



Review

Pathophysiological mechanisms linking sarcopenic obesity to mental health among older people: A state-of-the-art review linking peripheral signals to neural consequences

Wilson Kin Chung Leung^{1,2}, Sonata Suk Yu Yau³, Connie Yim Ching Yau¹, Simon Ching Lam^{1,2,*} and Lorna Kwai Ping Suen^{1,*}

- ¹ School of Nursing, Tung Wah College, 16/F, Ma Kam Chan Memorial Building, 31 Wylie Road, Kowloon, Hong Kong SAR, People's Republic of China
- ² Translational Research Centre for Digital Mental Health, Tung Wah College, Kowloon, Hong Kong SAR, People's Republic of China
- ³ Department of Rehabilitation Sciences, Faculty of Health and Social Sciences, The Hong Kong Polytechnic University, Kowloon, Hong Kong SAR, People's Republic of China

* **Correspondence:** Lorna Kwai Ping Suen: Email: lornasuen@twc.edu.hk; Tel: +85237256228; Simon Ching Lam: Email: simlc@alumni.cuhk.net; Tel: +85234686854.

Supplementary

Appendix 1. Narrative review checklist.

Section/Topic	Item No	Item	Reported on Page Number/Line Number	Reported on Section/Paragraph
TITLE				
Title	1	Identify the report as a Narrative Review or Literature Review.	P. 1, Lines 1–4	Title page
ABSTRACT				
Structured summary	2	Provide a structured summary with the subsections as: Background and Objective, Methods, Key Content and Findings, Conclusion.	P. 3, Lines 47–76	Abstract
INTRODUCTION				
Rationale/background	3	Describe the rationale for the review in the context of what is already known.	P. 6–11, Lines 84–247; Tables 1–3; Figure 1	Introduction
Objectives	4	Specify the key question(s) identified for the review topic.	P. 11–12, Lines 249–275	Introduction
METHODS				
Research selection	5	Specify the process for identifying the literature search (eg, years considered, language, publication status, study design, and databases of coverage).	P. 13–14, Lines 277–322; Table 4 & Appendix 2	Literature search strategy
DISCUSSION/SUMMARY				
Narrative	6	Discuss: 1) research reviewed including fundamental or key findings, 2) limitations and/or quality of research reviewed, and 3) need for future research.	P. 15–26, Lines 324–658; Tables 5 & Figures 2–5	Neural pathophysiological mechanisms linking SO to mental health
Summary	7	Provide an overall interpretation of the narrative review in the context of clinical practice for health professionals, policy development and implementation, or future research.	P. 27–28, Lines 660–711	Conclusion

Appendix 2. PubMed search strategy.

((("sarcopenia"[MeSH Terms] OR "sarcopenia"[All Fields] OR "sarcopenia s"[All Fields] OR "sarcopenic"[All Fields] OR "muscle loss"[All Fields]) AND ("obeses"[All Fields] OR "obesity"[MeSH Terms] OR "obesity"[All Fields] OR "obese"[All Fields] OR "obesities"[All Fields] OR "obesity s"[All Fields] OR ("obeses"[All Fields] OR "obesity"[MeSH Terms] OR "obesity"[All Fields] OR "obese"[All Fields] OR "obesities"[All Fields] OR "obesity s"[All Fields]) OR ("overweight"[MeSH Terms] OR "overweight"[All Fields] OR "overweighted"[All Fields] OR "overweightness"[All Fields] OR "overweights"[All Fields])) AND ("mental"[All Fields] OR "mentalities"[All Fields] OR "mentality"[All Fields] OR "mentalization"[MeSH Terms] OR "mentalization"[All Fields] OR "mentalizing"[All Fields] OR "mentalize"[All Fields] OR "mentalized"[All Fields] OR "mentally"[All Fields] OR ("psychologic"[All Fields] OR "psychological"[All Fields] OR "psychologically"[All Fields] OR "psychologization"[All Fields] OR "psychologized"[All Fields] OR "psychologizing"[All Fields]) OR "depress*"[All Fields] OR ("anxiety"[MeSH Terms] OR "anxiety"[All Fields] OR "anxieties"[All Fields] OR "anxiety s"[All Fields]) OR ("stress"[All Fields] OR "stressed"[All Fields] OR "stresses"[All Fields] OR "stressful"[All Fields] OR "stressfulness"[All Fields] OR "stressing"[All Fields]) OR ("distress"[All Fields] OR "distressed"[All Fields] OR "distresses"[All Fields] OR "distressful"[All Fields] OR "distressing"[All Fields]) OR ("affect"[MeSH Terms] OR "affect"[All Fields] OR "mood"[All Fields]) OR "emotion*"[All Fields] OR "affect*"[All Fields] OR ("sleep"[MeSH Terms] OR "sleep"[All Fields] OR "sleeping"[All Fields] OR "sleeps"[All Fields] OR "sleep s"[All Fields]) OR ("insomnia s"[All Fields] OR "sleep initiation and maintenance disorders"[MeSH Terms] OR ("sleep"[All Fields] AND "initiation"[All Fields] AND "maintenance"[All Fields] AND "disorders"[All Fields]) OR "sleep initiation and maintenance disorders"[All Fields] OR "insomnia"[All Fields] OR "insomnias"[All Fields]) OR ("resilience, psychological"[MeSH Terms] OR ("resilience"[All Fields] AND "psychological"[All Fields]) OR "psychological resilience"[All Fields] OR "resilience"[All Fields] OR "resiliences"[All Fields] OR "resiliencies"[All Fields] OR "resiliency"[All Fields] OR "resilient"[All Fields] OR "resilients"[All Fields]) OR "quality of life"[All Fields] OR ("personal satisfaction"[MeSH Terms] OR ("personal"[All Fields] AND "satisfaction"[All Fields]) OR "personal satisfaction"[All Fields] OR "satisfaction"[All Fields] OR "satisfactions"[All Fields] OR "satisfaction s"[All Fields])))) AND ((2021/1/1:2025/3/24[pdat]) AND (english[Filter]))

Limiters

- ARTICLE LANGUAGE: English

Appendix 3. Unrelated studies excluded after full-text assessment ($n = 65$).

No.	First Author	Title	Journal / Conference	Publication Year
1	Barbera	Increased ectodysplasin-A2-receptor EDA2R is a ubiquitous hallmark of aging and mediates parainflammatory responses	<i>Nat Commun</i>	2025
2	Demircan	The Association of Sarcopenia and Body Composition With Benign Positional Paroxysmal Vertigo in Older Adults	<i>Laryngoscope</i>	2025
3	Smith	Sex-specific response of intramuscular fat to diet-induced obesity in rats	<i>Sci Rep</i>	2025

Continued on next page

No.	First Author	Title	Journal / Conference	Publication Year
4	Ye	Association between skeletal muscle mass to visceral fat area ratio and depression: A cross-sectional study based on the National Health and Nutrition Examination Survey	<i>J Affect Disord</i>	2025
5	Zhang	Nicotinamide Phosphoribosyltransferase Acetylation Mediating Muscle Dysfunction Contributes to Sleep Apnoea in Obesity	<i>J Cachexia Sarcopenia Muscle</i>	2025
6	Booranasuksakul	Body Composition, Sarcopenic Obesity, and Cognitive Function in Older Adults: Findings From the National Health and Nutrition Examination Survey (NHANES) 1999–2002 and 2011–2014	<i>J Am Nutr Assoc</i>	2024
7	Cancello	Sarcopenia Prevalence among Hospitalized Patients with Severe Obesity: An Observational Study	<i>J Clin Med</i>	2024
8	Eitmann	Activity of the hypothalamic neuropeptide Y increases in adult and decreases in old rats	<i>Sci Rep</i>	2024
9	Just	Artificial intelligence-based analysis of body composition predicts outcome in patients receiving long-term mechanical circulatory support	<i>J Cachexia Sarcopenia Muscle</i>	2024
10	Lee	Factors Affecting Handgrip Strength in Menopausal Women at High Risk of Sarcopenia: A National Population-Based Study	<i>Healthcare (Basel)</i>	2024
11	Lenihan-Geels	Skeletal muscle p53-depletion uncovers a mechanism of fuel usage suppression that enables efficient energy conservation	<i>J Cachexia Sarcopenia Muscle</i>	2024
12	Li	Sarcopenic obesity is associated with adverse outcomes after kidney transplantation: a retrospective cohort study	<i>Int Urol Nephrol</i>	2024
13	Liu	Association between sarcopenia and sleep disorders: a cross-sectional population based study	<i>Front Nutr</i>	2024
14	Liu	Sarcopenic Obesity and Outcomes for Patients With Cancer	<i>JAMA Netw Open</i>	2024
15	Low	Reduced skeletal muscle mass to visceral fat area ratio is independently associated with reduced cognitive function in type 2 diabetes mellitus	<i>J Diabetes Complications</i>	2024
16	Munekawa	Daidzein Inhibits Muscle Atrophy by Suppressing Inflammatory Cytokine- and Muscle Atrophy-Related Gene Expression	<i>Nutrients</i>	2024
17	Rohrbach	Epicardial adipose tissue and muscle distribution affect outcomes in very old patients after transcatheter aortic valve replacement	<i>Eur Heart J Open</i>	2024
18	Shang-Guan	Effect of Sarcopenic Obesity on Weight Loss Outcomes and Quality of Life after Laparoscopic Sleeve Gastrectomy: A Retrospective Cohort Study	<i>Obes Surg</i>	2024
19	Simó-Servat	Prospective Study to Evaluate Rectus Femoris Muscle Ultrasound for Body Composition Analysis in Patients Undergoing Bariatric Surgery	<i>J Clin Med</i>	2024

Continued on next page

No.	First Author	Title	Journal / Conference	Publication Year
20	Beberashvili	Sarcopenic Obesity Versus Nonobese Sarcopenia in Hemodialysis Patients: Differences in Nutritional Status, Quality of Life, and Clinical Outcomes	<i>J Ren Nutr</i>	2023
21	Fajardo	Prevalence and Mechanisms of Skeletal Muscle Atrophy in Metabolic Conditions	<i>Am J Physiol Endocrinol Metab</i>	2023
22	Fonfría-Vivas	Assessing quality of life with SarQol is useful in screening for sarcopenia and sarcopenic obesity in older women	<i>Aging Clin Exp Res</i>	2023
23	Kim	Luteolin Protects Against Obese Sarcopenia in Mice with High-Fat Diet-Induced Obesity by Ameliorating Inflammation and Protein Degradation in Muscles	<i>Mol Nutr Food Res</i>	2023
24	Maccarone	Sarcopenia prevalence and association with nutritional status in cohort of elderly patients affected by musculoskeletal concerns: a real-life analysis	<i>Front Endocrinol (Lausanne)</i>	2023
25	Moroni	Discovering the Individualized Factors Associated with Sarcopenia and Sarcopenic Obesity Phenotypes-A Machine Learning Approach	<i>Nutrients</i>	2023
26	Ning	Targeting the DP2 receptor alleviates muscle atrophy and diet-induced obesity in mice through oxidative myofiber transition	<i>J Cachexia Sarcopenia Muscle</i>	2023
27	Osugi	Interaction Between Sarcopenic Obesity and Nonlocomotive Physical Activity on the Risk of Depressive Symptoms in Community-Dwelling Older Adult Japanese Women	<i>J Aging Phys Act</i>	2023
28	Wang	Clinical impacts of sarcopenic obesity on chronic obstructive pulmonary disease: a cross-sectional study	<i>BMC Pulm Med</i>	2023
29	You	Growth arrest and DNA damage-inducible alpha regulates muscle repair and fat infiltration through ATP synthase F1 subunit alpha	<i>J Cachexia Sarcopenia Muscle</i>	2023
30	Adams	Targeting MuRF1 by small molecules in a HFpEF rat model improves myocardial diastolic function and skeletal muscle contractility	<i>J Cachexia Sarcopenia Muscle</i>	2022
31	Carretero-Gómez	High-Risk Obesity Phenotypes: Target for Multimorbidity Prevention at the ROFEMI Study	<i>J Clin Med</i>	2022
32	Chang	miR-320 regulates myogenesis by targeting growth factor receptor-bound protein-2 and ameliorates myotubes atrophy	<i>Int J Biochem Cell Biol</i>	2022
33	Chen	Probiotic supplementation attenuates age-related sarcopenia via the gut-muscle axis in SAMP8 mice	<i>J Cachexia Sarcopenia Muscle</i>	2022
34	Chou	Sarcopenic Obesity Tendency and Nutritional Status Is Related to the Risk of Sarcopenia, Frailty, Depression and Quality of Life in Patients with Dementia	<i>Int J Environ Res Public Health</i>	2022
35	Dantas	Mitochondrial uncoupling attenuates sarcopenic obesity by enhancing skeletal muscle mitophagy and quality control	<i>J Cachexia Sarcopenia Muscle</i>	2022

Continued on next page

No.	First Author	Title	Journal / Conference	Publication Year
36	De Lorenzo	Myosteatorsis Significantly Predicts Persistent Dyspnea and Mobility Problems in COVID-19 Survivors	<i>Front Nutr</i>	2022
37	Dondero	Geriatric Vulnerabilities Among Obese Older Adults With and Without Sarcopenia: Findings From a Nationally Representative Cohort Study	<i>J Geriatr Phys Ther</i>	2022
38	Jaiswal	AKT controls protein synthesis and oxidative metabolism via combined mTORC1 and FOXO1 signalling to govern muscle physiology	<i>J Cachexia Sarcopenia Muscle</i>	2022
39	Ji	Thresholds of visceral fat area and percent of body fat to define sarcopenic obesity and its clinical consequences in Chinese cancer patients	<i>Clin Nutr</i>	2022
40	Jin	Gintonin-enriched fraction protects against sarcopenic obesity by promoting energy expenditure and attenuating skeletal muscle atrophy in high-fat diet-fed mice	<i>J Ginseng Res</i>	2022
41	Kim	Ginsenoside compound K ameliorates palmitate-induced atrophy in C2C12 myotubes via promyogenic effects and AMPK/autophagy-mediated suppression of endoplasmic reticulum stress	<i>J Ginseng Res</i>	2022
42	Lu	Prevalence and risk factors of sarcopenia without obesity and sarcopenic obesity among Chinese community older people in suburban area of Shanghai: A cross-sectional study	<i>Front Aging Neurosci</i>	2022
43	Merchant	Gender Differences in Body Composition in Pre-Frail Older Adults With Diabetes Mellitus	<i>Front Endocrinol (Lausanne)</i>	2022
44	Ou	Saikokeishikankyoto extract alleviates muscle atrophy in KKAY mice	<i>J Nat Med</i>	2022
45	Terada	Sex-specific associations of fat mass and muscle mass with cardiovascular disease risk factors in adults with type 2 diabetes living with overweight and obesity: secondary analysis of the Look AHEAD trial	<i>Cardiovasc Diabetol</i>	2022
46	Toyoshima	Difference between “Physical Fitness Age” Based on Physical Function and Chronological Age Is Associated with Obesity, Hyperglycemia, Depressive Symptoms, and Low Serum Albumin	<i>J Nutr Health Aging</i>	2022
47	Vankrunkelsven	Obesity attenuates inflammation, protein catabolism, dyslipidaemia, and muscle weakness during sepsis, independent of leptin	<i>J Cachexia Sarcopenia Muscle</i>	2022
48	Yang	Association of sleep duration with sarcopenic obesity in multi-ethnic older adults: findings from the WCHAT Study	<i>BMC Geriatr</i>	2022
49	Youssef	Clinical and Biological Adaptations in Obese Older Adults Following 12-Weeks of High-Intensity Interval Training or Moderate-Intensity Continuous Training	<i>Healthcare (Basel)</i>	2022

Continued on next page

No.	First Author	Title	Journal / Conference	Publication Year
50	Chen	Longitudinal changes in physical and mental health of older adults with chronic hepatitis B infection: Trajectories and predictors	<i>Prev Med Rep</i>	2021
51	Cheng	Sarcopenia risk and associated factors among Chinese community-dwelling older adults living alone	<i>Sci Rep</i>	2021
52	Choi	Skeletal Lipocalin-2 Is Associated with Iron-Related Oxidative Stress in ob/ob Mice with Sarcopenia	<i>Antioxidants (Basel)</i>	2021
53	Espinoza	Intranasal Oxytocin Improves Lean Muscle Mass and Lowers LDL Cholesterol in Older Adults with Sarcopenic Obesity: A Pilot Randomized Controlled Trial	<i>J Am Med Dir Assoc</i>	2021
54	Kim	Ablation of USP21 in skeletal muscle promotes oxidative fibre phenotype, inhibiting obesity and type 2 diabetes	<i>J Cachexia Sarcopenia Muscle</i>	2021
55	López-Teros	The Association of Osteosarcopenia With Functional Disability in Community-Dwelling Mexican Adults 50 and Older	<i>Front Med (Lausanne)</i>	2021
56	Mena-Montes	Low-Intensity Exercise Routine for a Long Period of Time Prevents Osteosarcopenic Obesity in Sedentary Old Female Rats, by Decreasing Inflammation and Oxidative Stress and Increasing GDF-11	<i>Oxid Med Cell Longev</i>	2021
57	Moriggi	Skeletal Muscle Proteomic Profile Revealed Gender-Related Metabolic Responses in a Diet-Induced Obesity Animal Model	<i>Int J Mol Sci</i>	2021
58	Park	Internet of things-based lifestyle intervention for prostate cancer patients on androgen deprivation therapy: a prospective, multicenter, randomized trial	<i>Am J Cancer Res</i>	2021
59	Rauen	Free Fatty Acid Species Differentially Modulate the Inflammatory Gene Response in Primary Human Skeletal Myoblasts	<i>Biology (Basel)</i>	2021
60	Ross	Lower body extremity function is associated with health-related quality of life: a cross-sectional analysis of overweight and obese older adults with and without type 2 diabetes mellitus	<i>Qual Life Res</i>	2021
61	Shang	Pim1 knockout alleviates sarcopenia in aging mice via reducing adipogenic differentiation of PDGFR α ⁺ mesenchymal progenitors	<i>J Cachexia Sarcopenia Muscle</i>	2021
62	Sousa	The effects of diet composition and chronic obesity on muscle growth and function	<i>J Appl Physiol (1985)</i>	2021
63	Sugiyama	Obesity and myosteatorsis: the two characteristics of dynapenia in patients with cirrhosis	<i>Eur J Gastroenterol Hepatol</i>	2021
64	Szlejć	Association of sleep disturbances with sarcopenia and its defining components: the ELSA-Brasil study	<i>Braz J Med Biol Res</i>	2021
65	Toledo-Pérez	Metformin and tBHQ Treatment Combined with an Exercise Regime Prevents Osteosarcopenic Obesity in Middle-Aged Wistar Female Rats	<i>Oxid Med Cell Longev</i>	2021



AIMS Press

© 2026 the Author(s), licensee AIMS Press. This is an open access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>)