Fry (1971).

7. **P**ressure: Significant increases in systolic and diastolic blood pressure following mirthful laughter (Fry & Savin; 1988); significant reductions in systolic blood pressure (Yoshikawa et al., 2019).

8. **I**mmune functions. Berk et al. (2001) found a 1-hour humor video increased natural killer cell activity ($n = 52$). Bennett et al. (2003) found mirthful laughter and improved natural killer cell activity ($n = 33$).

9. **N**eurotransmission: laughter can decrease epinephrine (adrenalin) levels (Berk et al., 1989). Other neurotransmitters are covered in the DOSE acronym, and No.18.

10. **G**lucose: Laughter can decrease post-prandial blood glucose levels and is thus protective for Type 2

diabetes (Hayashi & Murakami, 2009; 2003: *n* = 19, 2006: *n* = 12).

11. **M**uscular health: Laughter yoga (*n* = 14) benefits trunk (abdominal and paraspinal) muscles, its impact on internal oblique muscles is superior to "traditional exercise" (Wagner et al., 2014).

12. **E**ndothelium function: Mirthful laughter benefits cardiovascular endothelium (Miller & Fry, 2009). Sugawara et al. (2010) found mirthful laughter (*n* = 17) benefits vascular endothelium function.

13. **C**ytokines: Mirthful laughter can attenuate inflammatory cytokines (*n* = 20) implicated in diabetes (Berk & Tan, 2009).

14. **H**eart rate/variability: Laughter results in increased heart rate and reduced heart rate variability, notably with simulated laughter (Law et al., 2018); longer-term heart rate is reduced (Yoshikawa et al., 2019).

15. **A**ctivity-rest regulation: Laughter can increase and expend/deplete energy (Buchowski et al., 2007); lead to euphoria, but also relax, thus increase sleep quality (*n* = 68) (Özer, & Ateş, 2021).

16. **N**euroendocrine/endocrine functions: Mirthful laughter "laughtercise" (*n* = 14), regulated ghrelin and leptin (Berk et al., 2010). Ghrelin levels in those with atopic dermatitis were benefited (Kimata, 2006).

17. **I**nflammatory response: C-reactive protein (CRP), an inflammatory biomarker levels reduces following mirthful laughter (Bains et al., 2018) using a humorous video (*n* = 32). (Also see No. 8 and 13).

18. **S**tress response: Cortisol levels reduced with mirthful laughter (Berk et al., 1989; Kramer & Leitao, 2023), laughter yoga (*n* = 35) (Meier et al., 2021). Replicated: Fujisawa et al., 2018; Ko et al., 2022.

19. **M**etabolic functions: Laughter can impact energy expenditure (Buchowski et al., 2007; Funakubo, 2022). Berk and Tan (2009) found mirthful laughter can raise "good" HDL cholesterol.

4.2.2. Laugh-Thrive model: Psychological eudaimostasis.

The Laugh-Thrive model (Figure 4.2.) illustrates the potential of laughter as a habit to support the regulation of health, and well-being, in the short- and longer-term. Laugh-Thrive is depicted in two temporal dimensions (short versus longer-term), that distinguish negative versus positive affect and states, reflecting "valence" (i.e., the negative-positive continuum of emotions). A third dimension of "arousal" or the intensity of feelings, conditions, and states, can be considered; positive valence is positively correlated with arousal (Yik et al., 2022).

Laugh-Thrive was influenced by positive psychology including a large volume of work by my supervisors (Guha & Carson, 2014; Clarry & Carson, 2020; Allen et al., 2020; Ujhelyi-Gomez et al., 2020; Makin et al., 2022), and by Macfarlane's (2021) I-Flourishing and Languishing

Opportunities Wheel (I-FLOW) model depicting how optimism and flow can regulate positive and negative feelings, thoughts, and behaviours to achieve "homeostatic balance".

Eudaimonia is linked to well-being and flourishing and more recently to autonomy and self-determination (Deci & Ryan, 2006). I define psychological "eudaimostasis," as the regulation of our well-being, through self-determination, with an aim to thrive (or flourish) independently of state or context. Individual laughter- and humour-supported eudaimostasis potential, will vary according to the range of negative and positive factors individuals are confronted with, and the intensity with which they are perceived and felt. Some factors we cannot control. However, we can aim to regulate our perceptions and emotions using laughter and humour. The "eustress" potential of humour-induced laughter demonstrated by Berk et al., (2001), supports thinking of laughter therapy as "a humor-induced hormonal intervention to reduce stress and anxiety" (Akimbekov & Razzaque, 2021).

Laugh-Thrive contemplates the employment of laughter to navigate "states" of intense suffering, distress, and mild discomfort, to reach contentment, by changing where possible our perceptions. Ultimately, as life is dynamic, a state of constant contentment is unlikely, and thus it is better to aim to reach a state of "thriving" despite variations in outside events. Thriving, in Laugh-Thrive, goes further than contentment as it explicitly seeks to draw meaning from situations, to find a way to thrive within them. A number of measurements could gauge Laugh-Thrive, including Huppert and So's (2013) flourishing framework. That said, and why I favour "thrive", thriving has been viewed as relating to both physical and mental health, with flourishing more psychological in nature (Brown et al., 2017).

Figure 4.2. Laughter and humour in eudaimostatic regulation: The Laugh-Thrive model.

Positive Longer-term factors: e.g. Mood, Health, Eustress, Well-being, Social support, Healthy Environment, Positive behaviours
Laugh to maintain/increase

3. SOME DISCOMFORT Some Volatility: Manage Affect
Laugh to increase positive affect

4. CONTENTMENT Positive State: Enjoy
Laugh to maintain and aim to thrive

Negative Short-term factors: e.g. Affect, Pain, Stress
Laugh to mitigate/reduce

5. THRIVING EUDAIMOSTASIS
Dynamic pragmatic laughter to regulate and appreciate 1-4

Positive Short-term factors: e.g. Affect, Energy, Optimism
Laugh to maintain/increase

1. INTENSE SUFFERING Very Challenging: Aim Positive Affect
Laugh if you can to build positive affect

2. DISTRESS But Opportunity: Aim Positive Mood
Laugh to build habit of positive mood

Potential Pathways

To change perceived state

To change perceived factors

Negative Longer-term factors: e.g. Mood, health, Stress, Pain, Social issues, Poor Environment, Negative behaviours
Laugh to mitigate/reduce

Model Dimensions
Temporal/Valence
Negative versus Positive perception of health and well-being factors
x-axis: Short Term Neg. vs. Positive
y-axis: Longer-term Neg. Vs. Positive
z-axis not shown: Arousal: Low to High

EUDAIMOSTASIS
Laughter and Humour used intentionally and strategically to positively regulate feelings and perceptions of: Enjoyment[1], Understanding[2], Depression[3], Anxiety[4]. Inactivity[5], Meaningfulness[6], Optimism[7], Satisfaction with life[8], Tension[9], Ability[10], Sociability[11], Insomnia[12], Self-Esteem[13]

Notes to the Laugh-Thrive Model.

1. **E**njoyment: Laughter is associated with joy (Panksepp & Burgorf, 2003), as is humour (Bianchi et al., 2022). Both are associated with cheerfulness and happiness.

2. **U**nderstanding: Laughter and humour are associated with cognitive learning and learning (Bains et al., 2014; Cueva et al., 2006; Savage et al., 2017); this can renew and elevate thinking and insight.

3. **D**epression: Laughter and humour interventions can relieve depression (Zhao et al., 2019; Bressington et al., 2019).

4. **A**nxiety: Laughter (Zhao et al., 2019) and laughter yoga (e.g., Tavakoli et al., 2019) can relieve anxiety; laughter can reduce anxiety in children (Jahanimoghadam, 2023).

5. **I**nactivity: Laughter therapy can ameliorate activity and vitality in older people (Greene et al., 2017; Yoshikawa et al. 2019).

6. **M**eaningfulness: Humour can benefit meaningfulness at work (Bartzik et al., 2021), and laughter and humour can encourage meaning and perspective in difficult situations (Dean & Gregory, 2005).

7. **O**ptimism: Laughter yoga can significantly improve optimism (Miles et al., 2016). Positive humour is correlated with optimism (Ford et al., 2016).

8. **S**atisfaction with life: Laughter yoga can increase life satisfaction (Çelik& Kılınç, 2022); benevolent humour correlates positively with life satisfaction (Heintz et al., 2020).

9. **T**ension/**P**ain: Laughter yoga benefits self-perceived tension (Tanaka et al., 2018); humour benefits tension (Lash, 2022). Pain benefits from laughter (Dunbar et al., 2011); humour (Lapierre et al., 2020).

10. **A**bility: Laughter can ameliorate self-efficacy and self-regulation (Beckman et al., 2007). Affiliative and self-enhancing humour correlates positively with self-efficacy (Falanga et al., 2014).

11. **S**ociability: Evolutionary social function of laughter (Navarro et al., 2016); supports social connections (Palagi et al., 2022; Caruana, 2017; 2020). Humour aids social bonding (Knight, 2013; Hall, 2021).

12. **I**nsomnia: Laughter therapy can reduce insomnia in smartphone addicts (Salunke & Shah, 2019) and benefit sleep quality and insomnia in the elderly (Ko & Youn, 2011).

13. **S**elf-esteem: Laughter therapy can improve self-esteem in those with addictive disorders (De Francisco et al., 2019).

4.3. The Laughie Challenge Australia.

Merv Neal, CEO of Laughter Yoga Australia and New Zealand, launched the year-long mental health initiative, the Laughie Challenge Australia, in February 2022 (Sathicq, 2022; Campbell, 2022). This independent usage of the Laughie, with its focus on video Laughies, provided a unique opportunity to observe its real-world usage. Two research strands resulted: 1) an "invited" collaborative autoethnography; 2) a citizen-science initiative.

4.3.1. Invited Collaborative Autoethnography (ICAE).

As I was keen to both assess the Laughie Challenge, and move research forward, I considered communication modalities before approaching Merv Neal. Autoethnography, originally employed by anthropologists as a narrative platform to communicate with American natives (Gonot-Schoupinsky et al., 2023), seemed suitable. I conceived Invited Collaborative Autoethnography (ICAE) as a pragmatic approach to enable Merv Neal, to narrate his story, and for my supervisor and fellow autoethnographer, Professor Jerome Carson, and I to

reflect on it with him. Our overall purpose was to promote public-science communication and see if we could leverage on the Laughie Challenge to investigate laughter prescription more closely. The ICAE (Table 1.1., No. 17.), is accepted for publication.

4.3.2. Citizen science laughter prescription research.

The Citizen Science research developing from the Laughie Challenge is the longest prescription of daily laughter to date. So far eight experienced "laughers" have completed a 30-day prescription where they recorded a one-minute Laughie each day, posted it on a private Facebook page, and laughed with that Laughie at least once a day. The resulting 200+ Laughie videos can be analysed, for example using the Facial Action Coding System (FACS; e.g., Platt et al., 2013). Their acoustics also provide a wealth of information, including for possible depression detection (Navarro et al., 2019). Participants were video-interviewed during and following the intervention. Following the intervention, the 20-item Laughie Experience Questionnaire, and the Positive Psychology One-off Post-intervention (PPOP) measures (see Portfolio) were administered.

To investigate and track the perceived impact of this study I developed the Positive Psychology One-off Post-intervention (PPOP) measure as a Post-Intervention Perceived Impact Measure (PIPIM) (see Portfolio). My involvement in citizen science inspired a practical way to investigate results, following a gap I had observed in the UAE (I refer to how some students stated the laughter prescription had been significantly beneficial, yet due to their high pre-study WHO-5 wellbeing scores, this could not be shown).

Now that Neal has experience administering the prescription in a population he knows, we are planning to export the study, firstly to those new to laughter as an exercise, and eventually to a similar group with mental health challenges.

4.4. Case studies.

In '*The Case Study Method in Psychology and Related Disciplines*, Bromley (1986, p. ix) proposes that case studies are "the bedrock of scientific investigation". Case studies are undoubtedly helpful to investigate psychological phenomenon in detail. However, their *ideographic* approach, and focus on the uniqueness of individuals, can be unfavourably contrasted to a scientific *nomothetic* approach, grounded in laws, experimental replication, validity, reliability, and generalization (Rolls, p. 12). Edwards et al. (2004), view case-based methods not only as empirical but also as superior in that they "usually preserve the complexity of the real-life situation far better than multivariate studies". Case studies do not involve "determined procedures" (Edwards, 2007), enabling flexible usage. Traditionally case studies have been researcher-written and interpreted. However, the benefits of capturing "lived experience" by giving the voice to the case themselves is increasingly recognized (Carson & Hurst, 2022), with the researcher varying the structure, the usage of open- and closed-ended questions, and the extent of their interpretation (e.g., Ogilvie & Carson, 2023). Interest in historical case studies (e.g., Wakely & Carson, 2011; Willmott et al., 2018), demonstrates our ongoing fascination with expert and unique individuals.

Case studies in laughter and humour exist (e.g., Dionigi & Canestrari, 2018), but are rare. Nevertheless, narrative research in gelotology (the study of laughter) is valued. William Fry (the "Father of Gelotology") and Melanie Allen's (1975) in-depth interviews of seven famous American comedy writers, demonstrate this esteem for expert narratives. My research on the lived experience of laughter and humour academics and practitioners builds on this tradition. As all six case studies (this includes that of Joe Hoare, a laughter yoga professional), feature individuals who have written books, with several skilled not only in autobiography but also autoethnography, it seemed appropriate all six narrated their story. Ten questions, pertinent to the overarching theme of my research, were posed to all and provided some structure, but wide-ranging and unprompted narrative was also encouraged. In view of case-based

qualitative research, that draws on individual case studies to further investigate specific questions (Edwards, 2007), these case studies can enable future data distillation across case studies according to the research area of interest.

Collaboration with Merv Neal inspired the first case study published in *Mental Health and Social Inclusion*. Five, of the eight planned case studies, have been published: Neal and Gonot-Schoupinsky, (2022); Berger and Gonot-Schoupinsky, (2023); Ben-Moshe and Gonot-Schoupinsky, (2023); Kataria et al., (2023); Morrison et al., (2023). The purpose is to show-case insight and expertise on laughter and humour applications for mental health, from both practitioners and academics. Case studies are by definition subjective, and reflect the views of one person, albeit here of experts in their domain. My contribution to these Q3-journal articles range from 30-40%.

4.4.1. Merv Neal.

Merv Neal highlights laughter's ability to reduce stress. He states laughter: 1) Brings you into the present moment; 2) Is a distraction; 3) Breaks negative thought patterns; 4) Silences the inner critical voice; 5) Brings joy. Neal recommends a Laughie App, saying: "I get excited at the simplicity and effectiveness of such an idea and am convinced that health professionals will also." The App can "remind us to laugh (once or several times) daily depending on the requirement to ensure the quantity of the laughter required as prescribed."

4.4.2. Arthur Asa Berger.

Arthur Asa Berger, Professor Emeritus of San Francisco State University, has written widely on humour, and taught comedy. He conducted humor and mental health hospital workshops for doctors and nurses with William Fry. Arthur highlights the importance of using humor in a positive way and avoiding humor that insults specific individuals, groups, religions, races, or

gender identities. Although for Arthur the term "prescribing humour" is "too clinical", he does conceive of therapists suggesting patients fill their prescriptions by finding and enjoying humour wherever they can and proposing certain texts as a kind of medicine.

My meeting Arthur is one of the more important events tied to my laughter research. As I was familiar with his 45 humour techniques (Berger, 2016), I recognised his name when '23andme' (an ancestry DNA website) serendipitously matched us as distant cousins in 2020.

4.4.3. Ros Ben-Moshe.

Having penned a popular chapter, "How to encourage Leadership and LOL in your Institution", with Ros Ben-Moshe (Gonot-Schoupinsky & Ben-Moshe, 2021), I knew her story of using laughter to cope with bowel cancer was important to communicate. A positive psychology lecturer at La Trobe University, and author of *The Laughter Effect* (Ben-Moshe, 2023), Ben-Moshe sees regular laughter as an ideal way to "enhance our internal joy quotient" and stimulate the release of feel-good dopamine, oxytocin, serotonin, endorphins (DOSE) chemicals. She explains how physiological responses, including enhanced oxygenation, increase well-being and stress resilience. She recommends choosing to practice laughing out loud to re-frame negative situations. She also considers laughter prescriptions endorsed by the medical community as "the next step", with the Laughie an exemplar of how a laughter prescription can be "filled".

4.4.4. Madan Kataria.

Madan Kataria, a physician from India, conceived laughter yoga. His interest in intentional laughter has had wide-reaching impact. Laughter yoga builds on the idea that the body responds in the same way to the physical act of laughing, be it spontaneous or self-induced.

There is no need for humour, yet laughter yoga is conflated with physical exercise and social interaction as it was designed as a group activity. However, it can be undertaken alone.

Kataria told me he likes the Laughie, but thinks it is not long enough. For someone who starts the day at 4am with up to 30 minutes of solitary laughter, and an average two hours of daily laughter, this is perhaps not surprising. While we agree on many things, we differ on the "amount" of laughter needed. I see one or several minutes of daily intentional laughter as good to aim for, he views 10-15mins of sustained laughter as a minimum. We also diverge on the stated rationale to laugh (I find the laughter yoga mantra "laugh for no reason" unhelpful as intentional laughter necessitates a reason, moreover there are many), and the concept of "Fake it till you make it" (I find this mantra has a negative connotation, moreover it is technically inaccurate as highlighted by Billing et al., 2021).

4.4.5. Mary Kay Morrison.

Mary Kay Morrison is a past president of the Association of Applied and Therapeutic Humor (AATH), based in Illinois, United States. AATH (2023) has as its stated mission to "elevate and nourish the human spirit through the intentional use of humor and laughter". Morrison has written books on using humour to maximize learning and living. She has coined the terms "humergy" to denote the energy, "that emerges from the joy and optimism of our inner spirit", and "humordoomer" to denote "a person who consistently uses negative humor to control and manipulate others". Her "Humor Tonic" prescription incorporates purposeful humor practice and the use of play to generate laughter as an antidote for depression, stress, and anxiety.

**4.5.   Scoping Review: Solitary laughter and its potential benefits.**

Solitary laughter, or laughing alone, is of interest as the Laughie was designed to be used alone, although it is recommended to also use it with others. This is for practical (it can be done at any time, no need to rely on others), "philosophical" (when laughter is viewed as an exercise its sociality is discretionary), and "reach" reasons (it is for people in all situations, including those solitary by choice and necessity). Understanding the differential impact of laughing alone versus with others is relevant for all laughter modalities, not just the Laughie. As Louie et al. (2014) stated, *"it is currently unknown the extent to which group laughter provides different benefits compared to laughing on one's own".*

My research shows participants can enjoy laughing alone (Gonot-Schoupinsky & Garip, 2019a). I suspect, as Tamada et al. (2022) found in their research, laughter is best undertaken with others and alone. Yet, Provine and Fischer's (1989) statistics, showing that we are 30 times more likely to laugh with others than alone, have led a generation of laughter and humour academics to dismiss solitary laughter. Despite the fact that their research is 30 plus years old, has never been replicated, involved only 28 American psychology students, and used an outdated definition of alone ("without media"), it is still touted as a central argument as to why laughter is a social behaviour, including by eminent neuroscientists (e.g., Scott et al., 2014). Weeks (2016), highlighted that had media been included, the statistic would fall to 5 times more likely to laugh with others than alone. Martin and Kuiper (1999), also showed (n = 80) that over 10% of laughter episodes can occur when we are alone, although they also view laughter with media as being intrinsically social.

Mark Weeks at Nagoya University, and I, set out to explore solitary laughter and redress the unfortunate inattention to it. Solitary laughter can evoke strong negative feelings, but if we view laughing alone akin to physical exercise alone, it clearly should not evoke feelings of

stigma. Our scoping review (n = 109), reveals four types of solitary laughter, as shown in the Solitary Laughter Model (SLM) in Figure 4.3. Solitary laughter is somewhat cumbersome, I feel, and I coined "solirisy" as an alternative.

Figure 4.3. Solitary Laughter Model (SLM).
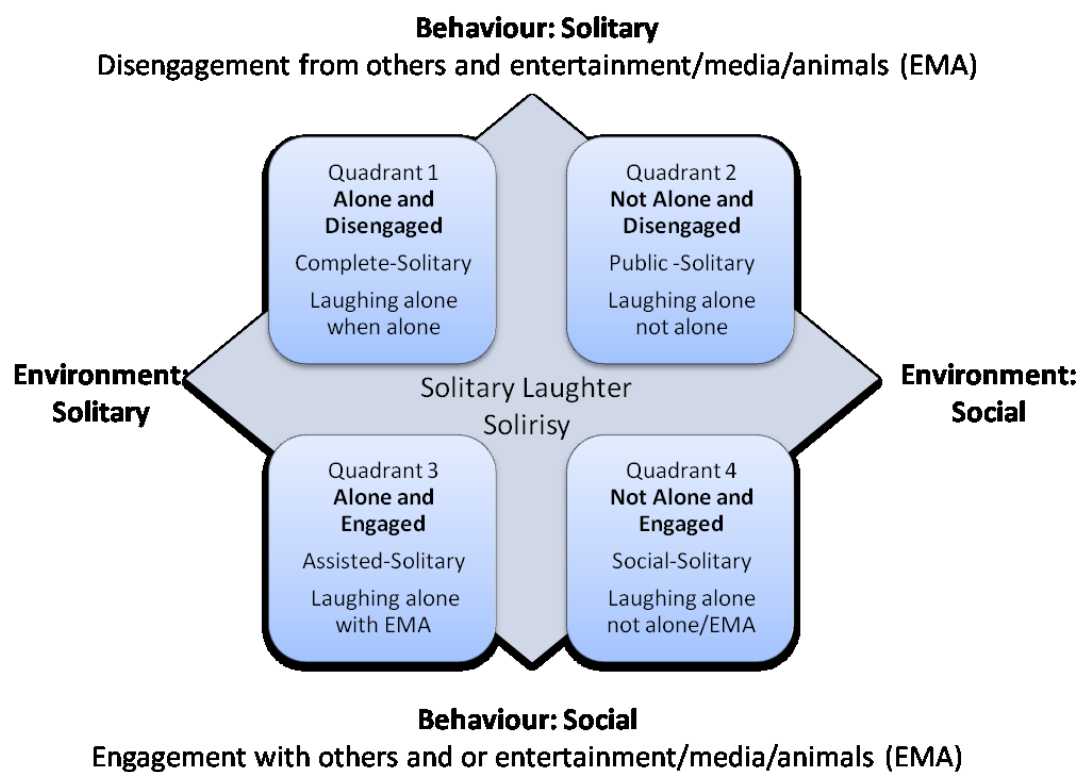
Source: Gonot-Schoupinsky, Gonot-Schoupinsky and Weeks, under review.

4.6.   Conclusions: Key Findings.

My second-wave research builds on my critical literature review. The Laugh-Health and Laugh-Thrive models are proposed to conceptualise and reveal the numerous physiological and psychological benefits of laughter. In 2022, my research independently found its way to the "real world" with the Laughie, the focus of a year-long mental health initiative. This enabled me to enrich my research scope and widen it to support ethnographic citizen science research investigating laughter prescription. A series of case studies of academics and practitioners within the field provided me, and the academic community, valuable insights on using laughter and humour to support mental health and social inclusion. My work in solitary laughter/solirisy is possibly the most original of my contributions. While laughter yoga demonstrates that humour is not needed to harness laughter's benefits, I showed, with the Laughie, that other people are not needed either. This thinking is potentially a step too far for many, including in the field. I have persisted as I see solirisy as a practical, beneficial, and enjoyable element in laughter prescription and feel research avenues should not be closed.

Chapter 5:   So what? Real world applications, implications, and some caveats.

5.1.   Introduction.

Here I consider the practical implications of laughter prescription. First, I delve deeper into the "why" of laughter prescription, to then reflect on who could prescribe laughter. I also discuss the risks and challenges that laughter prescription may entail. Finally, I propose practical ways, and provide examples, of laughter prescription. Until we prescribe laughter in primary care, and via social prescribing, and gather usage and impact data, many of the elements raised here remain largely theoretical. However, they serve as a starting point.

5.2.   Why is laughter prescription topical?

Laughter prescription appears to provide an accessible way to address and alleviate suffering. Increases in global stress-related and life-style diseases result in emotional and financial burdens for those affected and their carers. In 2019, 33.2 million people died of cancer, diabetes, cardiovascular disease and chronic respiratory diseases, an increase of 28% from 2000 (World Health Organisation, WHO, 2022a, p. 37). The WHO (2022a, p. 104) estimated the probability of dying from four diseases (cancer, diabetes, cardiovascular disease and CRD) between the ages of 30 to 70 in 2019 was 17.8%.

As seen, there is evidence that laughter and humour can alleviate cancer, diabetes and cardiovascular disease, and may even play a preventive role. Laughter can even significantly improve pulmonary function in tuberculosis patients (Jang et al., 2022). Hypertension (global prevalence in ages 30-79 is 33%; WHO, 2022a, p. 65), which can negatively impact health in numerous ways, is also alleviated by laughter. Laughter may also be protective for dementia,

another condition impacting us (global estimates for 2019 were 55 million; WHO, 2022b, p. 39).

Mental health affects us all directly or indirectly. In 2019, nearly a billion people lived with a diagnosable mental disorder; 29% relating to depression, 31% to anxiety disorders (WHO, 2022b, p. 40). Since COVID-19 this situation has worsened. An estimated 15% of the working population is impacted at any given time (WHO, 2022b, p. 13). Laughter and humour have been shown to benefit mental health (e.g., Stiwi & Rosendahl, 2022).

5.3. Who could prescribe laughter?

Laughter can be self-prescribed for those in good health. My focus here is on 1) Laughter prescription in primary care; 2) "Social prescribing".

5.3.1. Laughter prescription in primary care.

With increasing evidence for laughter to benefit health and well-being, we can be more confident to recommend its medical prescription now, than when Louie et al. (2014) did. As the role of primary health care includes preventive and health-promoting services (WHO, 2022a, p. 62), there appears to be no conflict to suggest laughter and humour prescriptions, in cases where they may be appropriate. However, laughter may not be suitable for everyone as we will see, and prescriptions must be tailored to patient needs, abilities, and preferences.

Non-pharmacological prescribing by a GP is still unusual, but there are precedents. "Physical activity on prescription" (PAP), is a successful intervention used in Sweden by General Practitioners (GPs), despite findings that GPs were unfamiliar with and, or, reserved about prescribing physical activity (Persson et al., 2013; Onerup et al., 2019). In theory, laughter

prescription enables doctors to encourage and monitor low-risk, low-cost, accessible, and enjoyable solutions where appropriate.

5.3.2. Social prescribing.

In the UK, social prescribing grew out of the recognition that up to 20% of primary care consultations involved a "social problem" (Polley et al., 2017, p. 4), and was therefore developed to unburden primary and secondary care and address patient needs. The practice developed (separately) elsewhere. It is now used in 17 countries and reflects WHO objectives for people to take increasing control over their health. In Denmark, "Exercise by Prescription" has even been promoted nationally (Morse et al., 2022). The WHO (2022c) has created a toolkit to adapt social prescribing to local contexts.

The suitability of laughter for social prescription has previously been recognized. Hatchard and Worth (2021), consider that laughter yoga fits in with the ethos of social prescribing. Drawbacks to social prescribing include inadequate community provision, and the need to recognize that not everyone is open to joining a group (Stuart et al., 2022). However, with numerous experienced laughter professionals world-wide, thanks to the laughter yoga movement, social prescription provides an important perspective for laughter prescription.

5.4. What are the challenges and risks of laughter prescription?

Here I consider three areas for laughter prescribers and facilitators to consider: 1) Potential risks involved; 2) Individual differences; 3) Supporting motivation and habit formation.

5.4.1. Potential risks of laughter and humour.

Boisterous laughter could be seen to be dangerous, however Miller and Fry (2009), refer to a very low incidence of laughter-induced hemorrhagic incidents, so infrequent that no statistics are available. Evidence for a "sparring factor" that renders the vascular systems fully dynamic during laughter explains this "paradox" (Miller & Fry, 2009).

Ferner and Aronson's (2013) investigation into the benefits and harms of laughter concluded that *"laughter in any form carries a low risk of harm and may be beneficial"*. Nevertheless, they note laughter can trigger asthma attacks, headaches and "giggle incontinence", and has even resulted in a dislocated jaw. The advice Joubert (1980, p. 126), gave in the sixteenth century on the risks of laughter is, I suggest, still relevant: *"There is nothing so useful and so pleasant that it cannot become harmful and dangerous if continued for too long a time"*.

The Laughie is deliberately short in duration, as my goal was to focus on minimum amounts of laughter needed to boost mood. Kataria has stated that laughter must be sustained for at least 10-15 minutes to provide physiological benefit (Kataria et al., 2023), and Louie et al. (2014) suggested, in their "speculative template" for laughter prescription, 30 minutes of belly laughter once a week. Nevertheless, research with the Laughie is showing us that less can be effective. It seems to me more practical and less risky to aim for one minute of laughter each day possibly repeated several times daily.

There are a range of pathologies associated with laughter, including pseudobulbar affect (PBA), gelastic epilepsy, and genetic conditions such as Angelman syndrome. Laughter is a symptom of these, yet we do not know if, or, to what extent it is also a risk factor. PBA, a neurological disorder involving uncontrolled laughter or crying that does not result in relief, is common in multiple sclerosis, Alzheimer's and Parkinson's disease (PD), and amyotrophic

lateral sclerosis (Nabizadeh et al., 2022). PBA is also seen in stroke victims with a prevalence of up to 20% (Gillespie et al., 2016). These conditions may not all benefit from laughter prescription. However, we do know that laughter yoga significantly improved well-being in adults (and their caregivers) with PD (*n* = 85) (DeCaro & Brown, 2016).

The psychological risks of laughter and humour are also pervasive. Humor can be hurtful and disrespectful, and it can be devastating to be mocked or ridiculed. There is a need to educate people on the potential harms of laughter (Platt et al., 2016). Michael Titze first highlighted the psychological profile of those with gelotophobia, the fear of being laughed at, which may affect 20% of the population (Platt et al., 2010).

5.4.2. Individual laughter styles and preferences.

Laughter prescription facilitators must be aware of individual differences in laughter and humour appreciation. Laughter can be interpreted in many ways. Joubert ([1579] 1980 p. 44) saw laughter as caused by "desire" and "composed of sorrow", and Descartes (1985, p. 126), as resulting not only from joy, but also from hatred and wonder. Humour can be tied to masked aggression and other forces in the unconscious (Berger, 2013). Martin et al.'s (2003) humour styles oppose "adaptive" (self-enhancing and affiliative), to "maladaptive" (self-defeating and aggressive) humour. "Adaptive" styles are seen as "health-promoting" and "maladaptive" as "health-endangering" (Plessen et al., 2020). Some flexibility is needed, or else, how to tell 96-year-old Mel Brooks that self-defeating jokes are health-endangering!

Knowledge of personality differences at play in humour appreciation is relevant. For example, health-promoting humour styles positively correlate with openness, conscientiousness, extraversion and agreeableness, and negatively with neuroticism (Plessen et al., 2020), and the use of Ruch et al.'s (2018a) eight comic styles, reveals sarcasm and cynicism correlate with low agreeableness, cynicism with introversion, and fun

with extraversion. That said, humour as a character strength is malleable (Gander et al., 2020), and thus personality can guide, rather than limit, prescription. Finding the best way to ameliorate individual humour styles is a challenge in humour-induced laughter prescription.

Humour-free laughter preferences are also individual. As my own research and observations have found, some people do not like the sound of their laughter. Others feel uncomfortable videoing, or watching, themselves laughing. Neal tells me he advises these people to exit their comfort zones and learn to embrace their laughter and visual image, as this also serves to support personal development and increase self esteem and self-compassion. Interestingly, laughter may be more contagious in an auditory than a visual modality (De Weck et al., 2022). Laughter prescription should be individually tailored to preferences.

Laughter and humour prescriptions likely need to be tailored to living environments, social support systems, health conditions, age, physical and intellectual disability profiles, cultural, religious, employment and socio-economic contexts. For example, the use of humour to those in palliative care (e.g., Cuervo Pinna et al., 2018), will entail a different approach to those with intellectual disabilities (e.g., Chadwick & Platt, 2018), or children with autism spectrum disorders, who can benefit from social interventions (e.g., Short & Vital, 2021), yet may find humour challenging (e.g., Samson, 2013). Prescribers can identify those with laughter-associated conditions using GELOPH (Ruch & Proyer, 2008) to assess gelotophobia, or PhoPhiKat-45 (Ruch & Proyer, 2009), to also test for gelotophilia (the enjoyment of being laughed at) and katagelasticism (the enjoyment of laughing at others); treating gelotophobia with humour has not been ruled out. Coulrophobia (the fear of clowns) may also need to be considered (Tyson et al., 2022).

5.4.3. Motivation and habit formation.

Integral to laughter prescription is that prescribers understand, and facilitators understand and enjoy, the modality. This undoubtedly unleashes a placebo effect, but I contend, it is needed to guide prescription motivation and habit formation. The Theory of Planned Behaviour (TPB; Ajzen, 1985), sees intentions, influenced by subjective norms, attitudes, and perceived behavioural control, leading to behaviours. Ajzen (2011) has stated "at its core, the TPB is concerned with the prediction of intentions" and recognizes that habit formation also plays a role. To encourage intentions to follow a laughter prescription, clear guidance is needed. Information provision, in the form of a formal prescription or Treatment (Rx) (Latin *recipe* i.e., "take") tailored to individual needs is superior to a mere recommendation, including because a prescription can be monitored.

Initial intentions to follow a prescription may be sincere, but motivation fluctuates. Reversal Theory (RT; e.g., Apter et al., 1998) views healthy individual motivation as dynamic and "psycho-diverse" (Apter & Carter, 2002). It is noteworthy that RT considers four paired motivational states, including serious (telic) versus playful (paratelic) and sees individuals having a dominant state for each that can frequently reverse. My hypothesis is that laughter prescription involves the serious state of following a prescription, and the playful state of enjoying it, and thus prescribing laughter is not immediately intuitive and may be challenging. James (1914, p. 54) advised to *"make automatic and habitual as early as possible as many useful actions as we can"*. One longitudinal study suggested habit formation for fun and simple physical exercises may occur at six weeks if performed four times a week (Kaushal & Rhodes, 2015). Mulcaster (1888, p. 65), already recommended laughter as an exercise in his 1581 *Positions*, but whether laughter as a fun and simple physical exercise can become habitual at six weeks remains to be tested.

5.5.   How can laughter prescription actually be undertaken?

Now I want to propose ways in which laughter prescription might be managed using: 1) The rational prescribing model; 2) Material to explain laughter prescription.

.

5.5.1. Rational prescribing model.

To dispense laughter prescription in primary care, the World Health Organisation's (WHO) six-step rational prescribing model (de Vries et al., 1994) is of interest. The word "rational" communicates an important message: the prescription must be both context- and patient-appropriate. Table 5.1 lists the six steps; I have added examples of specific laughter prescription application considerations. In Step 5 the treatment prescription is described.

To enable the prescriber to clearly communicate prescription (Rx) details I use the acronym LAUGH (Length, Amount, Usage, Goals, Hazards). Louie et al.'s (2014) proposition of FITT (Frequency, Intensity, Time, Type), may be considered, but it may be more suitable if a framework to prescribe different laughter intensities (low/medium/high) is developed.

Table 5.1. Proposed laughter prescription using the WHO rational prescribing model.

| Steps[1]	Rational treatment process[1]	Laughter prescription application considerations
Step 1	Define the patient's problem.	1. Is there evidence that laughter can benefit the stated patient's problem? 2. Is there evidence for the patient's age bracket, health profile, lifestyle/culture?
Step 2	Specify the therapeutic objective. What do you want to achieve with the treatment?	3. Is laughter prescription to be used as a stand-alone option, or in addition to other treatment? 4. Is laughter prescription to be used primarily to boost mood, or also for other remedial uses e.g., pain alleviation, sleep amelioration, anxiety reduction, stress management?
Step 3	Verify the suitability of your P-treatment[2]. Check effectiveness and safety.	5. What type of laughter prescription is most suitable for the patient from a preference perspective? Do they enjoy laughter/laughing, do they prefer cognitive humour, do they have any fears or phobias related to laughter, would they enjoy group therapy, or prefer individual therapy? 6. What type of laughter prescription is most suitable for the patient from a physical perspective? Are they mobile and fit? Is a 30-minute laughter yoga group session appropriate? Is one-minute of laughter more realistic?
Step 4	Start the treatment.	7. Does the patient have a choice of prescription? 8. Does the patient agree to the treatment conditions, and do they understand the reasons why they were given a laughter prescription, and the reasons why they will be asked to laugh, and how their progress will be tracked?
Step 5	Give information, instructions and warnings.	9. Does the patient have adequate information and understand the prescription (Rx) **L**ength, **A**mount, **U**sage, **G**oals, **H**azards (LAUGH): **Length:** How long will the laughter prescription last? **Amount:** How often should the prescription be taken? **Usage:** What precisely should the patient do? **Goals:** What are the reasons for the treatment? **Hazards:** What are the risks and when should the patient stop?
Step 6	Monitor (and stop?) treatment.	10. The patient is instructed to track their progress (eventually this could be automated with an App) and feed this back to the prescriber. Patient and prescriber can then decide on treatment continuation, refinement, or cessation as appropriate.

Note. 1. Source: World Health Organisation (de Vries et al., 1994); 2. P(ersonal) treatment i.e., the personal selection of treatments chosen by the prescriber (de Vries et al., 1994, p. 17).

5.5.2. Communicating laughter prescription with levity.

Laughter prescription can seem incongruous to people, and as such communication materials are needed to explain it. The Laugh-Health and the Laugh-Thrive models may be suitable to share with some patients. For young patients, or adults who prefer more accessible material, a lighter visual model with four characters called NOL (no laughter), RAL (rarely laughter), SOL (some laughter) and LOL (lots of laughter) can be used (Figure 5.1.).

The idea of laughter prescription is to encourage people to use laughter strategically for their health and wellbeing. The intentionally light-hearted **H**abits, **M**eans, **M**eaning, **M**otivation, **M**ethods (HMMMM) framework (Figure 5.1.) reflects how prescription can 1) Encourage a **H**abit of laughter, due to its length; 2) Provide the **M**eans, in the form of a prescription that is accessible; 3) Provide **Me**aning, such as laughing for health; 4) Encourage **M**otivation, by providing support; and 5) Supply **M**ethods, via training and written instructions.

Figure 5.1. HMMMM: From NOL to LOL with Laughter Prescription.
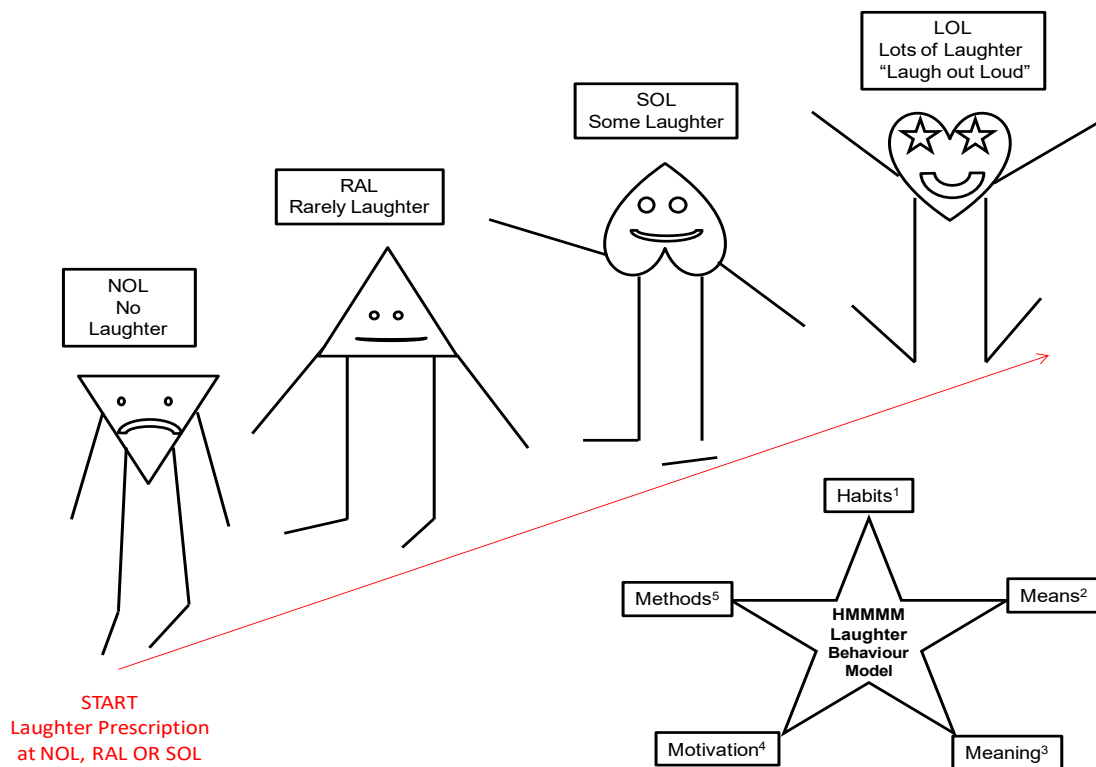
Note. 1. Habits: e.g., regular practice of laughter; 2. Means: e.g., Accessible laughter prescription; 3. Meaning: e.g., reasons and, or purpose of laughter; 4. Motivation: e.g., support when feeling unmotivated to laugh; 5. Methods: e.g., instructions, insight, know-how, to support laughter.

5.6. Laughter prescription examples.

The content of laughter prescriptions will depend on the personality, choice, and needs of the patient, insight of the prescriber, and expertise of the facilitator. There are many modalities including ones we have not mentioned, such as Laughter Qigong (Chang et al., 2013).

Content may be based on voluntary, self-induced, laughter, and, or mirthful laughter. Here I consider 1) Laughter-led prescriptions; 2) Humour-led prescriptions.

5.6.1. Laughter-led prescriptions.

Figure 5.2. presents four prescription examples. They differ in mode (i.e., time involvement and whether conducted alone, or in a group), type of laughter (i.e., voluntary/self-induced versus spontaneous/humour-induced), and content (e.g., Laughie, Laughter Yoga, hybrid etc). Rx instructions (i.e., LAUGH: Length, Amount, Usage, Goals, Hazards) are noted. Each prescription would need to be developed and communicated carefully with the laughter facilitator to ensure patients fully understand what is required. If the prescription is managed directly, a video explanation for each prescription is recommended.

Prescription 4 suggests the use of my seven Laughter Habits (Rx 7; Table 5.2). These are inspired by, and intended to complement, The 7 Humor Habits (McGhee, 2010; Table 5.3).

5.6.2. Humour-led laughter prescriptions.

Although voluntary laughter can be impactful, it is not easy, or enjoyable, for everyone. Four humour-led prescription examples are presented in Figure 5.3. Humour interventions can be

effective for promoting well-being (Crawford & Catabriano, 2011). Ruch et al. (2018b) tested

(*n* = 110, adults) the 7 Humor Habits program (McGhee, 2010) over 8-weeks (1x 2-hour

session per week) and found it to be effective.

Figure 5.2. Examples of laughter prescriptions.

Mode: Quick and can be done alone
Type: Voluntary Laughter
1. Rx = Laughie

LAUGH prescription example
- Length: 1 week
- Amount: 3 x per day i.e. 3 minutes
- Usage: 1 x am, 1 x pm; note feelings
- Goal: to lift mood & enjoy alone time
- Hazards: stop if feel unwell

Mode: Leisurely and at your own pace
Type: Voluntary & Spontaneous Laughter
2. Rx = Laughie and comic films

LAUGH prescription example
- Length: 2 weeks
- Amount: 1 Laughie/day; 2 films/week
- Usage: Laugh in different ways
- Goal: to lift mood & enjoy alone time
- Hazards: stop if feel unwell

Rx Laughter
Examples of Laughter-led Prescriptions

Mode: More time intensive and in groups
Type: Voluntary Laughter
3. Rx = Laughter Yoga

LAUGH prescription example
- Length: 4 weeks
- Amount: 1 x 30 minutes per week
- Usage: join local group, note feelings
- Goal: to lift mood & socialise
- Hazards: stop if feel unwell

Mode: Most time intensive; with others
Type: Voluntary & Spontaneous Laughter
4. Rx = 7 Laughter Habits

LAUGH prescription example
- Length: 8 weeks
- Amount: 1 x 60 mins & 1 film per week
- Usage: group learning & films at home
- Goal: to lift mood & socialise
- Hazards: stop if feel unwell

Table 5.2. The 7 Laughter Habits (Rx 7).

The 7 Laughter Habits "Rx 7"
1   Reasons. Learn about the power of laughter.
2   Recipes: Discover different ways to laugh.
3   Routine. Make it a habit to laugh each day.
4   Reserves. Safeguard things to laugh with.
5   Resourcefulness. Find ways to create laughter.
6   Relish. Enjoy laughter, explore it your way.
7   Recalibration. Identify your laughter needs.

Figure 5.3. Examples of humour-led laughter prescriptions.

Mode: Quick and can be done alone **Type:** Spontaneous Laughter **1. Rx = Exploring Humour Habits** **1. LAUGH prescription example** • Length: 1 week • Amount: 10 minutes per day • Usage: watching comedy clips • Goal: to lift mood & enjoy alone time • Hazards: stop if feel unwell	**Rx Laughter** **Examples of** **Humour-led** **Prescriptions**	**Mode:** Leisurely and at your own pace **Type:** Spontaneous Laughter **2. Rx = Watch, Read, Make Humour** **LAUGH prescription example** • Length: 4 weeks • Amount: 20 minutes per day • Usage: choice of exercises each day • Goal: to lift mood & enjoy alone time • Hazards: stop if feel unwell
Mode: More time intensiveand in groups **Type:** Spontaneous Laughter **3. Rx = Humour Therapy + Comic Films** **LAUGH prescription example** • Length: 4 weeks • Amount: 1 x 60 mins plus 1 film per week • Usage: join local humor therapy group • Goal: to lift mood & socialise • Hazards: stop if feel unwell		**Mode:** Most time intensive, in groups **Type:** Spontaneous Laughter **4. Rx = The 7 Humor Habits Program** **LAUGH prescription example** • Length: 8 weeks • Amount: 1 x 60 minutes per week • Usage: join local Humor Habits group • Goal: to lift mood & socialise • Hazards: stop if feel unwell

Table 5.3. The 7 Humor Habits.

The 7 Humor Habits (McGhee, 2010)
1   Surround yourself with humor.
2   Cultivate a playful attitude.
3   Laugh more often and more heartily.
4   Create your own verbal humor.
5   Look for humor in everyday life.
6   Take yourself lightly, laugh at yourself.
7   Find humor in the midst of stress.

Source: McGhee, 2010

5.7. Caveat: Health recommendations necessitate robust evidence.

It is important to emphasize that laughter prescription is a new area of research. Research using the Laughie laughter prescription has been exploratory, and research with other potential prescription modalities (e.g., humour-based, laughter yoga) has not investigated laughter prescription *per se*. There is, however, a growing body of interventional evidence-based research, mainly using small samples, and only some of which can be termed robust, that implicitly suggests that laughter prescription undertaken in a range of ways can benefit health and well-being. In view of this situation, my recommendation is that laughter, at this stage operationalized as the user's joyful, natural, and or playful laughter, and undertaken in dosages of one minute prescribed one or more times per day, be prescribed as a choice, and carefully tracked and assessed.

Pending evidence, I believe we cannot be definitive, or presume to prescribe "how" people laugh with the Laughie. The following areas remain explorative: 1) Laughter style such as intensity, frequency, pitch; 2) Dose frequency (e.g., once a day may be sufficient for some, including as a top-up prescription for those who may benefit from two or more times daily); 3) Usage style (e.g., whether the Laughie is video or audio, or how often the Laughie recording is changed. The Laughie was designed to facilitate laughter with the user laughing along with a pre-recording of their joyful and playful laughter; the recording can be used over varying time periods or may be changed daily); or 4) Lengths of a prescription (so far the longest observed in a group of healthy adults has been 30 days consecutive usage), which will likely also vary widely.

5.8. Conclusions: Key findings.

In this chapter I addressed practical aspects of laughter prescription that enable it to be considered as an accessible, low-risk solution to alleviate the pain and suffering caused by life-style diseases and poor mental health. There is an increasingly robust body of evidence to suggest that laughter prescription offers a pragmatic, low-cost, and enjoyable way to address this. A range of materials that could support laughter prescription are thus proposed. We must be mindful of individual needs. Tailored solutions will likely be appropriate. Laughter and humour can also harm, both physically and psychologically. I recommended that laughter prescription be undertaken with caution, and facilitated by well-trained, motivated, laughter and humour professionals, to encourage favourable habit formation. Furthermore, evidence assessment, to gauge prescription outcomes, must be ongoing.

Chapter 6:   A bright but busy future for laughter prescription.

6.1.   Introduction.

In this final chapter, I consider the future of laughter prescription research, and discuss and critique my research as a body of work. I reflect on its doctorateness by considering its cohesiveness, originality, publishability, independence, and disciplinary belonging. I then present my "third-wave" research plans. Finally, I look in more detail at the implications of my research by reviewing my five key contributions to knowledge.

6.2.   Avenues for laughter prescription research.

In his "treatise" on laughter, Joubert ([1579] 1980, p. 17) recounts how laughter is that "frisky pleasure" that "counteracts old age" and can render a patient "curable" (pp. 127-128). While we have progressed in our understanding of laughter since then, its prescriptive potential remains largely unexplored, and laughter and humour are still frequently conflated. To address this, I devised the Laughie as a laughter-only prescription to research the impact of laughter itself as the "active ingredient". To further our knowledge, we need 1) More stringent academic research; 2) Real-world research and collaborations.

6.2.1.   Stringent academic research.

As seen, an increasing number of large-scale studies, systematic reviews, and RCTs are revealing positive, and often significant, outcomes that lend support to laughter prescription. Nevertheless, quality evidence focused on laughter prescription would be appropriate. Future studies need to measure individual laughter to investigate its prescriptive impact. This entails precise laughter instructions, recording and, or videoing laughter content, and employing

objective measures, including wearables (e.g., Di Lascio et al., 2019). Wearable technology is still developing but can detect bodily changes associated with laughter. A dedicated laughter journal, and, or academic laughter association/group, may help move thinking forward.

6.2.2. Real-world research collaborations.

Citizen science research, led by professional laughter and humour experts can enable us to gather global insight in different communities and in naturalistic environments. This approach ensures that trained laughter professionals are facilitating interventions. Although RCTs are viewed as the gold standard, as Seligman (2018, p. 220) observed, randomizing people to groups they may not wish to join can be overrated as a methodology, as therapeutic outcomes are closely linked to personal choice. As more insight is gathered, primary-care-based research, both with, and without "social prescribing" interfaces, will be needed to extend knowledge for laughter prescription.

Industry collaborations are also of interest. Technology can support laughter prescription. For example, appliances such as a fridge that only opens if it detects a smile, have been found to positively influence mood (Tsujita & Rekimoto, 2013). An App, with a free "Lite" version, to enable both users and prescribers to manage, track, and enable two-way feedback on laughter prescription could be practical, but would depend on working with experienced and well-intentioned third parties.

6.3. Reflections on my research.

In this critical commentary I have recounted and critiqued my efforts to gain evidence to substantiate laughter prescription and presented a cohesive body of original published

works. Here, I explicitly critique my research according to its Cohesiveness, Originality, Publishability, Independence, Disciplinary belonging (Nygaard & Solli, 2021).

6.3.1. Cohesiveness.

The demonstration of thematic, philosophical, and logical cohesiveness, to tie the thesis by publication together and avoid presenting "a stack of articles" that are "fragmented" is recommended by Nygaard and Solli (2021, pp. 77-82). Therefore, all publications that are not directly related to my overarching research mission, of substantiating laughter prescription, have been removed from the Critical Commentary. These are listed in Table 1.2. Those that inspired, or were inspired by, my work on laughter prescription are discussed in the Portfolio. Here, my objective has been to draw out the "golden thread" of laughter prescription running through my research, namely the thematic cohesiveness that relates to substantiating laughter prescription. Philosophical cohesiveness is reflected in my pragmatic epistemology, an epistemology that is inherently eclectic, exploratory, and experiential. Logical cohesiveness can be seen in the overall rationale of my work: the substantiation of laughter prescription. In the next two paragraphs I reflect on these three types of cohesiveness in more detail.

The prospective PhD, while often compared to the retrospective PhD, is, I suggest, more similar to a traditional PhD than it is to a retrospective PhD. This is because prospective candidates are enrolled in an institution, during which time they produce their body of work under supervision. That body of research would likely be planned, in anticipation, to be cohesive, and homogeneous. The retrospective PhD route enables those outside of academia to enrol when they have a portfolio of work (e.g., Chong & Johnson, 2022, p. 2). As in my case, that route may result in a more heterogeneous body of work than had a topic been more systematically studied within a university environment. That said, the thematic cohesiveness of my research in Table 1.1., is robust in that it all relates to laughter and

humour, overall, and from varying perspectives. These publications address, explicitly and implicitly, my overarching research mission, which is to substantiate the potential of laughter prescription in order to promote well-being in the healthy and in those with health conditions. My publications draw on research questions that explore the why, when, to whom, by whom, with what purpose, and what of laughter prescription, and as such have, for example, sought to disentangle laughter and humour, and deconstruct laughter prescription.

The philosophical cohesiveness of my work is reflected in my pragmatic epistemology. Pragmatism has also been employed in how I have completed my research, in other words in a more adaptive way than would likely have occurred had I been enrolled as a student. I have been proactive and reactive to opportunities for collaborations and publications, while also maintaining the momentum of the logical cohesion of my laughter prescription research. This logical cohesiveness is perhaps best explained in terms of my research strategy to focus my efforts within the "Pasteur quadrant" (e.g., Pettigrew & Cooke, 2022). In other words, to be active in both a quest for fundamental understanding of laughter and humour, and in a quest for how that understanding can be put to use to benefit society. Thus, throughout my journey, I have been juggling the hats of a "pure" and an "applied" researcher. The intellectual cohesion that has flown from that approach has resulted in my overarching research question(s) relating to both the fundamental understanding and the practical benefits and application of laughter and laughter prescription. Thematic cohesion can also be shown in the ten questions I posed to the laughter and humour experts in the case series.

6.3.2. Originality.

Originality is at the core of my research, with the Laughie presenting a new way to laugh. Other original contributions include models, new approaches, and different perspectives. Some of this originality could be critiqued as "contrarian", for example going against the grain

of viewing laughter as a "social emotion", by actively highlighting its solitary personal development functions, and benefits. Yet, it is all pragmatic, with a stated purpose for the originality, and intended to provide a benefit. The main critique of my originality is the need for more evidence. Ideas and theories can be instruments of progress, but unless context-clear experiential evidence is also provided, their utility is limited. The purpose of the pragmatic scientific approach is that we recognize that all potential "truths" may also be fallible, and that we investigate whether they do work, and for whom, and in what circumstances.

The Laughie is innovative in that it combines three strands of laughter research evidence to create a practical health and well-being tool designed to advance research. Firstly, that one minute of laughter can boost mood. Secondly that laughter is contagious. Thirdly that laughter can be used as a diagnostic tool for depression. The idea of asking users to record their laughter and then to laugh with it (alone or with others) is original. The Laughie is of interest due to its simplicity, rendering it accessible, and its potential to make a change. The Laughie 1) Enables the user to create their own laughter tool which doubles as a timer, and may support laughter contagion, and serve as a mastery experience to build self-efficacy and habitual laughter; 2) Provides a way in which to gather data for both research and diagnostic purposes by analysis of the user's laughter in an audio, and or, video format; and 3) Encourages laughter experience sharing by using existing smartphone technology to capture one-minute of laughter, and to share it with friends and family. The Laughie laughter prescription could be seen to represent a paradigm shift in thinking about how laughter can be used to support health.

Despite a need for more evidence, including an RCT, the original conception of the Laughie research has already advanced knowledge as to how laughter interventions can be

undertaken, and how existing technology can be used, in a new, yet simple, and accessible, way, to promote the health benefits of laughter. The Laughie laughter prescription has independently been shown to be a feasible and effective modality by laughter professionals and practitioners in Australia. The Laughie was chosen by Merv Neal, the CEO of Laughter Yoga Australia and New Zealand, in consultation with laughter professionals in Australia, to be the focus of the year-long Laughie Challenge. The Laughie has therefore been under close scrutiny by laughter professionals. It has also been used by those who have taken on the Challenge. Neal, many of his fellow laughter professionals, and non-professional users, have been recording and posting their Laughies daily on Facebook since February 2022. Enthusiasm for the benefits of the Laughie on well-being is reflected in its use by laughter professionals, my own research and personal Laughie usage, and insight from the citizen science research currently underway. We are therefore investigating the development of a Laughie App with Health Innovation Manchester led by Professor Lloyd Gregory and Ben Diette. Should an App be developed, the originality of the Laughie concept may be more conspicuous; however, even without an App it can be recognized.

6.3.3. Publishability.

To contemplate publishability, I lean on the first two, of ten, research evaluation principals proposed by scientometricians Hicks et al. (2015) in *Bibliometrics: The Leiden manifesto for research metrics.* Firstly, the need to support quantitative metrics with qualitative assessment, and secondly, the need to measure performance against the research missions of the institution, group or researcher. There are many quantitative metrics available. In Chapter 1, Figure 1.1., I present metrics from Scopus and Google Scholar. Those from Scopus are arguably more stringent, as publishers must be "reviewed and selected by an independent Content Selection and Advisory Board to be, and continue to be, indexed on Scopus" (Elsevier, 2023). As per Figure 1.1., on 30/06/23 Scopus listed 19 of my articles,

and reported 99 citations, and an H-index of 4. In Figure 6.1., a Scopus-generated table showing citations for each of the 19 articles is presented. Ten of these articles mention laughter or humour in the title, and all but three (two on coffee, one on luxury markets) of the 19 are included towards my PhD. Thus, 16 of the 25 publications on which my PhD rests are Scopus-indexed. If the two accepted publications are included, (No. 16 and No. 18 in Table 1.1.), this rises to 18 of the 25 articles. Of the remaining 7 of the 25 articles, one is under review with a Scopus-indexed journal, one is published as a pre-print, and thus could be submitted to a Scopus-indexed journal, three are popular articles in non-Scopus-indexed publications, and two are commentaries in non-Scopus-indexed books.

Figure 6.1. Scopus-indexed papers with citation counts (30/06/23).

	Documents	Citations	<2019	2019	2020	2021	2022	2023	Subtotal	>2023	Total
	Total		0	9	12	17	32	29	99	0	99
1	Laughter and humour interventions for well-being in older ad...	2018		6	6	7	9	4	32		32
2	Laughter and humour for personal development: A systematic s...	2020			1	5	6	5	17		17
3	The Engage-Disengage Model as an Inclusive Model for the Pro...	2022					6	6	12		12
4	Prescribing laughter to increase well-being in healthy adult...	2019		2	2	2	3	1	10		10
5	Coffee as a Naturally Beneficial and Sustainable Ingredient ...	2021					3	1	4		4
6	Prescribing laughter to ameliorate mental health, sleep, and...	2020				1	2	1	4		4
7	A flexible framework for planning and evaluating early-stage...	2019			2		1	1	4		4
8	Differential qualitative analysis: A pragmatic qualitative m...	2019		1	1	1	1		4		4
9	Humour and mental health: a case study of Arthur Asa Berger	2023						3	3		3
10	Laughter and mental health: a case study of Merv Neal	2022						3	3		3
11	Laughter, mental health and cancer: a case study of Ros Ben-...	2023						2	2		2
12	Laughter and mental health: a case study of Dr Madan Kataria	2023						1	1		1
13	"You can end up in a happy place" (Voyce): a role for positi...	2023						1	1		1
14	The Impact of a Laughter Prescription on Creativity, Well-Be...	2022					1		1		1
15	Wake up and smell the coffee: An exploratory prepilot study ...	2020				1			1		1
16	Humor, laughter and mental health: a case study of Mary Kay ...	2023							0		0
17	Facilitating the planning and evaluation of narrative interv...	2022							0		0
18	Managing Longevity in Luxury Markets: A Perspective from Mon...	2021							0		0
19	The Covid-19 Pandemic as an Opportunity for Positive Psychol...	2021							0		0

Source: Elsevier/Scopus (30/06/23).

Another Scopus-generated metric of interest is "author position" (Figure 6.2.), which is calculated retrospectively. Figure 6.2. shows most of my Scopus-indexed papers up to 2022 were first-authored and 15% were single-authored. Figure 6.2. also includes Scopus' Field Weighted Citation Impact (FWCI) metric, whereby "Exactly 1 means that the output performs just as expected for the global average. More than 1 means that the output is more cited than expected according to the global average. For example, 1.48 means 48% more cited than expected" (Elsevier, 2023). As shown in Figure 6.2., the FWCI for my first-authored papers is 2.003, and for my last-authored it is 1.515.

Figure 6.2. Scopus-indexed papers up to 2022 by author position and FWCI (30/06/23).
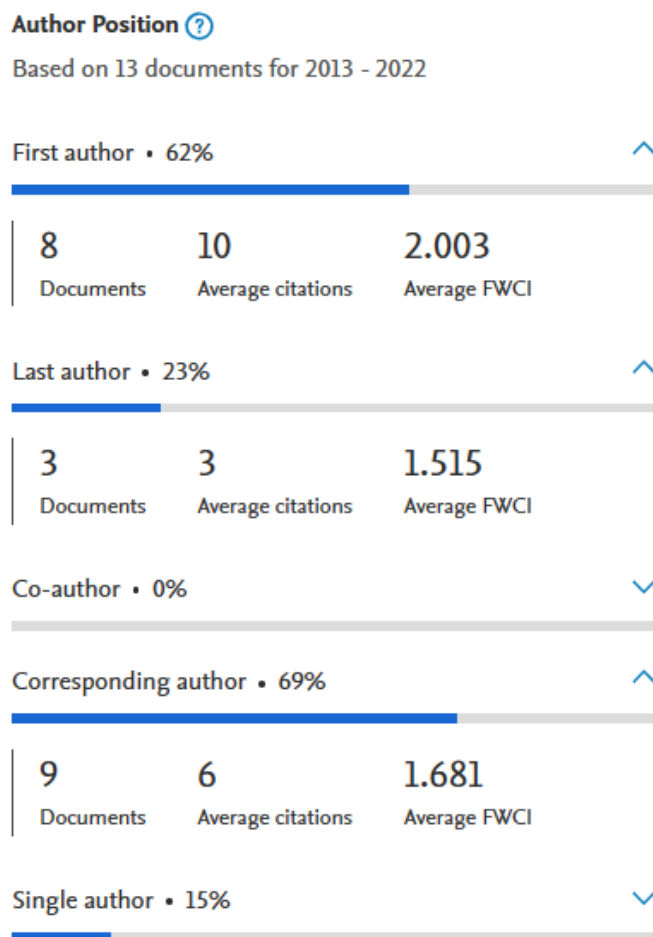
Source: Elsevier/Scopus (30/06/23).

A final Scopus-generated metric to highlight is within-institution rankings. Figure 6.3., shows a snapshot of the list generated on 30/06/23 that ranks the 772 academics associated with the University of Bolton, on that day, according to number of publications. My "rank" on that day (such metrics are clearly fluid) marginally made it to the "top 50", at number 49, with my 19 publications (and an H-index of 4).

Figure 6.3. Scopus peer ranking within University of Bolton (from 772 people) (30/06/23).

Source: Elsevier/Scopus (30/06/23).

As mentioned at the start of this section, quantitative metrics must be considered in tandem with qualitative assessment, and in relation to research missions. There are also six precise qualitative publishability criteria (Nygaard & Solli, 2021, pp. 76-77) to consider: that publications 1) Are relevant to the scholarly audience it is written for; 2) Are methodologically

sound; 3) Have a clear argument (a well-defined question that is answered by a claim you can support); 4) Are organized and coherent; 5) Are clear and reflect the conventions of the field; 6) Follow stylistic conventions. I believe my published work does answer to all six of these criteria. Central to my research mission has been to contribute to a better understanding of my topic. To that end, I have introduced a range of innovative and, or alternative ideas. The innovative nature of my research has, however, entailed the implicit and explicit questioning of certain dominant views in the field (for example that laughter is a social emotion, that solitary laughter is rare, that laughter without humour is rare, and that humour is needed for enjoyable laughter). This has likely not facilitated its publication or reception. Moreover, for journal Editors, external validity ranks as one of the most important factors when judging publishability (Lounds et al., 2001), and for innovative research, and early-stage interventions, this is by definition challenging.

Publication in higher impact factor (IF) journals, would have been preferable to reach my target audience. My top two IF publications are my systematic review on laughter (Gonot-Schoupinsky & Garip, 2019a) in *Complementary Therapies in Medicine*; IF 2022: 1.979, showing over 70 citations on Google Scholar, and the Laughie and creativity study (Sharma et al., 2022) in the *Journal of Creative Behaviour*; IF 2021: 3.323. The varied publication outlets and types (e.g., book chapters, primary and secondary research, popular articles) may, on reflection, have contributed to interest in my research from outside of academia. That interest has resulted in an ongoing scrutiny of the Laughie laughter prescription in the real world, and it has "struck a chord". In turn, the profile of my laughter prescription work is being raised, leading to more interest in my research among laughter and humour, health care, and positive psychology academics (e.g., Macfarlane & Carson, 2023).

6.3.4. Independence.

Nygaard and Solli (2021, pp. 89-92), highlight the need to demonstrate independence. In the prospective PhD route, that they admit is the focus of their book (p. 5), "It is common that PhD candidates publish with their supervisor" (p. 90). However, the retrospective PhD, particularly for those not attached to an institution, is, I propose, an inherently independent route. The candidate must be an independent thinker, and doer, in order to follow such a route. There is no supervision until the final year(s), after which the majority of the portfolio has already been completed. The retrospective route is self-driven, self-motivated, and fundamentally an independent undertaking. The qualities of independent thinking, writing, and critique are ones that I value enormously and enjoy refining. My independence, as a personal quality, was honed over 30 years as a self-employed management consultant, often working alone. Yet, where possible, I seek to team with self-motivated experts with practical and technical knowledge. For example, I view an expert statistician as indispensible where quantitative research is concerned. Having experienced "independent researcher" academic status, I would argue that independent applied research is somewhat of an oxymoron, as university ethics, and expert teams are important components of evidence-based research.

As an independent researcher, I have published independently. However, during my PhD I have sought to reduce, rather than increase, my independence, by pursuing research collaborations. I independently initiated many of these collaborations. As shown in Tables 1.1. and 1.2., I had a fruitful collaboration with Dr. Gulcan Garip, previously my MSc supervisor, as she has attested (Portfolio). I led on design and research input, and my contribution was 85% plus in all joint work, excepting for the project in the UAE (Gonot-Schoupinsky et al., 2020b), where she estimated my contribution at 50%. In my final PhD year, under the Supervision of Professor Carson, I found myself in a more conducive environment to focus on my research golden thread, and collaborate with others. I was able

to continue to independently initiate a range of projects which were inspired by his work. These include the case study series (of which five are published, one is accepted, and three more are planned); the ICAE (Invited Collaborative Autoethnography) research that I designed (accepted for publication); the Positive Autoethnography (PosAE) research I conceived (published); the Citizen Science research (underway); and a collaboration I instigated exploring the concept of doctorateness and "positive doctorateness" by reflecting on doctorateness from a positive psychology perspective (underway).

6.3.5. Disciplinary belonging.

In this critical commentary I have sought to connect to the field of psychology in general. Here I reflect on how, in particular, I also connect to my discipline of Health Psychology. A justified critique of my research is its interdisciplinary nature. Academic laughter research spans the humanities to computer science. My published laughter and humour research gravitates to health, not psychology, journals. My solitary laughter collaboration is with a professor of cultural studies in Japan. My citizen science research is with the CEO of Laughter Yoga Australia. This interdisciplinary breadth strengthens my research. Nevertheless, as a steward of my discipline, I am aware of the need to generate, conserve, and transform knowledge in my field in line with the ethical and moral dimension that that entails (Golde, 2006). This is why, during my PhD, I developed research connected to my field such as the case study series and the Laugh-Health/Laugh-Thrive models and prepared my "third-wave" research.

Numerous sub-disciplines of psychology are implicated in the study of laughter and humour, yet it is unrealistic to seek, or profess, expertise in all. For example, behavioural neuroscience is arguably an increasingly important area in laughter research, yet not one I am trained in. Since my MSc in the discipline of Health Psychology, and prior to that a

Psychology conversion course (the two over four years from 2014 to 2018), I have been building my knowledge within my discipline of Health Psychology, My previous degrees, (a BA in History, and an MBA), provided somewhat different perspectives, yet enriched my PhD by motivating my interest in the history of laughter and humour, and my interdisciplinary research.

The American Psychological Association (APA) launched the Division of Health Psychology in 1978 (as the 38th division) (Matarazzo, 1980). Its aims (APA, 2023) are ones I aspire to:

> *The Society for Health Psychology (SfHP) seeks to improve the lives of individuals and society by promoting health, preventing illness, and improving health care through research, practice, education, training, and advocacy.*

According to Ogden (2018, p. 6), Health Psychology draws from four key health and illness perspectives: 1) The Biopsychosocial model (Engel, 1977); 2) Health as a continuum; 3) The relationship between psychology and health; and 4) A focus on variability and behaviour. Ogden (2018, p. 7), claims there are two overarching aims of Health Psychology: 1) Understanding, explaining, developing and testing theory, and 2) Putting this theory into practice. In this critical commentary, I have revealed how my research is consistent with these aims of health psychology. My research has investigated laughter and humour to understand, explain, develop, and test theory, (mainly within the field of laughter, to a lesser extent that of humour), and it has looked at how to convert this theory into practice with the conception, testing, and refinement of the Laughie laughter prescription. My research builds on, and seeks further insight into, the four perspectives of health psychology highlighted above. For example, one of my theoretical contributions, BPSE-B, proposes the extension of the biopsychosocial model to explicitly embrace the role of behaviour, a critical element of health psychology, in biopsychosocial thinking.

6.4.   Third-wave research underway, planned, and thereafter.

As of mid-2023, six additional projects are underway. The first five facilitated by Professor Jerome Carson.

1) **Book chapter**: Co-author with Joe Hoare, a laughter professional, for *Autoethnographies in psychology and mental health: New Voices* (Routledge, 2024). (Accepted manuscript).

2) **Article**: Qualitative research being prepared for submission. Lead with seven co-authors: *"Doctorateness": Autoethnographic perspectives and a role for positive psychology?*

3) **Book**: Lead author with Merv Neal and Professor Jerome Carson, *The positive psychology of laughter and humour*, Emerald Publishing (delivery 11/2023).

4) **Case studies (3)**: To complete the series in *Mental Health and Social Inclusion*. Dr. Patch Adams, Professor Willibald Ruch, and Professor Sophie Scott have been invited.

5) **Book**: Co-author with Professor Jerome Carson, Dr. Tara Chandler, Patrick Hopkinson, *"Positive psychology and qualitative methods"*; early-stage planning, Emerald Publishing.

6) **Research**: Mixed-methods research to explore the impact of group Laughies, in earthquake survivors in Turkey, with Dr. Nilgűn Kuru Alici and Dr. Gulcan Garip.

Thereafter, I have many questions to address. Topics that intrigue me include: 1) Humour as a response to laughter (i.e., the inverse of how it is normally viewed); 2) Disentangling the immediate versus longer-term benefits of laughter; 3) Investigating laughter, including solitary laughter, in pathologies and autism, to ascertain its function (hypothesis: it has benefits); 4) Exploring the Laughie in the physically impaired; 5) Laughter and longevity.

6.5.   Limitations: Critical reflections on my critical commentary.

6.5.1. Paucity of primary and robust empirical research.

My retrospective PhD saw me self-directing and compiling the majority of my portfolio, over four out of the five years, outside of formal academia. This gave me freedom to explore widely. Nevertheless, it precluded access to a range of academic resources, notably supervisory advice on, and ethical approval of, participant-based research. In order to conduct participant-based research it was necessary to either request university collaboration, as I did in the UAE, or to respond to such a request, as I did with the one coming from India. These collaborations entailed considerable time commitments, yet as they were of limited success, I was dissuaded from continuing to invest my efforts in this way.

In year five, I enrolled as a PhD student at the University of Bolton. An early undertaking was to design and organize a participant-based, ethically approved study with my supervisor. The Laughie citizen science collaboration is in progress. Professor Carson has invited me to take on a visiting researcher position at the University of Bolton following my PhD, and this will enable me to expand my efforts in participant-based research. Research involving the Laughie, either with or without a Laughie App (an App is currently in discussion with Health Innovation Manchester, under the direction of Professor Lloyd Gregory and Ben Diette) and will be a priority.

6.5.2. Constrained use of pragmatic autoethnography.

In order to focus on laughter prescription, I relegated ancillary published, cited, research to the portfolio, and did not cover other research at all. This introduces a bias into my research journey. The behavioural potential and impact of using laughter to support health and well-being involves many elements. I have not treated all equally. I barely mention the acoustics

of laughter (Bachorowski et al., 2001; Lavan et al., 2016), my attempts to analyse Laughies with Raven Lite (ornithological/bird-song software), findings from ethological/animal research (Davila-Ross and Dezecache, 2021), the neuroscience of laughter (Zauli et al., 2022; Caruana, 2020), smiling (Hofmann et al., 2017) or playfulness (Ruch et al., 2019).

In terms of pragmatic autoethnography (PAE, Gonot-Schoupinsky, 2022; Gonot-Schoupinsky et al., 2023), and my usage of it here, the verdict is out. Autoethnographers could be justified in critiquing that I do not reveal enough of myself or share more emotions of my journey. However, PAE is a style that aims to give the writer stylistic and epistemological freedom in how they convey the "auto", the "ethno" and the "graphy" to best support their purpose, topic, and constraints. To focus on the essential, the narrative does not fully reflect its experiential and reflexive potential. Yet, PAE served me far beyond its function as a narrative approach. It fundamentally impacted my second-wave research. My reflections on ethnographic insight, largely inspired by autoethnography, fuelled my interest in citizen science and enabled me to explore new avenues and alternative perspectives.

6.6. Contributions to knowledge.

I introduced my five contributions to knowledge in Chapter 1, and have aimed, throughout to highlight them, albeit potentially more implicitly. Here I explicitly reflect on each.

6.6.1. Laughie prescription research.

My conception, development, testing, refining, and observation of the one-minute Laughie (Laugh Intentionally Everyday) laughter prescription over five plus years, is at the core of my laughter prescription research. The Laughie not only provides a practical and quick way to prescribe laughter, but also enables us to measure and explore laughter as the active

ingredient by minimising confounding factors contained in most laughter interventions. While I do not view the Laughie as the only solution for laughter prescription, and recognize that it can introduce its own challenges, it provides a practical way to explore laughter and laughter prescription.

To my knowledge, I am the first to explicitly raise and explore the importance of laughing for a reason, be it for health, happiness, relaxation, energy, etc. The laughter yoga mantra to laugh for "no reason" is, I contend, unhelpful for laughter prescription. We need to be explicit about why we are prescribing laughter, particularly self-induced laughter that does not rely on humour, as it is still not widely understood. Finally, I think I am the first to investigate the impact of humour-free laughter prescription *per se*, theoretically, in interventions, and in field research. And to show that by prescribing laughter, even if for only a few minutes per day, we can harness a range of benefits.

6.6.2. Deconstructing laughter.

The conflation of laughter and humour is very long-standing, and I am not the first to comment on it or attempt to disentangle the two. But I think I am one of the first to push the idea that there is a need for laughter and humour to be treated equally within academia, and fields such as positive psychology, to attempt to systematically investigate differences and similarities in laughter and humour, and to call for research into areas that depend on the two being disentangled, such as investigation of the bi-directionality of laughter and humour. My efforts to deconstruct laughter and laughter prescription to explore, understand, and communicate its purpose, application, content, and conflational, mindset, measurement, modality challenges have been inspired by practical reasons. I see a need to elevate laughter to the level of humour within academia as by subsuming laughter within the field of humour we are creating an artificial barrier that can limit laughter research and applications.

My comparative definitions of laughter and humour, the Humour Laughter Affect model (HuLA), the Personal Development Theory (PDT) of laughter and humour, and the Laugh-Health and Laugh-Thrive models all seek to convey the message that laughter and humour are both important, but can differentially impact health and well-being. I have clarified how and why laughter and humour are fundamentally different, and how a clear separation of the two is needed, including if we are to fully investigate the potential of voluntary, non-humour-driven laughter to benefit health. My purpose here has been to move thinking forward.

6.6.3. Pioneering solitary laughter research.

Mainstream humour and laughter research tends to be fixated on its social aspects. While these are extremely important, due to my interests in personal development and self-care, solitary laughter interested me as an area of focus. Solitary laughter is dismissed as an anomaly by the majority in the field, or it is ignored. Only one other academic is, to my knowledge, active in this field, and I am collaborating with him.

The exploration of laughing alone/solitary laughter for health and well-being is challenging. Solitary laughter is an undervalued, overlooked, and unfairly stigmatised behaviour, which tends only to be noted in relation to pathology and neurodivergence. However, because it has been so overlooked, I contend that it presents many opportunities for research. Also, I think most things that can be beneficial done with others, can have value when done alone, and I see no reason why laughter should be an exception. I have persisted with solitary laughter research as I see it as a topic that increases our understanding of laughter and individual differences and can open research avenues in a range of areas. For example, I wonder if autistic solitary laughter (e.g., Zane et al., 2018) has a beneficial function that is currently being overlooked. Solitary laughter, or solirisy (I coined this term as to me solitary is associated with calm and quiet), is at the core of the Laughie laughter prescription for practical reasons. My research demonstrates that laughing alone on prescription can be

enjoyable and beneficial. This contribution embodies both practical and philosophical knowledge advancement.

6.6.4. Citizen science laughter prescription.

When the Laughie was independently taken up in a real-world mental health initiative as the focal point of the year-long Laughie Challenge Australia, it provided a unique opportunity to observe Laughie usage outside an academic research environment. Inspired by my interest in ethnography, my purpose of developing Citizen Science research from this initiative was to collect real-world data. It has resulted in the longest prescription of daily laughter overseen by a professional laughter expert, to my knowledge, undertaken. It also inspired my conception of a Post-Intervention Perceived Impact Measure (PIPIM). The PIPIM explicitly measures the perceived impact of an intervention, rather than implicitly drawing it out from pre-post measures. My involvement in citizen science has thus contributed to identifying and using practical ways to gather and investigate real-world outcomes in laughter prescription.

6.6.5. Ancillary methodological contributions.

Ten original methodological contributions to support my research and address gaps are discussed in the Portfolio. These relate to, or were inspired by, my work in laughter and humour and form my fifth contribution. Many have been mentioned already.

1) FRAME-IT.
2) Differential Qualitative Analysis (DQA).
3) BPSE-B.
4) Four Circles of Creativity (4CC) / Four Circles of Humor (4CH) models.
5) Compound Review.
6) Engage-Disengage model.
7) STAIR-STAIR*.

8) Pragmatic autoethnography.

9) Invited Collaborative Autoethnography (ICAE).

10) Positive Autoethnography (PosAE).

6.7.   Conclusions: Key Findings.

In this final chapter I considered the doctorateness qualities of my first- and second-wave research and its contributions to knowledge. The implications of my research are wide-ranging. My research has produced a viable laughter prescription modality that has found some resonance in the real-world. It has raised the profile of laughter prescription, highlighted the need to communicate reasons as to why laughing is beneficial, and encouraged a mindset that values the inherent differences of laughter and humour and their impact on health and well-being, and acknowledges their co-equal status within academia. I also hope to have inspired practical and research interest in solitary laughter (solirisy).

Nevertheless, the research undertaken to date remains exploratory. It is important to acknowledge that there is a lack of robust empirical evidence for the Laughie and for the theoretical contributions presented here. There is much more work to be done including to address conflational, measurement, mindset, and modality challenges to substantiate laughter prescription. However, we have sufficient evidence to begin to prescribe laughter in primary care, for patients who choose it, when deemed safe and suitable. Laughter is too important to be left to chance. Laughter prescription in practice will extend our understanding. I invite others to join me in investigating laughter prescription, practitioners to test it, and doctors to prescribe it.

References.

Adams, P. (1998). *Gesundheit*. Healing Arts Press.

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckmann (Eds.), *Action contro*l: *From cognition to behavior* (pp. 11-39). Springer. https://doi.org/10.1007/978-3-642-69746-3_2

Ajzen, I. (2011). The theory of planned behaviour: Reactions and reflections. *Psychology & Health*, *26*(9), 1113-1127. https://doi.org/10.1080/08870446.2011.613995

Akimbekov, N. S., & Razzaque, M. S. (2021). Laughter therapy: A humor-induced hormonal intervention to reduce stress and anxiety. *Current Research in Physiology*, *4*, 135-138. https://doi.org/10.1016/j.crphys.2021.04.002

Allen, R. E., Carson, J., Merrifield, B., & Bush, S. (2020). Still worlds apart: Flourishing in people with mental health problems. *Mental Health and Social Inclusion*, *24*(3), 163-172. https://doi.org/10.1108/MHSI-05-2020-0027

APA (American Psychological Society). (2023). Society for Health Psychology, Retrieved June 30, 2023, from: Society for Health Psychology (Division 38) (apa.org)

Apter, M. J., Mallows, R., & Williams, S. (1998). The development of the motivational style profile. *Personality and Individual Differences*, *24*(1), 7-18. https://doi.org/10.1016/S0191-8869(97)00148-7

Apter, M.J. & Carter, S. (2002). Mentoring and motivational versatility: An exploration of reversal theory. *Career Development International*, *7*(5), 292-295. https://doi-org.ezproxy.bolton.ac.uk/10.1108/13620430210440136

Armat, M. R., Emami Zeydi, A., Mokarami, H., Nakhlband, A., & Hojjat, S. K. (2022). The impact of laughter yoga on depression and anxiety among retired women: A randomized controlled clinical trial. *Journal of Women & Aging*, *34*(1), 31-42. https://doi.org/10.1080/08952841.2020.1774225

Association of Applied and Therapeutic Humor (AATH). (2023). Our rallying cry: Humor helps. Retrieved from: Association For Applied And Therapeutic Humor | United States (aath.org)

Bachorowski, J. A., Smoski, M. J., & Owren, M. J. (2001). The acoustic features of human laughter. *The Journal of the Acoustical Society of America*, *110*(3), 1581-1597. https://doi.org/10.1121/1.1391244#

Bains, G. S., Berk, L. S., Daher, N., Lohman, E., Schwab, E., Petrofsky, J., & Deshpande, P. (2014). The effect of humor on short-term memory in older adults: A new component for whole-person wellness. *Advances in Mind-body Medicine*, *28*(2), 16-24.

Bains, G., Berk, L., Lohman, E., Daher, N., & Miranda, B. (2018). Decrease in inflammation (CRP) and heart rate through mirthful laughter. *The FASEB Journal*, *31*, 697-7. https://doi.org/10.1096/fasebj.31.1_supplement.697.7

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 191.

Bandura, A. (1990). Perceived self-efficacy in the exercise of personal agency. *Journal of Applied Sport Psychology*, *2*(2), 128-163. https://doi.org/10.1080/10413209008406426

Bartzik, M., Bentrup, A., Hill, S., Bley, M., von Hirschhausen, E., Krause, G., Ahaus, P., Dahl-Dichmann, A. & Peifer, C. (2021). Care for joy: Evaluation of a humor intervention and its effects on stress, flow experience, work enjoyment, and meaningfulness of work. *Frontiers in Public Health*, *9*. https://doi.org/10.3389/fpubh.2021.667821

Beckman, H., Regier, N., & Young, J. (2007). Effect of workplace laughter groups on personal efficacy beliefs. *The Journal of Primary Prevention*, *28*(2), 167-182. https://doi.org/10.1007/s10935-007-0082-z

Ben-Moshe, R. (2023). *The laughter effect*, Nero.

Ben-Moshe, R. & Gonot-Schoupinsky, F. (2023). Ben-Moshe, R. & Gonot-Schoupinsky, F. (2023). Laughter, mental health and cancer: A case study of Ros Ben-Moshe. *Mental Health and Social Inclusion*, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/MHSI-11-2022-0071

Bennett, M. P., Zeller, J. M., Rosenberg, L., & McCann, J. (2003). The effect of mirthful laughter on stress and natural killer cell activity. *Alternative Therapies in Health and Medicine, 9*(2), 38-45.

Bennett, M. P., & Lengacher, C. (2008). Humor and laughter may influence health: III. Laughter and health outcomes. *Evidence-based Complementary and Alternative Medicine*, *5*(1), 37-40. https://doi.org/10.1093/ecam/nem041

Bennett, P. N., Parsons, T., Ben-Moshe, R., Weinberg, M., Neal, M., Gilbert, K., Rawson, H., Ockerby, C. Finlay, P. & Hutchinson, A. (2014). Laughter and humor therapy in dialysis. In *Seminars in Dialysis (27)*5, 488-493. https://doi.org/10.1111/sdi.12194

Bennett, P. N., Parsons, T., Ben-Moshe, R., Neal, M., Weinberg, M. K., Gilbert, K., Ockerby, C., Rawson, H., Herbu, C. & Hutchinson, A. M. (2015). Intradialytic Laughter Yoga therapy for haemodialysis patients: A pre-post intervention feasibility study. *BMC Complementary and Alternative Medicine*, *15*(1), 1-7. https://doi.org/10.1186/s12906-015-0705-5

Bennett, P. N., Hussein, W. F., Reiterman, M., Yu, J., & Schiller, B. (2020). The effects of laughter therapy on depression symptoms in patients undergoing center hemodialysis: A

pragmatic randomized controlled trial. *Hemodialysis International*, *24*(4), 541-549.
https://doi.org/10.1111/hdi.12870

Berger, A. A. (2013). Why we laugh and what makes us laugh: 'The enigma of humor'. *Europe's Journal of Psychology*, *9*(2), 210-213.
https://doi.org/10.5964/ejop.v9i2.599

Berger, A. A. (2016). Three holy men get haircuts: The semiotic analysis of a joke. *Europe's Journal of Psychology*, *12*(3), 480-497. https://doi.org/10.5964/ejop.v12i3.1042

Berger, A. A. (2021). *The creative process: An ethnographic analysis*. Cambridge Scholars Publishing.

Berger, A.A. & Gonot-Schoupinsky, F. (2023). Humour and mental health: A case study of Arthur Asa Berger. *Mental Health and Social Inclusion. 27* (1), 37-50.
https://doi.org/10.1108/MHSI-08-2022-0051

Berk, L. S., Tan, S. A., Fry, W. F., Napier, B. J., Lee, J. W., Hubbard, R. W., Lewis, J. E. & Eby, W. C. (1989). Neuroendocrine and stress hormone changes during mirthful laughter. *The American Journal of the Medical Sciences*, *298*(6), 390-396.
https://doi.org/10.1097/00000441-198912000-00006

Berk, L. S., Felten, D. L., Tan, S. A., Bittman, B. B., & Westengard, J. (2001). Modulation of neuroimmune parameters during the eustress of humor-associated mirthful laughter. *Alternative Therapies in Health and Medicine*, *7*(2), 62-76.

Berk, L. S., & Tan, S. (2009). Mirthful laughter, as adjunct therapy in diabetic care, increases HDL cholesterol and attenuates inflammatory cytokines and C-RP and possible CVD risk. *The FASEB Journal*, *23*, 990-1.https://doi.org/10.1096/fasebj.23.1_supplement.990.1

Berk, L., Prowse, M., Bains, G., Batt, J., Petrofsky, J., Daher, N., Danner, H. Ludeman, L., Lahman, M., Tan, S. & Berk, D. (2010). Humor-associated laughter affects appetite hormones. *The FASEB Journal*, *24*, 996-1. https://doi.org/10.1096/fasebj.24.1_supplement.996.1

Berk, R. A. (2001). The active ingredients in humor: Psychophysiological benefits and risks for older adults. *Educational Gerontology*, *27*(3-4), 323-339. https://doi.org/10.1080/036012701750195021

Bianchi, I., Branchini, E., Canestrari, C., & Burro, R. (2022). On pleasures of the mind related to humour and insight problem solving: An investigation of people's awareness of what they like and why. *Journal of Cognitive Psychology*, 1-18. https://doi-org.ezproxy.bolton.ac.uk/10.1080/20445911.2022.2047058

Billing, A. D., Cooper, R. J., & Scott, S. K. (2021). Pre-SMA activation and the perception of contagiousness and authenticity in laughter sounds. *Cortex*, *143*, 57-68. https://doi.org/10.1016/j.cortex.2021.06.010

Black, J. M. (1999). Writing your humor prescription: A stress management teaching strategy. *Journal of Health Education*, *30*(4), 258-260.

Boone, T., Hansen, S., & Erlandson, A. (2000). Cardiovascular responses to laughter: A pilot project. *Applied Nursing Research*, *13*(4), 204-208. https://doi.org/10.1053/apnr.2000.7656

Bressington, D., Yu, C., Wong, W., Ng, T. C., & Chien, W. T. (2018). The effects of group-based Laughter Yoga interventions on mental health in adults: A systematic review. *Journal of Psychiatric and Mental Health Nursing*, (8), 517-527. https://doi.org/10.1111/jpm.12491

Bressington, D., Mui, J., Yu, C., Leung, S. F., Cheung, K., Wu, C. S. T., Bollard, M. & Chien, W. T. (2019). Feasibility of a group-based laughter yoga intervention as an adjunctive treatment for residual symptoms of depression, anxiety and stress in people with depression. *Journal of Affective Disorders*, *248*, 42-51. https://doi.org/10.1016/j.jad.2019.01.030

Brown, D. J., Arnold, R., Fletcher, D., & Standage, M. (2017). Human thriving. *European Psychologist*. https://doi.org/10.1027/1016-9040/a000294

Bromley, D. B. (1986). *The case study method in psychology and related disciplines*. John Wiley.

Brutsche, M. H., Grossman, P., Müller, R. E., Wiegand, J., Baty, F., & Ruch, W. (2008). Impact of laughter on air trapping in severe chronic obstructive lung disease. *International Journal of Chronic Obstructive Pulmonary Disease*, *3*(1), 185. https://doi.org/10.3390%2Fjcm9051417

Buchowski, M. S., Majchrzak, K. M., Blomquist, K., Chen, K. Y., Byrne, D. W., & Bachorowski, J. A. (2007). Energy expenditure of genuine laughter. *International Journal of Obesity*, *31*(1), 131-137. https://doi.org/10.1038/sj.ijo.0803353

Campbell, H.J. (2022). Be part of the Laughie challenge for mental health. *thehappydemic.co.au*. Retrieved October 4, 2022, from Be part of The Laughie Challenge for mental health (thehappydemic.com.au)

Carson, J., & Hurst, R. (2022). Editorial. Remarkable lives: The next steps. *Mental Health and Social Inclusion*, *26*(3), 193-196. https://doi.org/10.1108/MHSI-08-2022-099

Caruana, F. (2017). Laughter as a neurochemical mechanism aimed at reinforcing social bonds: Integrating evidence from opioidergic activity and brain stimulation. *Journal of Neuroscience*, *37*(36), 8581-8582. https://doi.org/10.1523/JNEUROSCI.1589-17.2017

Caruana, F. (2020). Chapter 3. Emotional mirroring promotes social bonding and social

habits. In F. Caruna, & I. Testa, (Eds.), *Habits. Pragmatist approaches from cognitive*

science, neuroscience, and social theory, (pp.79-99). Cambridge University Press.

https://doi.org/10.1017/9781108682312

Carvalho Neto, D. P. D., Gonot-Schoupinsky, X. P., & Gonot-Schoupinsky, F. N. (2021).

Coffee as a naturally beneficial and sustainable ingredient in personal care products: A

systematic scoping review of the evidence. *Frontiers in Sustainability*, *2*, 697092.

https://doi.org/10.3389/frsus.2021.697092

Çelik, A. S., & Kılınç, T. (2022). The effect of laughter yoga on perceived stress, burnout, and

life satisfaction in nurses during the pandemic: A randomized controlled

trial. *Complementary Therapies in Clinical Practice*, *49*, 101637.

https://doi.org/10.1016/j.ctcp.2022.101637

Cha, M. Y., & Hong, H. S. (2015). Effect and path analysis of laughter therapy on serotonin,

depression and quality of life in middle-aged women. *Journal of Korean Academy of*

Nursing, *45*(2), 221-230. https://doi.org/10.4040/jkan.2015.45.2.221

Chadwick, D. D., & Platt, T. (2018). Investigating humor in social interaction in people with

intellectual disabilities: A systematic review of the literature. *Frontiers in Psychology*, *9,*

1745. https://doi.org/10.3389/fpsyg.2018.01745

Chang, C., Tsai, G., & Hsieh, C. J. (2013). Psychological, immunological and physiological

effects of a Laughing Qigong Program (LQP) on adolescents. *Complementary Therapies*

in Medicine, *21*(6), 660-668. https://doi.org/10.1016/j.ctim.2013.09.004

Chong, S. W., & Johnson, N. (Eds.). (2022). *Landscapes and narratives of PhD by*

publication: Demystifying students' and supervisors' perspectives. Springer Nature.

Clarry, L., & Carson, J. (2020). Positive psychology for depression: A critical review. *Mental Health Practice*, *23*(1). https://doi.org/10.7748/mhp.2019.e1312

Cosentino, S., Sessa, S., & Takanishi, A. (2016). Quantitative laughter detection, measurement, and classification—A critical survey. *IEEE Reviews in Biomedical Engineering*, *9*, 148-162. https://doi.org/10.1109/RBME.2016.2527638

Cousins, N. (1979). *Anatomy of an illness.* W.W. Norton & Company.

Crawford, S. A., & Caltabiano, N. J. (2011). Promoting emotional well-being through the use of humour. *The Journal of Positive Psychology*, *6*(3), 237-252. https://doi.org/10.1080/17439760.2011.577087

Cueva, M., Kuhnley, R., Lanier, A., & Dignan, M. (2006). Healing hearts: Laughter and learning. *Journal of Cancer Education*, *21*(2), 104-107. https://doi.org/10.1207/s15430154jce2102_14

Cuervo Pinna, M. Á., Mahtani-Chugani, V., Sanchez Correas, M. A., & Sanz Rubiales, A. (2018). The use of humor in palliative care: A systematic literature review. *American Journal of Hospice and Palliative Medicine*, *35*(10), 1342-1354. https://doi.org/10.1177/1049909118764414

Darwin, C. (1896). *The expressions of the emotions in man and animals.* Appleton and Company. (Original work published 1872). Retrieved September 4, 2022, from The Expression of the Emotions in Man and Animals - Google Books

Davila-Ross, M., & Dezecache, G. (2021). The complexity and phylogenetic continuity of laughter and smiles in hominids. *Frontiers in Psychology*, *12*, 2065.https://doi.org/10.3389/fpsyg.2021.648497

de Almeida, C. C. (2012). The methodological influence of Peirce's pragmatism on knowledge organization. *Knowledge Organization*, *39*(3), 204-215.

De Francisco, S., Torres, C., De Andrés, S., Millet, A., Ricart, M. T., Hernández-Martínez-Esparza, E., Abades, M. & Trujols, J. (2019). Effectiveness of integrative laughter therapy to reduce anxiety, improve self-esteem and increase happiness: A naturalistic study at a day hospital for addictive disorders. *International Journal of Environmental Research and Public Health*, *16*(21), 4194. https://doi.org/10.3390/ijerph16214194

de Vries,T. P.G., Henning, R. H., Hogerzeil, H. V., Fresle, D. A. (1994). Guide to good prescribing: A practical manual. World Health Organization. Retrieved December 7, 2022, from https://apps.who.int/iris/bitstream/handle/10665/59001/WHO_DAP_94.11.pdf

De Weck, M., Perriard, B., Annoni, J. M., & Britz, J. (2022). Hearing someone laugh and seeing someone yawn: Modality-specific contagion of laughter and yawning in the absence of others. *Frontiers in Psychology*, *13*. https://doi.org/10.3389%2Ffpsyg.2022.780665

Dean, R. A. K., & Gregory, D. M. (2004). Humor and laughter in palliative care: An ethnographic investigation. *Palliative & Supportive Care*, *2*(2), 139-148. https://doi.org/10.1017/S1478951504040192

DeCaro, D. S., & Brown, J. L. C. (2016). Laughter yoga, adults living with Parkinson' s disease, and caregivers: A pilot study. *Explore*, *12*(3), 196-199. https://doi-org.ezproxy.bolton.ac.uk/10.1016/j.explore.2016.02.005

Descartes, R. (1985). *The philosophical writings of Descartes: Volume 1*. Cambridge University Press. Retrieved September 18, 2022, from The Philosophical Writings of Descartes: Volume 1 - Google Books

Dewey, J. (1910). *How we think*. D.C. Heath & Co. Retrieved October 4, 2022, from [The Project Gutenberg eBook of How We Think, by John Dewey.](#)

Di Lascio, E., Gashi, S., & Santini, S. (2019, May 20). Laughter recognition using non-invasive wearable devices. In *Proceedings of the 13th EAI International Conference on Pervasive Computing Technologies for Healthcare* [Conference session]. *Pervasive Health*, 19, 262-271. https://doi.org/10.1145/3329189.3329216

Dionigi, A., & Canestrari, C. (2018). The role of laughter in cognitive-behavioral therapy: Case studies. *Discourse Studies*, *20*(3), 323-339. https://doi.org/10.1177/1461445618754426

Dunbar, R. I., Baron, R., Frangou, A., Pearce, E., Van Leeuwen, E. J., Stow, J., Partridge, G., MacDonald, I., Barra, V. & Van Vugt, M. (2011). Social laughter is correlated with an elevated pain threshold. *Proceedings of the Royal Society B: Biological Sciences*, *279*(1731), 1161-1167 https://doi.org/10.1098/rspb.2011.1373

Edwards, D. J., Dattilio, F. M., & Bromley, D. B. (2004). Developing evidence-based practice: The role of case-based research. *Professional Psychology: Research and Practice*, *35*(6), 589. https://psycnet.apa.org/doi/10.1037/0735-7028.35.6.589

Edwards, D. J. (2007). Collaborative versus adversarial stances in scientific discourse: Implications for the role of systematic case studies in the development of evidence-based practice in psychotherapy. *Pragmatic Case Studies in Psychotherapy*, *3*(1). https://doi.org/10.14713/pcsp.v3i1.892

Eguchi, E., Ohira, T., Nakano, H., Hayashi, F., Okazaki, K., Harigane, M., Funakubo, N., Takahashi, A., Takase, K., Maeda, M., Yasumura, S., Yabe, H., Kamiya, K., & Fukushima Health Management Survey Group. (2021). Association between laughter and lifestyle diseases after the Great East Japan Earthquake: The Fukushima Health Management

Survey. *International Journal of Environmental Research and Public Health*, *18*(23),

12699. https://doi.org/10.3390/ijerph182312699

Ellis, C., Adams, T. E., & Bochner, A. P. (2011). Autoethnography: An overview. *Historical

Social Research/Historische Sozialforschung*, 273-290.

Elsayed, M. M., & Nagy, E. N. (2023). Effectiveness of aerobic exercise with laughter therapy

on functional, cognitive, and psychological well-being in the elderly: A randomized

controlled clinical trial. *The Egyptian Journal of Hospital Medicine*, *90*(1), 241-247.

https://dx.doi.org/10.21608/ejhm.2023.279528

Elsevier (2023). Scopus: How Scopus works. Retrieved June 30, 2023 from: Content - How

Scopus Works - Scopus - | Elsevier solutions

Eraydin, C., & Alpar, S. E. (2022). The effect of laughter therapy on nursing students' anxiety,

satisfaction with life, and psychological well-being during the COVID-19 pandemic:

Randomized controlled study. *Advances in Integrative Medicine*, *9*(3) 173-179.

https://doi.org/10.1016/j.aimed.2022.06.006

Falanga, R., De Caroli, M. E., & Sagone, E. (2014). Humor styles, self-efficacy and prosocial

tendencies in middle adolescents. *Procedia-Social and Behavioral Sciences*, *127*, 214-

218. https://doi.org/10.1016/j.sbspro.2014.03.243

Farley, S. D. (2022). Introduction to the special issue of the scientific study of laughter:

Where we have been, current innovations, and where we might go from here. *Journal of

Nonverbal Behavior*, 1-6. https://doi.org/10.1007/s10919-022-00413-6

Ferner, R. E., & Aronson, J. K. (2013). Laughter and MIRTH (Methodical investigation of

risibility, therapeutic and harmful): Narrative synthesis. *BMJ*, *347*.

https://doi.org/10.1136/bmj.f7274

Foley, E., Matheis, R., & Schaefer, C. (2002). Effect of forced laughter on mood. *Psychological Reports*, *90*(1), 184-184. https://doi.org/10.2466/pr0.2002.90.1.184

Ford, T. E., Lappi, S. K., & Holden, C. J. (2016). Personality, humor styles and happiness: Happy people have positive humor styles. *Europe's Journal of Psychology*, *12*(3), 320. https://doi.org/10.5964%2Fejop.v12i3.1160

Forneris, T., Danish, S. J., & Fries, E. (2009). How perceptions of an intervention program affect outcomes. *Journal of Educational and Psychological Consultation*, *19*(2), 130-149. https://doi.org/10.1080/10474410902888673

Fry Jr, W. F., & Stoft, P. E. (1971). Mirth and oxygen saturation levels of peripheral blood. *Psychotherapy and Psychosomatics*, *19*(1-2), 76-84.

Fry, W. F., & Allen, M. (1975). *Make 'em laugh: Life studies of comedy writers*. Science & Behavior Books.

Fry, W. F., & Savin, W. M. (1988). Mirthful laughter and blood pressure. *Humor, 1*(1), 49-62. https://doi.org/10.1515/humr.1988.1.1.49

Fry, W. F. (2006). Humor and me. *Studies in American Humor (14)*, 105-132. Retrieved August 18, 2022, from https://www.jstor.org/stable/42573706

Fujisawa, A., Ota, A., Matsunaga, M., Li, Y., Kakizaki, M., Naito, H., & Yatsuya, H. (2018). Effect of laughter yoga on salivary cortisol and dehydroepiandrosterone among healthy university students: A randomized controlled trial. *Complementary Therapies in Clinical Practice*, *32*, 6–11. https://doi.org/10.1016/j.ctcp.2018.04.005

Fujiwara, Y., & Okamura, H. (2018). Hearing laughter improves the recovery process of the autonomic nervous system after a stress-loading task: A randomized controlled trial. *BioPsychoSocial Medicine*, *12*, 22. https://doi.org/10.1186/s13030-018-0141-0

Funakubo, N., Eguchi, E., Hayashi, R., Hirosaki, M., Shirai, K., Okazaki, K., Nakano, H., Omata, J., Imano, H., Iso, H., & Ohira, T. (2022). Effects of a laughter program on body weight and mental health among Japanese people with metabolic syndrome risk factors: A randomized controlled trial. *BMC Geriatrics*, *22*, 361. https://doi.org/10.1186/s12877-022-03038-y

Gander, F., Hofmann, J., Proyer, R. T., & Ruch, W. (2020). Character strengths–Stability, change, and relationships with well-being changes. *Applied Research in Quality of Life*, *15*(2), 349-367. https://doi.org/10.1007/s11482-018-9690-4

Gerbella, M., Pinardi, C., Di Cesare, G., Rizzolatti, G., & Caruana, F. (2021). Two neural networks for laughter: A tractography study. *Cerebral Cortex*, *31*(2), 899-916. https://doi.org/10.1093/cercor/bhaa264

Gillespie, D. C., Cadden, A. P., Lees, R., West, R. M., & Broomfield, N. M. (2016). Prevalence of pseudobulbar affect following stroke: A systematic review and meta-analysis. *Journal of Stroke and Cerebrovascular Diseases*, *25*(3), 688-694. https://doi.org/10.1016/j.jstrokecerebrovasdis.2015.11.038

Gillham, J. E., & Seligman, M. E. (1999). Footsteps on the road to a positive psychology. *Behaviour Research and Therapy*, *37*(1), S163-173.

Golde, C. (2006). Preparing stewards of the discipline. The Carnegie foundation of the advancement of teaching. Retrieved December 12, 2022, from https://files.eric.ed.gov/fulltext/ED498972.pdf

Gonot-Schoupinsky, F. N., & Garip, G. (2018). Laughter and humour interventions for well-being in older adults: A systematic review and intervention classification. *Complementary Therapies in Medicine*, *38*, 85-91. https://doi.org/10.1016/j.ctim.2018.04.009

Gonot-Schoupinsky, F. N., & Garip, G. (2019a). Prescribing laughter to increase well-being in healthy adults: An exploratory mixed methods feasibility study of the Laughie. *European Journal of Integrative Medicine*, *26*, 56-64. https://doi.org/10.1016/j.eujim.2019.01.005

Gonot-Schoupinsky, F. N., & Garip, G. (2019b). A flexible framework for planning and evaluating early-stage health interventions: FRAME-IT. *Evaluation and Program Planning*, 77, 101685. https://doi.org/10.1016/j.evalprogplan.2019.101685

Gonot-Schoupinsky, F., & Garip, G. (2019c). Differential qualitative analysis: A pragmatic qualitative methodology to support personalised healthcare research in heterogenous samples. *The Qualitative Report*. https://doi.org/10.46743/2160-3715/2019.3936

Gonot-Schoupinsky, F. N., Garip, G., & Sheffield, D. (2020a). Laughter and humour for personal development: A systematic scoping review of the evidence. *European Journal of Integrative Medicine*, 37, 101144. https://doi.org/10.1016/j.eujim.2020.101144

Gonot-Schoupinsky, F. N., Garip, G., Sheffield, D., Omar, O. M., & Arora, T. (2020b). Prescribing laughter to ameliorate mental health, sleep, and wellbeing in university students: A protocol for a feasibility study of a randomised controlled trial. *Contemporary Clinical Trials Communications,* 20, 100676. https://doi.org/10.1016/j.conctc.2020.100676

Gonot-Schoupinsky, F. N., & Gonot-Schoupinsky, X. P. (2020). Wake up and smell the coffee: An exploratory pre-pilot study assessing 'Coffea arabica' solution to cover grey hair. *Australian Journal of Herbal and Naturopathic Medicine*, *32*(3), 102-106.

Gonot-Schoupinsky F. & Garip G. (2021a) The Covid-19 pandemic as an opportunity for positive psychology to promote a wider-ranging definition of humour and laughter. In E. Vanderheiden & C.-H. Mayer (Eds.), *The Palgrave handbook of humour research*, (pp. 459-478), Palgrave Macmillan. https://doi.org/10.1007/978-3-030-78280-1

Gonot-Schoupinsky F. & Garip G. (2021b). Chapter 3. Debating the role of humour in teaching the HEALTH sciences: Humour Extremely Assistive, Laughter Thoroughly Helps! In K. Vaidya (Ed.), *Teach public health with a sense of humour*. The Curious Publishing. https://amzn.to/3yPF7O

Gonot-Schoupinsky F. & Ben-Moshe, R. (2021). Chapter 5. How to encourage leadership and LOL in your institution. In K. Vaidya (Ed.), *Lead with a sense of humour. Volume 1.* The Curious Publishing. https://amzn.to/3Pkne1s

Gonot-Schoupinsky, F. N. (2021a). *How to laugh more*. Psyche.co. Retrieved from How to laugh more | Psyche Guides

Gonot-Schoupinsky, F. N. (2021b). Insert: An exploration of the links between creativity and humor. In A. A. Berger (Ed.), *The creative process: An ethnographic analysis.* Cambridge Scholars Publishing (pp. 44-49). The Creative Process - Google Books

Gonot-Schoupinsky, F. N. (2021c: Preprint). The 'Compound Review': A transparent methodology to combine primary and secondary research in intervention reviews. *SSRN*. https://dx.doi.org/10.2139/ssrn.4044255

Gonot-Schoupinsky, F. N. (2021d). The luxury haven of Monaco, in (A.A. Berger) *Luxury and American consumer culture: A Socio-semoiotic analysis*. pp. 86–90. Cambridge Scholars Publishing.

Gonot-Schoupinsky, F. (2021e). Managing longevity in luxury markets: A perspective from Monaco. *Society*, *58*(5), 392-397. https://doi.org/10.1007/s12115-021-00606-7

Gonot-Schoupinsky, F. N. (2021f). Perspectives on coffee culture: Arcimboldo's bean. *The Journal of Brief Ideas*. https://doi.org/10.5281/zenodo.5168485

Gonot-Schoupinsky, F. N. (2021g). Perspectives on coffee culture: Ge'ez conundrums. *The Journal of Brief Ideas*. https://doi.org/10.5281/zenodo.5502215

Gonot-Schoupinsky, F., Garip, G., & Sheffield, D. (2022a). The engage-disengage model as an inclusive model for the promotion of healthy and successful aging in the oldest-old. *Activities, Adaptation & Aging*, 46(2), 159-181. https://doi.org/10.1080/01924788.2021.1970892

Gonot-Schoupinsky, F. N., Garip, G., & Sheffield, D. (2022b). Facilitating the planning and evaluation of narrative intervention reviews: Systematic transparency assessment in intervention reviews (STAIR). *Evaluation and Program Planning*, 91, 102043. https://doi.org/10.1016/j.evalprogplan.2021.102043

Gonot-Schoupinsky, F. N. (2022). Pragmatic autoethnography: Thoughts on why it may be needed. *The Journal of Brief Ideas*. https://doi.org/10.5281/zenodo.7064070

Gonot-Schoupinsky, F., Weeks, M., Carson, J. (2023). "You can end up in a happy place" (Voyce): A role for positive autoethnography. *Mental Health and Social Inclusion,* Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/MHSI-02-2023-0021

Goodheart, A.G. (1994). *Laughter therapy. How to laugh about everything in your life that isn't really funny*. Less Stress Press.

Grant, A.J. (2023). Crafting and recognising good enough autoethnograpies: A practical guide and checklist. *Mental Health and Social Inclusion,* Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/MHSI-01-2023-0009

Greene, C. M., Morgan, J. C., Traywick, L. S., & Mingo, C. A. (2017). Evaluation of a laughter-based exercise program on health and self-efficacy for exercise. *The Gerontologist*, *57*(6), 1051-1061.https://doi.org/10.1093/geront/gnw105

Guha, M., & Carson, J. (2014). Positive psychology, utilitarianism and the pursuit of happiness. *Journal of Mental Health*, *23*(4), 159-161. https://doi.org/10.3109/09638237.2014.928404

Hall, G. S., & Alliń, A. (1897). The psychology of tickling, laughing, and the comic. *The American Journal of Psychology*, *9*(1), 1-41.

Hall, J. (2021). Humor and long-term romantic relationships. In J. Hall (Ed.), *The social psychology of humor* (pp. 74-91). Routledge. https://doi.org/10.4324/9781003042440

Hampson, T., & McKinley, J. (2023). Problems posing as solutions: Criticising pragmatism as a paradigm for mixed research. *Research in Education*, 00345237231160085. https://doi.org/10.1177/00345237231160085

Harrington, A. (2006). The many meanings of the placebo effect: Where they came from, why they matter. *Biosocieties*, *1*(2), 181-193. https://doi.org/10.1017/S1745855206050216

Hatchard, A., & Worth, P. (2021). No laughing matter: Qualitative study of the impact of laughter yoga suggests stress inoculation. *European Journal of Applied Positive Psychology*, *5*(2), 2397-7116.

Haviva, C., & Starzyk, K. B. (2022). Zero to 60 laughs per hour: Observed laughter, physical health, personality, and well-being in people aged 67 to 95: An exploratory study. *Journal of Nonverbal Behavior*, *46*(4), 363-381. https://doi.org/10.1007/s10919-022-00407-4

Hayashi, T., & Murakami, K. (2009). The effects of laughter on post-prandial glucose levels and gene expression in type 2 diabetic patients. *Life Sciences*, *85*(5-6), 185-187. https://doi.org/10.1016/j.lfs.2009.05.002

Hayashi, K., Kawachi, I., Ohira, T., Kondo, K., Shirai, K., & Kondo, N. (2015). Laughter and subjective health among community-dwelling older people in Japan: Cross-sectional analysis of the Japan gerontological evaluation study cohort data. *The Journal of Nervous and Mental Disease*, *203*(12), 934-942. https://doi.org/10.1097/NMD.0000000000000399

Hayashi, K., Kawachi, I., Ohira, T., Kondo, K., Shirai, K., & Kondo, N. (2016). Laughter is the best medicine? A cross-sectional study of cardiovascular disease among older Japanese adults. *Journal of Epidemiology*, *26*(10), 546-552. https://doi.org/10.2188/jea.JE20150196

Heintz, S., Ruch, W., Aykan, S., Brdar, I., Brzozowska, D., Carretero-Dios, H., Chen, H-C., Chłopicki, W., Choil, I., Dionigi, A., Ďurka, R., Ford, T.E., Güsewell, A., Isler, R.B., Ivanova, A., Laineste, L., Lajčiaková, P., Lau, C., Lee, M. & Wong, P. S. (2020). Benevolent and corrective humor, life satisfaction, and broad humor dimensions: Extending the nomological network of the BenCor across 25 countries. *Journal of Happiness Studies*, *21*(7), 2473-2492. https://doi.org/10.1007/s10902-019-00185-9

Heissel, A., Heinen, D., Brokmeier, L. L., Skarabis, N., Kangas, M., Vancampfort, D., Stubbs, B., Firth, J., Ward, P. B., Rosenbaum, S., Hallgren, M. & Schuch, F. (2023). Exercise as medicine for depressive symptoms? A systematic review and meta-analysis with meta-regression. *British Journal of Sports Medicine*. http://dx.doi.org/10.1136/bjsports-2022-106282

Hicks, D., Wouters, P., Waltman, L., De Rijcke, S., & Rafols, I. (2015). Bibliometrics: The Leiden Manifesto for research metrics. *Nature*, *520*(7548), 429-431. https://doi.org/10.1038/520429a

Hirosaki, M., Ohira, T., Shirai, K., Kondo, N., Aida, J., Yamamoto, T., Takeuchi, K., & Kondo, K. (2021). Association between frequency of laughter and oral health among community-dwelling older adults: A population-based cross-sectional study in Japan. *Quality of Life Research*, *30*(6), 1561-1569. https://doi.org/10.1007/s11136-020-02752-7

Hofmann, J., Platt, T., & Ruch, W. (2017). Laughter and smiling in 16 positive

emotions. *IEEE Transactions on Affective Computing*, *8*(4), 495-507.

https://doi.org/10.1109/TAFFC.2017.2737000

Holden, C. (1981). Cousins' account of self-cure rapped. *Science*, *214*(4523), 892-892.

https://doi.org/10.1126/science.7029711

Holland, N. N. (2007). Tickled rats and human laughter. *Neuropsychoanalysis*, *9*(1), 41-57.

https://doi.org/10.1080/15294145.2007.10773541

Huppert, F. A., & So, T. T. (2013). Flourishing across Europe: Application of a new

conceptual framework for defining well-being. *Social Indicators Research*, *110*(3), 837-

861.https://doi.org/10.1007/s11205-011-9966-7

Inoue, A., Hiratsuka, Y., Takesue, A., Aida, J., Kondo, K., & Murakami, A. (2022).

Association between visual status and the frequency of laughter in older Japanese

individuals: The JAGES cross-sectional study. *BMJ Open Ophthalmology*, *7*(1), e000908.

https://doi.org/10.1136/bmjophth-2021-000908

Jahanimoghadam, F., Shojaeepoor, R., Aftabi, R., Shahravan, A., Horri, A., & Jookar, S.

(2023). Impact of laughter therapy on anxiety and pain in pediatric dentistry: A double-

blinded randomized, controlled clinical trial. *Pesquisa Brasileira em Odontopediatria e

Clínica Integrada*, *22*, e210160.https://doi.org/10.1590/pboci.2022.069

JAMA (1928). Laughter and health. *Journal of the American Medical

Association, 90*(10):768–769.

James, W. (1890). *The principles of psychology, volume II*. Henry Holt and Company.

Retrieved October 1, 2022, from The Principles of Psychology - Google Books

James, W. (1914). *Habit*. Henry Holt and Company.

James, W. (1948) *Psychology.* The World Publishing Press. (Original work published 1890).

Retrieved September 25, 2022, from https://archive.org/details/in.ernet.dli.2015.752

James, W. (1981). *Pragmatism.* Hackett Publishing Company. (Original work published

1907). Retrieved September 29, 2022, from

https://archive.org/details/pragmatism0000jame_g7r4

Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research

paradigm whose time has come. *Educational Researcher*, *33*(7), 14-26.

https://doi.org/10.3102%2F0013189X033007014

Joubert, L. (1980). *Treatise on laughter* (Traité du ris, translated by de Rocher, G. D.).

(Original work published 1579). The University of Alabama Press.

Kataria, M. (1999). *Laugh for no reason*. Madhuri International.

Kataria, M., Ben-Moshe, R. & Gonot-Schoupinsky, F. (2023). Laughter and mental health: A

case study of Dr. Madan Kataria. *Mental Health and Social Inclusion,* Vol. ahead-of-print

No. ahead-of-print. https://doi.org/10.1108/MHSI-03-2023-0032

Kaushal, N., & Rhodes, R. E. (2015). Exercise habit formation in new gym members: A

longitudinal study. *Journal of Behavioral Medicine*, *38*, 652-663.

https://doi.org/10.1007/s10865-015-9640-7

Kaushik, V., & Walsh, C. A. (2019). Pragmatism as a research paradigm and its implications

for social work research. *Social Sciences*, *8*(9), 255.

https://doi.org/10.3390/socsci8090255

Kelly, K., Posternak, M., & Jonathan, E. A. (2022). Toward achieving optimal response:

Understanding and managing antidepressant side effects. *Dialogues in Clinical

Neuroscience*. https://doi.org/10.31887/DCNS.2008.10.4/kkelly

Kimata, H. (2007). Viewing humorous films improves night-time wakening in children with

    atopic dermatitis. *Indian Pediatrics*, *44*(4), 281.

Knight, N. K. (2013). Evaluating experience in funny ways: How friends' bond through

    conversational hum. *Text & Talk*, *33*(4-5), 553-574.https://doi.org/10.1515/text-2013-0025

Ko, H. J., & Youn, C. H. (2011). Effects of laughter therapy on depression, cognition and

    sleep among the community-dwelling elderly. *Geriatrics & Gerontology*

    International, *11*(3), 267-274. https://doi.org/10.1111/j.1447-0594.2010.00680.x

Ko, Y., Lee, E. S., & Park, S. (2022). Effects of laughter therapy on the stress response of

    married immigrant women in South Korea: A randomized controlled trial. *Health Care for*

    Women International, *43*(5), 518-531. https://doi.org/10.1080/07399332.2021.1963968

Kramer, C. K., & Leitao, C. B. (2023). Laughter as medicine: A systematic review and meta-

    analysis of interventional studies evaluating the impact of spontaneous laughter on

    cortisol levels. *PLoS ONE*, *18*(5), e0286260.

    https://doi.org/10.1371/journal.pone.0286260

Kugler, L., Kuhbandner, C., Gerum, S., Hierl, C., Münster, T., Offereins, B., & Lutterbach, L.

    S. (2021). Evaluation of a humor training for patients with chronic pain: A randomized

    clinical trial. *Journal of Pain Research*, *14*, 3121-3133.

    https://doi.org/10.2147/JPR.S313868

Kuru Alici, N. & Dönmez, A. A. (2020). A systematic review of the effect of laughter yoga on

    physical function and psychosocial outcomes in older adults. *Complementary Therapies*

    in Clinical Practice, *41*, 101252. https://doi.org/10.1016/j.ctcp.2020.101252

Lapierre, S. S., Baker, B. D., & Tanaka, H. (2019). Effects of mirthful laughter on pain

    tolerance: A randomized controlled investigation. *Journal of Bodywork & Movement*

    Therapies, *23*(4), 733-738. https://doi.org/10.1016/j.jbmt.2019.04.005

Lash, B. N. (2022). Managing stigma through laughter: Disability stigma and humor as a stigma management communication strategy. *Communication Studies*, *73*(4), 412-424. https://doi.org/10.1080/10510974.2022.2102668

Lavan, N., Scott, S. K., & McGettigan, C. (2016). Laugh like you mean it: Authenticity modulates acoustic, physiological and perceptual properties of laughter. *Journal of Nonverbal Behavior*, *40*(2), 133-149. https://doi.org/10.1007/s10919-015-0222-8

Law, M. M., Broadbent, E. A., & Sollers, J. J. (2018). A comparison of the cardiovascular effects of simulated and spontaneous laughter. *Complementary Therapies in Medicine*, *37*, 103-109. https://doi.org/10.1016/j.ctim.2018.02.005

Linge-Dahl, L. M., Heintz, S., Ruch, W., & Radbruch, L. (2018). Humor assessment and interventions in palliative care: A systematic review. *Frontiers in Psychology*, 9, 890. https://doi.org/10.3389/fpsyg.2018.00890

Lopes-Júnior, L. C., Bomfim, E., Olson, K., Neves, E. T., Silveira, D. S. C., Nunes, M. D. R., Nascimento, L.C., Pereira-da-Silva, G., & Lima, R. A. G. (2020). Effectiveness of hospital clowns for symptom management in paediatrics: Systematic review of randomised and non-randomised controlled trials. *BMJ, 371*, m4290. https://doi.org/10.1136/bmj.m4290

Louie, D., Brook, K., & Frates, E. (2014). The laughter prescription: A tool for lifestyle medicine. *American Journal of Lifestyle Medicine*, *10*(4), 262-267. https://doi.org/10.1177/1559827614550279

Lounds, J., Oakar, M., Knecht, K., Moran, M., Gibney, M., & Pressley, M. (2002). Journal editors' views on the criteria a paper must meet to be publishable. *Contemporary Educational Psychology*, *27*(2), 338-347. https://doi.org/10.1006/ceps.2001.1092

Macfarlane, J. (2021). Positive psychology and the I-FLOW model: A new dynamic model of homeostatic wellbeing for mental health nursing. *British Journal of Mental Health Nursing*, *10*(2), 1-17. https://doi.org/10.12968/bjmh.2021.0006

Macfarlane, J., & Carson, J. (2023). Humour. In *Positive Psychology for healthcare professionals: A toolkit for improving wellbeing* (pp. 71-77). Emerald Publishing Limited. https://doi.org/10.1108/978-1-80455-956-720231009

Makin, P., Allen, R., Carson, J., Bush, S., & Merrifield, B. (2022). Light at the end of the bottle: Flourishing in people recovering from alcohol problems. *Journal of Substance Use*, *27*(1), 107-114. https://doi.org/10.1080/14659891.2021.1905092

Manninen, S., Tuominen, L., Dunbar, R. I., Karjalainen, T., Hirvonen, J., Arponen, E., Hari, R., Jääskeläinen, I.P., Sams, M. & Nummenmaa, L. (2017). Social laughter triggers endogenous opioid release in humans. *Journal of Neuroscience*, *37*(25), 6125-6131. https://doi.org/10.1523/JNEUROSCI.0688-16.2017

Martin, R. A., & Kuiper, N. A. (1999). Daily occurrence of laughter: Relationships with age, gender, and Type A personality. *Humor*, 355-384.

Martin, R. A. (2001). Humor, laughter, and physical health: Methodological issues and research findings. *Psychological Bulletin*, *127*(4), 504-519. https://doi.org/10.1037/0033-2909.127.4.504

Martin, R. A., Puhlik-Doris, P., Larsen, G., Gray, J., & Weir, K. (2003). Individual differences in uses of humor and their relation to psychological well-being: Development of the Humor Styles Questionnaire. *Journal of Research in Personality*, *37*(1), 48-75. https://doi.org/10.1016/S0092-6566(02)00534-2

Martin, R. A., & Ford, T. (2006). *The psychology of humor*. Burlington, MA: Elsevier.

Martin, R., & Kuiper, N. A. (2016). Three decades investigating humor and laughter: An interview with Professor Rod Martin. *Europe's Journal of Psychology*, *12*(3), 498. https://doi.org/10.5964%2Fejop.v12i3.1119

Matarazzo, J. D. (1980). Behavioral health and behavioral medicine: Frontiers for a new Health Psychology. *American Psychologist*, *35*(9), 807.

Mathieu, S. I. (2008). Happiness and humor group promotes life satisfaction for senior center participants. *Activities, Adaptation & Aging*, *32*(2), 134-148. https://doi.org/10.1080/01924780802143089

Matsuzaki, T., Nakajima, A., Ishigami, S., Tanno, M., & Yoshino, S. (2006). Mirthful laughter differentially affects serum pro-and anti-inflammatory cytokine levels depending on the level of disease activity in patients with rheumatoid arthritis. *Rheumatology*, *45*(2), 182-186. https://doi.org/10.1093/rheumatology/kei081

McGhee, P. (2010). *Humor as survival training for a stressed-out world: The 7 humor habits program.* Author House.

McIlveen, P. (2008). Autoethnography as a method for reflexive research and practice in vocational psychology. *Australian Journal of Career Development*, *17*(2), 13-20. https://doi.org/10.1177/103841620801700204

Meier, M., Wirz, L., Dickinson, P., & Pruessner, J. C. (2021). Laughter yoga reduces the cortisol response to acute stress in healthy individuals. *Stress*, *24*(1), 44-52. https://doi.org/10.1080/10253890.2020.1766018

Miles, C., Tait, E., Schure, M. B., & Hollis, M. (2016). Effect of laughter yoga on psychological well-being and physiological measures. *Advances in Mind-Body Medicine*, *30*(1), 12-20.

Miller, M., & Fry, W. F. (2009). The effect of mirthful laughter on the human cardiovascular system. *Medical Hypotheses*, *73*(5), 636-639. https://doi.org/10.1016%2Fj.mehy.2009.02.044

Miller, A., Pratt, H., & Schiffer, R. B. (2011). Pseudobulbar affect: The spectrum of clinical presentations, etiologies and treatments. *Expert Review of Neurotherapeutics*, *11*(7), 1077-1088. https://doi.org/10.1586/ern.11.68

Miller, M. (2019). Emotional rescue: The heart-brain connection. In *Cerebrum: The Dana Forum on Brain Science*. Dana Foundation. Retrieved December 5, 2022, from Emotional Rescue: The Heart-Brain Connection (nih.gov)

Milner Davis, J. (2020). Forward in Derrin, D., & Burrows, H. (Eds.). *The Palgrave handbook of humour, history, and methodology*. Palgrave Macmillan. https://doi.org/10.1007/978-3-030-56646-3

Mobbs, D., Greicius, M. D., Abdel-Azim, E., Menon, V., & Reiss, A. L. (2003). Humor modulates the mesolimbic reward centers. *Neuron*, *40*(5), 1041-1048. https://doi.org/10.1016/S0896-6273(03)00751-7

Moher, D., Shamseer, L., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., Shekelle, P., Stewart, L. A. & PRISMA-P Group (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic Reviews*, *4*(1), 1-9. https://doi.org/10.1186/2046-4053-4-1

Mora-Ripoll, R. (2010). The therapeutic value of laughter in medicine. *Alternative Therapies in Health & Medicine*, *16*(6), 56-64.

Mora-Ripoll, R. (2011). Potential health benefits of simulated laughter: A narrative review of the literature and recommendations for future research. *Complementary Therapies in Medicine*, *19*(3), 170-177. https://doi.10.1016/j.ctim.2011.05.003

Mora-Ripoll, R. (2013). Laughter techniques for therapeutic use in medicine. *OA Alternative Medicine*, *1*(3), 25.

Mora-Ripoll, R. (2017). Simulated laughter techniques for therapeutic use in mental health. *Journal of Psychology & Clinical Psychiatry*, *8*(2), 00479. https://doi.10.15406/jpcpy.2017.08.00479

Morishima, T., Miyashiro, I., Inoue, N., Kitasaka, M., Akazawa, T., Higeno, A., Idota, A., Sato, A., Ohira, T., Sakon, M., & Matsuura, N. (2019). Effects of laughter therapy on quality of life in patients with cancer: An open-label, randomized controlled trial. *PLoS ONE*, *14*(6), e0219065. https://doi.org/10.1371/journal.pone.0219065

Morrison, M. K., Ben-Moshe, R. & Gonot-Schoupinsky, F. (2023). Humor and mental health: A case study of Mary Kay Morrison. *Mental Health and Social Inclusion,* Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/MHSI-03-2023-0036

Morse, D. F., Sandhu, S., Mulligan, K., Tierney, S., Polley, M., Giurca, B. C., Slade, S., Dias, S., Kamal, R.M., Wells, L., Wang, H., Zhao, B., De Figueiredo, C.E.M., Joost Meijs, J, Nam, H.K., Lee, K.H., Wallace, C., Elliott, M., Mendive, (...) Husk, K. (2022). Global developments in social prescribing. *BMJ Global Health*, *7*(5), e008524. https://doi.org/10.1136/bmjgh-2022-008524

Mulcaster, R. (1888). *Positions.* Longmans, Green.

Mueller, M. A., Cai, C. Q., Lima, C., Jin, G., Turek, A., & Scott, S. K. (2023; Preprint). Development of the Laughter Production and Perception Questionnaire (LPPQ): A novel tool to investigate human laughter behaviour. https://doi.org/10.31219/osf.io/9rksj

Munn, Z., Peters, M. D., Stern, C., Tufanaru, C., McArthur, A., & Aromataris, E. (2018). Systematic review or scoping review? Guidance for authors when choosing between a

systematic or scoping review approach. *BMC Medical Research Methodology*, *18*, 143.

https://doi.org/10.1186/s12874-018-0611-x

Nabizadeh, F., Nikfarjam, M., Azami, M., Sharifkazemi, H., & Sodeifian, F. (2022).

Pseudobulbar affect in neurodegenerative diseases: A systematic review and meta-

analysis. *Journal of Clinical Neuroscience*, *100*, 100-107.

https://doi.org/10.1016/j.jocn.2022.04.009

Navarro, J., del Moral, R., & Marijuán, P. C. (2016). Laughing bonds: A multidisciplinary

inquiry into the social information processes of human laughter. *Kybernetes, 45*(8), 1292-

1307. https://doi.org/10.1108/K-02-2016-0026

Navarro, J., Fernandez Rosell, M., Castellanos, A., Del Moral, R., Lahoz-Beltra, R., &

Marijuán, P. C. (2019). Plausibility of a neural network classifier-based neuroprosthesis

for depression detection via laughter records. *Frontiers in Neuroscience*, *13*, 267.

https://doi.org/10.3389/fnins.2019.00267

Neal, M. & Gonot-Schoupinsky, F. (2022). Laughter and mental health: A case study of Merv

Neal. *Mental Health and Social Inclusion,* Vol. ahead-of-print No. ahead-of-

print. https://doi.org/10.1108/MHSI-06-2022-0039

Neal, M. (2023a). *How to create a Laughie by Merv Neal.* [Video]. YouTube.
https://youtu.be/ANGA8jnxlnQ

Neal, M. (2023b). *How to laugh with your Laughie by Merv Neal.* [Video]. YouTube.
https://youtu.be/AeLy2FaEZec

Noureldein, M. H., & Eid, A. A. (2018). Homeostatic effect of laughter on diabetic

cardiovascular complications: The myth turned to fact. *Diabetes Research and Clinical*

Practice, *135*, 111-119. https://doi.org/10.1016/j.diabres.2017.11.014

Nygaard, L. P., & Solli, K. (2020). *Strategies for writing a thesis by publication in the social sciences and humanities*. Routledge.

Ogden, J. (2018). *Health Psychology, Fifth Edition*. McGraw Hill.

Ogilvie, L., & Carson, J. (2023). The value of stories. In *Stories of Addiction Recovery: The G-CHIME Model* (pp. 1-6). Emerald Publishing Limited.

Oliveira, R., & Arriaga, P. (2022). A systematic review of the effects of laughter on blood pressure and heart rate variability. *Humour*, *35*(2) 135-167. https://doi.org/10.1515/humor-2021-0111

Onerup, A., Arvidsson, D., Blomqvist, Å., Daxberg, E. L., Jivegård, L., Jonsdottir, I. H., Luqvist, S., Mellén, A., Persson, J., Sjögren, P., Svanberg, T. & Borjesson, M. (2019). Physical activity on prescription in accordance with the Swedish model increases physical activity: A systematic review. *British Journal of Sports Medicine*, *53*(6), 383-388. https://doi.org/10.1136/bjsports-2018-099598

Özer, Z., & Ateş, S. (2021). Effects of laughter yoga on hemodialysis patients' plasma-beta endorphin levels, pain levels and sleep quality: A randomized controlled trial. *Complementary Therapies in Clinical Practice*, *43*, 101382. https://doi.org/10.1016/j.ctcp.2021.101382

Palagi, E., Caruana, F., & de Waal, F. B. (2022). The naturalistic approach to laughter in humans and other animals: Towards a unified theory. *Philosophical Transactions of the Royal Society B*, *377*(1863), 20210175. https://doi.org/10.1098/rstb.2021.0175

Panksepp, J., & Burgdorf, J. (2003). "Laughing" rats and the evolutionary antecedents of human joy? *Physiology & Behavior*, *79*(3), 533-547. https://doi.org/10.1016/S0031-9384(03)00159-8

Parse, R. R. (1994). Laughing and health: A study using Parse's research method. *Nursing Science Quarterly*, *7*(2), 55-64. https://doi.org/10.1177/089431849400700205

Peirce, C.S. (1997). *Pragmatism as a principal and a method of right thinking*. State University of New York Press.

Persson, G., Brorsson, A., Ekvall Hansson, E., Troein, M., & Strandberg, E. L. (2013). Physical activity on prescription (PAP) from the general practitioner's perspective–A qualitative study. *BMC Family Practice*, *14*(1), 1-8. https://doi.org/10.1186/1471-2296-14-128

Peter, L. J. & Dana, B. (1982). *The laughter prescription*. Dana/Corwin Publications.

Peters, M. D., Godfrey, C. M., Khalil, H., McInerney, P., Parker, D., & Soares, C. B. (2015). Guidance for conducting systematic scoping reviews. *International Journal of Evidence-Based Healthcare*, *13*(3), 141-146. https://doi.org/10.1097/XEB.0000000000000050

Peterson, C., & Seligman, M. E. (2004). *Character strengths and virtues: A handbook and classification* (Vol. 1). Oxford University Press.

Pettigrew, R. I., & Cooke, J. P. (2022). At the nexus of science, engineering, and medicine: Pasteur's quadrant reconsidered. *PNAS Nexus*, *1*(3), 1-8. https://doi.org/10.1093/pnasnexus/pgac092

Pfundmair, M. (2022). Finding humor in hormones: Oxytocin promotes laughing and smiling. *Biological Psychology*, 108377. https://doi.org/10.1016/j.biopsycho.2022.108377

Platt, T., Ruch, W., & Proyer, R. T. (2010). A lifetime of fear of being laughed at. *Zeitschrift für Gerontologie und Geriatrie*, *43*(1), 36-41. https://doi.org/10.1007/s00391-009-0083-z

Platt, T., Hofmann, J., Ruch, W., & Proyer, R. T. (2013). Duchenne display responses towards sixteen enjoyable emotions: Individual differences between no fear and fear of

being laughed at. *Motivation and Emotion*, *37*, 776-786. https://doi.org/10.1007/s11031-013-9342-9

Platt, T., Proyer, R. T., Hofmann, J., & Ventis, W. L. (2016). Gelotophobia in practice and the implications of ignoring it. *The European Journal of Humour Research*, *4*(2), 46-56. https://dx.doi.org/10.7592/EJHR2016.4.2.platt

Plessen, C. Y., Franken, F. R., Ster, C., Schmid, R. R., Wolfmayr, C., Mayer, A. M., Sobisch, M., Kathofer, M., Rattner, K., Kotlya, E., Maierwieser, R. J. & Tran, U. S. (2020). Humor styles and personality: A systematic review and meta-analysis on the relations between humor styles and the Big Five personality traits. *Personality and Individual Differences*, *154*, 109676. https://doi.org/10.1016/j.paid.2019.109676

Polley, M., Bertotti, M., Kimberlee, R., Pilkington, K., and Refsum, C (2017). A review of the evidence assessing impact of social prescribing on healthcare demand and cost implications. University of Westminster. Microsoft Word - Polley et al Evidence summary of SP FINAL V3.docx (westminster.ac.uk)

Potter, P. (1995). *Hippocrates Volume VIII*. Harvard University Press. Retrieved August 19, 2022, from Hippocrates - Google Books

Provine, R. R., & Fischer, K. R. (1989). Laughing, smiling, and talking: Relation to sleeping and social context in humans. *Ethology*, *83*(4), 295-305.

Provine, R. R. (1993). Laughter punctuates speech: Linguistic, social and gender contexts of laughter. *Ethology*, *95*(4), 291-298.

Provine, R. R. (1996). Laughter. *American Scientist*, *84*(1), 38-45.

Provine, R. R. (2000). *Laughter: A scientific investigation*. Penguin.

Rodrigues, F., Teixeira, D. S., Neiva, H. P., Cid, L., & Monteiro, D. (2020). The bright and dark sides of motivation as predictors of enjoyment, intention, and exercise persistence. *Scandinavian Journal of Medicine & Science in Sports*, *30*(4), 787-800. https://doi.org/10.1111/sms.13617

Rolls, G. W. P. (2015). *Classic case studies in psychology*. Routledge.

Ross, P. T., & Bibler Zaidi, N. L. (2019). Limited by our limitations. *Perspectives on Medical Education*, *8*, 261-264. https://doi.org/10.1007/s40037-019-00530-x

Ruch, W. (1993). Exhilaration and humor. In M. Lewis & J. M. Haviland (Eds.) *The handbook of emotion* (pp. 605-616). Guilford Publications.

Ruch, W., & Ekman, P. (2001). The expressive pattern of laughter. In A. Kaszniak (Ed.) *Emotions, qualia, and consciousness* (pp. 426-443). World Scientific. https://doi.org/10.1142/9789812810687_0033

Ruch, W. (2008). Psychology of humor. In V. Raskin (Ed.) *The primer of humor research* (pp. 17-100). Mouton de Gruyter. https://doi.org/10.1515/9783110198492

Ruch, W., & Proyer, R. T. (2008). Who is gelotophobic? Assessment criteria for the fear of being laughed at. *Swiss Journal of Psychology/Schweizerische Zeitschrift für Psychologie/Revue Suisse de Psychologie*, *67*(1), 19. https://psycnet.apa.org/doi/10.1024/1421-0185.67.1.19

Ruch, W., & Proyer, R. T. (2009). Extending the study of gelotophobia: On gelotophiles and katagelasticists. *Humor, 22*(1/2), 183–212. https://doi.org/10.1515/HUMR.2009.009

Ruch, W., Proyer, R. T., & Weber, M. (2010). Humor as a character strength among the elderly. *Zeitschrift für Gerontologie und Geriatrie, 43*(1), 13-18. https://doi.org/10.1007/s00391-009-0090-0

Ruch, W., Hofmann, J., Platt, T., & Proyer, R. (2014). The state-of-the art in gelotophobia research: A review and some theoretical extensions. *Humor*, *27*(1), 23-45. https://doi.org/10..1515/humor-2013-0046

Ruch, W., Heintz, S., Platt, T., Wagner, L., & Proyer, R. T. (2018a). Broadening humor: Comic styles differentially tap into temperament, character, and ability. *Frontiers in Psychology*, *9*, 6. https://doi.org/10.3389/fpsyg.2018.00006

Ruch, W. F., Hofmann, J., Rusch, S., & Stolz, H. (2018b). Training the sense of humor with the 7 Humor Habits Program and satisfaction with life. *Humor*, *31*(2), 287-309.https://doi.org/10.1515/humor-2017-0099

Ruch, W., Platt, T., Proyer, R. T., & Chen, H. C. (2019). Humor and laughter, playfulness and cheerfulness: Upsides and downsides to a life of lightness. *Frontiers in Psychology*, *10*, 730. https://doi.org/10.3389/fpsyg.2019.00730

Sakurada, K., Konta, T., Watanabe, M., Ishizawa, K., Ueno, Y., Yamashita, H., & Kayama, T. (2020). Associations of frequency of laughter with risk of all-cause mortality and cardiovascular disease incidence in a general population: Findings from the Yamagata study. *Journal of Epidemiology*, *30*(4), 188-193. https://doi.org/10.2188/jea.JE20180249

Salunke, S., & Shah, M. R. (2019). Effectiveness of laughter therapy in smartphone addicts on insomnia, lung functions and flexibility. *International Journal of Health Sciences and Research*, *9*, 76-83.

Samson, A. C. (2013). Humor (lessness) elucidated–Sense of humor in individuals with autism spectrum disorders: Review and introduction. *Humor*, *26*(3), 393-409. https://doi.org/10.1515/humor-2013-0027

Sarink, F. S., & García-Montes, J. M. (2023). Humor interventions in psychotherapy and their effect on levels of depression and anxiety in adult clients, a systematic review. *Frontiers in Psychiatry*, *13*, 2937. https://doi.org/10.3389/fpsyt.2022.1049476

Sathicq, L. (2022). Beaudesert laughter yoga leader joins one-minute 'laughie' challenge'. *Beaudesert Times*. Retrieved from: Beaudesert laughter yoga leader joins one-minute "laughie" challenge | Beaudesert Times | Beaudesert, QLD

Savage, B. M., Lujan, H. L., Thipparthi, R. R., & DiCarlo, S. E. (2017). Humor, laughter, learning, and health: A brief review. *Advances in Physiology Education*. https://doi.org/10.1152/advan.00030.2017

Schardt, C., Adams, M. B., Owens, T., Keitz, S., & Fontelo, P. (2007). Utilization of the PICO framework to improve searching PubMed for clinical questions. *BMC Medical Informatics and Decision Making*, *7*, 1-6. https://doi.org/10.1186/1472-6947-7-16.

Schneider, M., Voracek, M., & Tran, U. S. (2018). "A joke a day keeps the doctor away?" Meta-analytical evidence of differential associations of habitual humor styles with mental health. *Scandinavian Journal of Psychology*, *59*(3), 289-300. https://doi.org/10.1111/sjop.12432

Schulz, K. F., Altman, D. G., & Moher, D. (2010). CONSORT 2010 statement: Updated guidelines for reporting parallel group randomised trials. *Journal of Pharmacology and Pharmacotherapeutics*, *1*(2), 100-107. https://doi.org/10.4103/0976-500X.72352

Scott, S. K., Lavan, N., Chen, S., & McGettigan, C. (2014). The social life of laughter. *Trends in Cognitive Sciences*, *18*(12), 618-620. https://doi.org/10.1016/j.tics.2014.09.002

Seligman, M. E. P. (2018). *The hope circuit: A psychologist's journey from helplessness to optimism*. Nicholas Brealey Publishing. https://doi.org/10.1080/03069885.2019.1612034

Sharma, E., Sharma, S., Gonot-Schoupinsky, X. P., & Gonot-Schoupinsky, F. N. (2022). The impact of a laughter prescription on creativity, well-being, affect, and academic efficacy in university students. *The Journal of Creative Behavior, 56*(3), 344-361. https://doi.org/10.1002/jocb.533

Shea, B. J., Bouter, L. M., Peterson, J., Boers, M., Andersson, N., Ortiz, Z., Ramsay, T., Bai, A. Shukla, V. K. & Grimshaw, J. M. (2007). External validation of a measurement tool to assess systematic reviews (AMSTAR). *PLoS ONE, 2*(12), e1350. https://doi.org/10.1371/journal.pone.0001350

Shiffman, R. (2020). Laughter may be effective medicine. The New York Times. Retrieved December 14, 2022, from Laughter May Be Effective Medicine for These Trying Times - The New York Times (nytimes.com)

Short, C. A., & Vital, P. (2021). A systematic review of social maintenance behavior outcomes of interactive social interventions for children with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities, 36*(2), 108-120. https://doi.org/10.1177/1088357621989324

Stiwi, K., & Rosendahl, J. (2022). Efficacy of laughter-inducing interventions in patients with somatic or mental health problems: A systematic review and meta-analysis of randomized-controlled trials. *Complementary Therapies in Clinical Practice, 47*, 101552. https://doi.org/10.1016/j.ctcp.2022.101552

Strean, W. B. (2009). Laughter prescription. *Canadian Family Physician, 55*(10), 965-967.

Stuart, A., Stevenson, C., Koschate, M., Cohen, J., & Levine, M. (2022). 'Oh no, not a group!' The factors that lonely or isolated people report as barriers to joining groups for health and well-being. *British Journal of Health Psychology, 27*(1), 179-193. https://doi.org/10.1111/bjhp.12536

Svebak, S., Martin, R. A., & Holmen, J. (2004). The prevalence of sense of humor in a large, unselected county population in Norway: Relations with age, sex, and some health indicators. *Humor, 17*(2), 121-134. https://doi.org/10.1515/humr.2004.001

Svebak, S., Romundstad, S., & Holmen, J. (2010). A 7-year prospective study of sense of humor and mortality in an adult county population: The HUNT-2 study. *The International Journal of Psychiatry in Medicine*, *40*(2), 125-146. https://doi.org/10.2190/PM.40.2.a

Swales, J. M. (1990). Genre analysis: English in academic and research settings. Cambridge University Press.

Tagalidou, N., Distlberger, E., Loderer, V., & Laireiter, A. R. (2019). Efficacy and feasibility of a humor training for people suffering from depression, anxiety, and adjustment disorder: A randomized controlled trial. *BMC Psychiatry*, *19*, 93. https://doi.org/10.1186/s12888-019-2075-x

Tamada, Y., Takeuchi, K., Yamaguchi, C., Saito, M., Ohira, T., Shirai, K., & Kondo, K. (2021). Does laughter predict onset of functional disability and mortality among older Japanese adults? The JAGES prospective cohort study. *Journal of Epidemiology*, *31*(5), 301-307. https://doi.org/10.2188/jea.JE20200051

Tamada, Y., Yamaguchi, C., Saito, M., Ohira, T., Shirai, K., Kondo, K., & Takeuchi, K. (2022). Does laughing with others lower the risk of functional disability among older Japanese adults? The JAGES prospective cohort study. *Preventive Medicine*, *155*, 106945. https://doi.org/10.1016/j.ypmed.2021.106945

Tanaka, A., Tokuda, N., & Ichihara, K. (2018). Psychological and physiological effects of laughter yoga sessions in Japan: A pilot study. *Nursing & Health Sciences*, *20*(3), 304-312. https://doi-org.ezproxy.bolton.ac.uk/10.1111/nhs.12562

Tavakoli, T., Davoodi, N., Tabatabaee, T. S. J., Rostami, Z., Mollaei, H., Salmani, F., Ayati, S. & Tabrizi, S. (2019). Comparison of laughter yoga and anti-anxiety medication on anxiety and gastrointestinal symptoms of patients with irritable bowel syndrome. *Middle East Journal of Digestive Diseases*, *11*(4), 211.
https://doi.org/10.15171%2Fmejdd.2019.151

Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., Moher, D., Peters, M. D. J., Horsley, T., Weeks, L., Hempel, S., Aki, E. A. , Chang, C., McGowan, J., Stewart, L., Hartling, L., Aldcroft, A., Wilson, M. G., Garritty, C., (...) Straus, S. E. (2018). PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. *Annals of Internal Medicine*, *169*(7), 467-473. https://doi.org/10.7326/M18-0850

Tsujita, H. & Rekimoto, J. (2013). Smile-encouraging digital appliances. *IEEE Pervasive Computing*, *12*(4) 5-7. https://doi.org/10.1109/MPRV.2013.73

Tyson, P. J., Davies, S. K., Scorey, S., & Greville, W. J. (2022). Fear of clowns: An investigation into the prevalence of coulrophobia in an international sample. *International Journal of Mental Health*, 1-16.https://doi.org/10.1080/00207411.2022.2046925

Ujhelyi-Gomez, K., Carson, J., Brown, G., & Holland, M. (2020). Positive psychology in dual diagnosis recovery: A mixed methods study with drug and alcohol workers. *Journal of Substance Use*, *25*(6), 663-671. https://doi.org/10.1080/14659891.2020.1760376

van der Wal, C. N., & Kok, R. N. (2019). Laughter-inducing therapies: Systematic review and meta-analysis. *Social Science & Medicine*, *232*, 473–488.
https://doi.org/10.1016/j.socscimed.2019.02.018

Wagner, H., Rehmes, U., Kohle, D., & Puta, C. (2014). Laughing: A demanding exercise for trunk muscles. *Journal of Motor Behavior*, *46*(1), 33-37. https://doi.org/10.1080/00222895.2013.844091

Wang, Y., Shirai, K., Ohira, T., Hirosaki, M., Kondo, N., Takeuchi, K., Yamaguchi, C., Tamada, Y., Kondo, K., & Iso, H. (2022). Occasions for laughter and dementia risk: Findings from a six-year cohort study. *Geriatrics & Gerontology International*, *22*(5), 392-398. https://doi.org/10.1111/ggi.14371

Weeks, M. C. (2016). The enigma of solitary laughter. *The European Journal of Humour Research*, *4*(3), 76-87.

Westbrook, K.E., Nessel, T. A., Hohman, M.H., Varacallo, M. (2022). Anatomy, head and neck, facial muscles. StatPearls. Anatomy, Head and Neck, Facial Muscles - PubMed (nih.gov)

WHO (World Health Organization). (2022a). World Health Statistics 2022: Monitoring health for the SDGs, sustainable development goals. World Health Organisation. 9789240051140-eng.pdf (who.int)

WHO (World Health Organization). (2022b). World Mental Health Report: Transforming mental health for all. World Health Organisation. World mental health report: Transforming mental health for all (who.int)

WHO (World Health Organization). (2022c). A toolkit on how to implement social prescribing. World Health Organisation. A toolkit on how to implement social prescribing (who.int)

Wood, A., & Niedenthal, P. (2018). Developing a social functional account of laughter. *Social and Personality Psychology Compass*, *12*(4), e12383. https://doi.org/10.1111/spc3.12383

Yamamoto, Y., Furukawa, S., Kato, A., Kusumoto, K., Miyake, T., Takeshita, E., Ikeda, Y., Yamamoto, N., Okada, K., Saeki, Y., & Hiasa, Y. (2022). The association between laughter and functional dyspepsia in a young Japanese population. *International Journal of Environmental Research and Public Health*, *19*(9), 5686. https://doi.org/10.3390/ijerph19095686

Yik, M., Mues, C., Sze, I. N. L., Kuppens, P., Tuerlinckx, F., De Roover, K., Kwok, F. H. C., Schwartz, S. H., Abu-Hilal, M., Adebayo, D. F., Aguilar, P., Al-Bahrani, M., Anderson, M. H., Andrade, L., Bratko, D., Bushina, E., Choi, J. W., Cieciuch, J., Dru, V., (...) Russell, J. A. (2022). On the relationship between valence and arousal in samples across the globe. *Emotion.* https://doi.org/10.1037/emo0001095

Yoshikawa, Y., Ohmaki, E., Kawahata, H., Maekawa, Y., Ogihara, T., Morishita, R., & Aoki, M. (2019). Beneficial effect of laughter therapy on physiological and psychological function in elders. *Nursing Open*, *6*(1), 93-99. https://doi.org/1002/nop2.190

Zane, E., Neumeyer, K., Mertens, J., Chugg, A., & Grossman, R. B. (2018). I think we're alone now: Solitary social behaviors in adolescents with autism spectrum disorder. *Journal of Abnormal Child Psychology, 46*, 1111-1120. https://doi.org/10.1007%2Fs10802-017-0351-0

Zauli, F. M., Del Vecchio, M., Russo, S., Mariani, V., Pelliccia, V., d'Orio, P., Sartori, I., Avanzini, P. & Caruana, F. (2022). The web of laughter: Frontal and limbic projections of the anterior cingulate cortex revealed by cortico-cortical evoked potential from sites eliciting laughter. *Philosophical Transactions of the Royal Society B*, *377*(1863), 20210180. https://doi.org/10.1098/rstb.2021.0180

Zhao, J., Yin, H., Zhang, G., Li, G., Shang, B., Wang, C., & Chen, L. (2019). A meta-analysis of randomized controlled trials of laughter and humour interventions on depression,

anxiety and sleep quality in adults. *Journal of Advanced Nursing*, *75*(11), 2435-2448.

https://doi.org/10.1111/jan.14000