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Viren Swami [a,b,*], Ulrich S. Tran [c], Stefan Stieger [d], Toivo Aavik [e], Hamed Abdollahpour Ranjbar [f], Sulaiman Olanrewaju Adebayo [g], Reza Afhami [h], Oli Ahmed [i], Annie Aimé [j], Marwan Akel [k,l], Hussam Al Halbusi [m], George Alexias [n], Khawla F. Ali [o], Nursel Alp-Dal [p], Anas B. Alsalhani [q], Sara Álvares-Solas [r], Ana Carolina Soares Amaral [s], Sonny Andrianto [t], Trefor Aspden [u], Marios Argyrides [v], John Jamir Benzon R. Aruta [w], Stephen Atkin [o], Olusola Ayandele [x,y], Migle Baceviciene [z], Radvan Bahbouh [aa], Andrea Ballesio [ab], David Barron [ac], Ashleigh Bellard [ad], Sóley Sesselja Bender [ae], Kerime Derya Beydağ [af], Gorana Birovljević [ag], Marie-Ève Blackburn [ah], Teresita Borja-Alvarez [ai], Joanna Borowiec [aj], Miroslava Bozogáňová [ak,al], Solfrid Bratland-Sanda [am], Matthew H.E. M. Browning [an], Anna Brytek-Matera [ao], Marina Burakova [ap], Yeliz Çakır-Koçak [aq], Pablo Camacho [ar], Vittorio Emanuele Camilleri [as], Valentina Cazzato [ad], Silvia Cerea [at,au], Apitchaya Chaiwutikornwanich [av], Trawin Chaleeraktrakoon [aw], Tim Chambers [ax], Qing-Wei Chen [ay,az], Xin Chen [ba], Chin-Lung Chien [bb], Phatthanakit Chobthamkit [aw], Bovornpot Choompunuch [bc], Emilio J. Compte [bd,be], Jennifer Corrigan [bf], Getrude Cosmas [bg], Richard G. Cowden [bh], Kamila Czepczor-Bernat [bi], Marcin Czub [ao], Wanderson Roberto da Silva [bj], Mahboubeh Dadfar [bk], Simon E. Dalley [bl], Lionel Dany [ap], Jesus Alfonso D. Datu [bm], Pedro Henrique Berbert de Carvalho [bn,bo], Gabriel Lins de Holanda Coelho [bf], Avila Odia S. De Jesus [w], Sonia Harzallah Debbabi [bp], Sandesh Dhakal [bq], Francesca Di Bernardo [br], Donka D. Dimitrova [bs], Jacinthe Dion [bt], Barnaby Dixson [bu], Stacey M. Donofrio [bl], Marius Drysch [bv], Hongfei Du [bw], Angel M. Dzhambov [bx], Claire El-Jor [by], Violeta Enea [bz], Mehmet Eskin [cb], Farinaz Farbod [cc], Lorleen Farrugia [as], Leonie Fian [c], Maryanne L. Fisher [cd], Michał Folwarczny [ce], David A. Frederick [cf], Matthew Fuller-Tyszkiewicz [ax], Adrian Furnham [cg], Antonio Alías García [ch], Shulamit Geller [ci], Marta Ghisi [at,cj], Alireza Ghorbani [ck], Maria Angeles Gomez Martinez [cl], Sarah Gradidge [a], Sylvie Graf [cm], Caterina Grano [ab], Gyöngyvér Gyene [cn], Souheil Hallit [co,cp], Motasem Hamdan [cq], Jonathan E. Handelzalts [ci,cr], Paul H.P. Hanel [cs], Steven R. Hawks [ct], Issa Hekmati [cu], Mai Helmy [cv,cw], Tetiana Hill [cx], Farah Hina [cy], Geraldine Holenweger [cz], Martina Hřebíčková [cm], Olasupo Augustine Ijabadeniyi [dc], Asma Imam [cq], Başak İnce [dd], Natalia Irrazabal [de], Rasa Jankauskiene [z], Ding-Yu Jiang [df], Micaela Jiménez-Borja [ai], Verónica Jiménez-Borja [dg], Evan M. Johnson [cf], Veljko Jovanović [dh], Marija Jović [di], Marko Jović [dj], Alessandra Costa Pereira Junqueira [dk,dl], Lisa-Marie Kahle [dm], Adam Kantanista [aj], Ahmet Karakiraz [dn], Ayşe Nur Karkin [cb], Erich Kasten [dm], Salam Khatib [do], Nuannut Khieowan [dp], Patricia Joseph Kimong [bg], Litza Kiropoulos [dq], Joshua Knittel [cz],

* Correspondence to: School of Psychology and Sport Science, Anglia Ruskin University,Cambridge, Cambridgeshire CB1 1PT, United Kingdom.
E-mail address: viren.swami@aru.ac.uk (V. Swami).

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Neena Kohli [dr], Mirjam Koprivnik [ds], Aituar Kospakov [dt,du], Magdalena Król-Zielińska [aj], Isabel Krug [dq], Garry Kuan [dv], Yee Cheng Kueh [dw], Omar Kujan [dx], Miljana Kukić [ag], Sanjay Kumar [dy], Vipul Kumar [dz], Nishtha Lamba [ed], Mary Anne Lauri [as], Maria Fernanda Laus [dk,dl], Liza April LeBlanc [cd], Hyejoo J. Lee [ee], Małgorzata Lipowska [ef], Mariusz Lipowski [eg], Caterina Lombardo [ab], Andrea Lukács [eh], Christophe Maïano [j,ei], Sadia Malik [ej], Mandar Manjary [dy,ek], Lidia Márquez Baldó [el], Martha Martinez-Banfi [em,en], Karlijn Massar [eo], Camilla Matera [ep], Olivia McAnirlin [an], Moisés Roberto Mebarak [eq], Anwar Mechri [er], Juliana Fernandes Filgueiras Meireles [es], Norbert Mesko [et], Jacqueline Mills [ax], Maya Miyairi [eu], Ritu Modi [dr], Adriana Modrzejewska [ev], Justyna Modrzejewska [ew], Kate E. Mulgrew [bu], Taryn A. Myers [ex], Hikari Namatame [ey], Mohammad Zakaria Nassani [ez], Amanda Nerini [ep], Félix Neto [fa], Joana Neto [fb], Angela Noguiera Neves [fc], Siu-Kuen Ng [fd], Devi Nithiya [fe], Jiaqing O [u], Sahar Obeid [ff], Camila Oda-Montecinos [fg], Peter Olamakinde Olapegba [x], Tosin Tunrayo Olonisakin [fh], Salma Samir Omar [fi], Brynja Örlygsdóttir [ae], Emrah Özsoy [dn], Tobias Otterbring [fj], Sabine Pahl [c], Maria Serena Panasiti [fk], Yonguk Park [fl], Muhammad Mainuddin Patwary [fm,fn], Tatiana Pethö [fo], Nadezhda Petrova [fp], Jakob Pietschnig [fq], Sadaf Pourmahmoud [h], Vishnunarayan Girishan Prabhu [fr], Vita Poštuvan [fs,ft], Pavol Prokop [fu,fv], Virginia L. Ramseyer Winter [fw], Magdalena Razmus [fx], Taotao Ru [ay,az], Mirjana Rupar [cm,fy], Reza N. Sahlan [fz], Mohammad Salah Hassan [ga], Anđela Šalov [gb], Saphal Sapkota [gc], Jacob Owusu Sarfo [gd], Yoko Sawamiya [ey], Katrin Schaefer [ge,gf], Michael Schulte-Mecklenbeck [cz,gg], Veya Seekis [gh], Kerim Selvi [gi], Mehdi Sharifi [gj], Anita Shrivastava [gk], Rumana Ferdousi Siddique [gl], Valdimar Sigurdsson [gm], Vineta Silkane [gn], Ana Šimunić [gb], Govind Singh [dr], Alena Slezáčková [go], Christine Sundgot-Borgen [gp], Gill Ten Hoor [eo], Passagorn Tevichapong [gq], Arun Tipandjan [gr], Jennifer Todd [a,b], Constantinos Togas [n], Fernando Tonini [de], Juan Camilo Tovar-Castro [gs], Lise Katrine Jepsen Trangsrud [am], Pankaj Tripathi [dr], Otilia Tudorel [gt], Tracy L. Tylka [gu], Anar Uyzbayeva [du], Zahir Vally [gv], Edmunds Vanags [gw], Luis Diego Vega [gx], Aitor Vicente-Arruebarrena [cl], Jose Vidal-Mollón [gy], Roosevelt Vilar [gz], Hyxia Villegas [gx], Mona Vintilă [gt], Christoph Wallner [bv], Mathew P. White [c], Simon Whitebridge [o], Sonja Windhager [ge,gf], Kah Yan Wong [ha], Eric Kenson Yau [hb], Yuko Yamamiya [hc], Victoria Wai Lan Yeung [hb,hd], Marcelo Callegari Zanetti [he], Magdalena Zawisza [a], Nadine Zeeni [by], Martina Zvaríková [fu], Martin Voracek [c]

[a] *School of Psychology and Sport Science, Anglia Ruskin University, Cambridge, United Kingdom*
[b] *Centre for Psychological Medicine, Perdana University, Kuala Lumpur, Malaysia*
[c] *Department of Cognition, Emotion, and Methods in Psychology, Faculty of Psychology, University of Vienna, Vienna, Austria*
[d] *Department of Psychology and Psychodynamics, Karl Landsteiner University of Health Sciences, Krems an der Donau, Austria*
[e] *Institute of Psychology, University of Tartu, Tartu, Estonia*
[f] *Department of Psychology, Koç University, Istanbul, Turkiye*
[g] *Department of Psychology and Behavioural Studies, Ekiti State University, Ado-Ekiti, Nigeria*
[h] *Department of Art Studies, Tarbiat Modares University, Tehran, Iran*
[i] *Department of Psychology, University of Chittagong, Chattogram, Bangladesh*
[j] *Department of Psychoeducation and Psychology, Université du Québec en Outaouais, Saint-Jérôme, Canada*
[k] *INSPECT-LB: National Institute of Public Health, Clinical Epidemiology, and Toxicology, Beirut, Lebanon*
[l] *School of Pharmacy, Lebanese International University, Beirut, Lebanon*
[m] *Department of Management, Ahmed Bin Mohammad Military College, Doha, Qatar*
[n] *Faculty of Psychology, Panteion University of Social and Political Sciences, Athens, Greece*
[o] *Royal College of Surgeons Ireland-Bahrain, Adliya, Bahrain*
[p] *Department of Midwifery, Faculty of Health Sciences, Munzur University, Tunceli, Turkiya*
[q] *Department of Oral Medicine and Diagnostic Sciences, Vision College of Dentistry and Nursing, Vision Colleges, Riyadh, Saudi Arabia*
[r] *Facultad de Ciencias de la Vida, Universidad Regional Amazónica Ikiam, Muyuna, Ecuador*
[s] *Federal Institute of Education, Science, and Technology of Southeast Minas Gerais, Barbacena, Brazil*
[t] *Department of Psychology, Universitas Islam Indonesia, Yogyakarta, Indonesia*
[u] *Department of Psychology, Aberystwyth University, Ceredigion, United Kingdom*
[v] *Department of Psychology, Neapolis University Pafos, Paphos, Cyprus*
[w] *Department of Psychology, De La Salle University, Phillippines*
[x] *Department of General Studies, The Polytechnic, Ibadan, Nigeria*
[y] *Department of Psychology, University of Ibadan, Ibadan, Nigeria*
[z] *Health Research and Innovation Science Centre, Faculty of Health Sciences, Klaipeda University, Klaipeda, Lithuania*
[aa] *Department of Psychology, Faculty of Arts, Charles University, Prague, Czechia*
[ab] *Department of Psychology, Sapienza University of Rome, Rome, Italy*
[ac] *School of Social Sciences, Heriot-Watt University Malaysia, Putrajaya, Malaysia*
[ad] *School of Psychology, Faculty of Health, Liverpool John Moores University, Liverpool, United Kingdom*
[ae] *Faculty of Nursing and Midwifery, University of Iceland, Reykjavik, Iceland*
[af] *Department of Nursing, Faculty of Health Sciences, Istanbul Gedik University, Istanbul, Turkiye*

[ag] Department of Psychology, Faculty of Humanities and Social Sciences, University of Rijeka, Rijeka, Croatia
[ah] ÉCOBES-Research and Transfer, Cégep de Jonquière, Québec, Canada
[ai] Colegio de Ciencias Sociales y Humanidades, Universidad San Francisco de Quito USFQ, Quito, Ecuador
[aj] Department of Physical Education and Lifelong Sports, Poznań University of Physical Education, Poznań, Poland
[ak] Institute of Social Sciences of the Centre of Social and Psychological Sciences, Košice, Slovakia
[al] Faculty of Humanities and Natural Sciences, Institute of Pedagogy, Andragogy, and Psychology, University of Prešov, Prešov, Slovakia
[am] Department of Sports, Physical Education and Outdoor Studies, University of South-Eastern Norway, Bø, Telemark, Norway
[an] Department of Parks, Recreation and Tourism Management, Clemson University, Clemson, United States of America
[ao] Institute of Psychology, University of Wrocław, Wrocław, Poland
[ap] Laboratory of Social Psychology, Aix-Marseille University, Aix-en-Provence, France
[aq] Department of Midwifery, Faculty of Health Sciences, Bartın University, Bartın, Turkiye
[ar] CentroSan Isidoro University Center, Seville, Spain
[as] Department of Psychology, University of Malta, Msida, Malta
[at] Department of General Psychology, University of Padova, Padova, Italy
[au] Department of Biomedical Sciences, University of Padova, Padova, Italy
[av] Faculty of Psychology, Chulalongkorn University, Bangkok, Thailand
[aw] Department of Psychology, Faculty of Liberal Arts, Thammasat University, Pathumthani, Thailand
[ax] School of Psychology, Deakin University, Geelong, Australia
[ay] Lab of Light and Physio-Psychological Health, National Center for International Research on Green Optoelectrics, South China Normal University, Guangzhou, China
[az] Guangdong Provincial Key Laboratory of Optical Information Materials and Technology & Institute of Electronic Paper Displays, South China Academy of Advanced Optoelectronics, South China Normal University, Guangzhou, China
[ba] Department of Psychology, Graduate School of Arts and Science, New York University, New York, United States of America
[bb] Department of Psychology, Soochow University, Taipei, Taiwan
[bc] Department of Educational Psychology and Guidance, Faculty of Education, Mahasarakham University, Maha Sarakham, Thailand
[bd] School of Psychology, Universidad Adolfo Ibáñez, Penalolen, Chile
[be] Comenzar de Nuevo Treatment Center, Monterrey, Mexico
[bf] School of Applied Psychology, University College Cork, Cork, Ireland
[bg] Faculty of Psychology and Education, Universiti Malaysia Sabah, Kota Kinabalu, Malaysia
[bh] Human Flourishing Program, Harvard University, Cambridge, United States of America
[bi] Department of Pediatrics, Pediatric Obesity and Metabolic Bone Diseases, Faculty of Medical Sciences in Katowice, Medical University of Silesia, Katowice, Poland
[bj] Graduate Program in Food, Nutrition, and Food Engineering, São Paulo State University, São Paulo, Brazil
[bk] Department of Addiction, School of Behavioral Sciences and Mental Health (Tehran Institute of Psychiatry), Iran University of Medical Sciences, Tehran, Iran
[bl] Department of Psychology, University of Groningen, Groningen, The Netherlands
[bm] Teacher Education and Learning Leadership Academic Unit, Faculty of Education. The University of Hong Kong, Hong Kong, China
[bn] Body Image and Eating Disorders Research Group, Federal University of Juiz de Fora, Juiz de Fora, Brazil
[bo] Institute of Psychiatry, University of São Paulo, São Paulo, Brazil
[bp] Faculty of Medicine, University of Sousse, Sousse, Tunisia
[bq] Central Department of Psychology, Tribhuvan University, Kathmandu, Nepal
[br] Department of Psychology, University of Campania Luigi Vanvitelli, Caserta, Italy
[bs] Department of Health Management and Healthcare Economics, Faculty of Public Health, Medical University of Plovdiv, Plovdiv, Bulgaria
[bt] Department of Psychology, Université du Québec à Trois-Rivières, Trois-Rivières, Canada
[bu] School of Health, University of the Sunshine Coast, Moreton Bay, Australia
[bv] Department of Plastic and Hand Surgery, BG University Hospital Bergmannsheil Bochum, Ruhr University Bochum, Bochum, Germany
[bw] Institute of Advanced Studies in Humanities and Social Sciences, Beijing Normal University, Zhuhai, China
[bx] Department of Hygiene, Faculty of Public Health, Medical University of Plovdiv, Plovdiv, Bulgaria
[by] Department of Natural Sciences, School of Arts and Sciences, Lebanese American University, Beirut, Lebanon
[bz] Department of Psychology, Alexandru Ioan Cuza University, Iași, Romania
[cb] Department of Psychology, Koc University, Istanbul, Turkiye
[cc] Department of Textile and Fashion Design, Alzahra University, Tehran, Iran
[cd] Department of Psychology, Saint Mary's University, Halifax, Canada
[ce] Discipline of Marketing, J.E. Cairnes School of Business & Economics, University of Galway, Galway, Ireland
[cf] Crean College of Health and Behavioral Sciences, Chapman University, Orange, United States of America
[cg] Department of Leadership and Organizational Behaviour, Norwegian Business School, Oslo, Norway
[ch] Department of Education, University of Almería, Almería, Spain
[ci] School of Behavioral Sciences, The Academic College of Tel Aviv-Yaffo, Tel Aviv-Yafo, Israel
[cj] Unità Operativa Complessa (UOC) Hospital Psychology, Padova University Hospital, Padova, Italy
[ck] Department of Social Sciences, Payam Noor University, Tehran, Iran
[cl] Faculty of Psychology, Pontifical University of Salamanca, Salamanca, Spain
[cm] Institute of Psychology, Czech Academy of Sciences, Prague, Czechia
[cn] Doctoral School of Psychology, Eötvös Loránd University, Budapest, Hungary
[co] School of Medicine and Medical Sciences, Holy Spirit University of Kaslik, Jounieh, Lebanon
[cp] Applied Science Research Center, Applied Science Private University, Amman 11931, Jordan
[cq] Faculty of Public Health, Al-Quds University, East Jerusalem, Palestine
[cr] Department of Psychiatry, University of Michigan, Ann Arbor, United States of America
[cs] Department of Psychology, University of Essex, Colchester, United Kingdom
[ct] Department of Kinesiology and Health Science, Utah State University, Logan, UnitedStates of America
[cu] Department of Psychology, Faculty of Human Science, University of Maragheh, Maragheh, Iran
[cv] Department of Psychology, College of Education, Sultan Qaboos University, Muscat, Oman
[cw] Department of Psychology, Faculty of Arts, Menoufia University, Shebin el Kom, Egypt
[cx] Hertfordshire Business School, University of Hertfordshire, Hatfield, United Kingdom
[cy] Department of Psychiatry, University of Cambridge, Cambridge, United Kingdom
[cz] Department of Consumer Behavior, University of Bern, Bern, Switzerland
[dc] Department of Sociology and Social Justice, Afe Babalola University, Ado-Ekiti, Nigeria
[dd] Centre for Research in Eating and Weight Disorders, Department of Psychological Medicine, Institute of Psychiatry, Psychology, and Neuroscience, King's College London, London, United Kingdom
[de] Faculty of Social Sciences, University of Palermo, Buenos Aires, Argentina
[df] Department of Psychology, National Chung Cheng University, Chia Yi, Taiwan
[dg] Colegio de Comunicación y Artes Contemporáneas, Universidad San Francisco de Quito USFQ, Quito, Ecuador
[dh] Department of Psychology, University of Novi Sad, Novi Sad, Serbia
[di] Faculty of Organizational Sciences, University of Belgrade, Belgrade, Serbia

[dj] Faculty of Medicine, University of Belgrade, Belgrade, Serbia
[dk] Department of Psychology, University of São Paulo, Ribeirão Preto, Brazil
[dl] Department of Nutrition, University of Ribeirão Preto, Ribeirão Preto, Brazil
[dm] Faculty of Life Sciences, Medical School Hamburg, Hamburg, Germany
[dn] Sakarya Business School, Sakarya University, Sakarya, Turkiye
[do] Faculty of Health Professions, Al-Quds University, East Jerusalem, Palestine
[dp] Asian Studies Department, Faculty of International Studies, Prince of Songkla University Phuket Campus, Phuket, Thailand
[dq] School of Psychological Sciences, University of Melbourne, Melbourne, Australia
[dr] Department of Psychology, University of Allahabad, Prayagraj, India
[ds] Institute of Anton Martin Slomsek, Primary School Montessori, Maribor, Slovenia
[dt] Department of Sociology and Social Work, Al-Farabi Kazakh National University, Almaty, Kazakhstan
[du] Department of General Education Disciplines, Astana IT University, Astana, Kazakhstan
[dv] Exercise and Sport Sciences, School of Health Sciences, Universiti Sains Malaysia, Kubang Kerian, Malaysia
[dw] Biostatics and Research Methods Unit, School of Medical Sciences, Universiti Sains Malaysia, Kubang Kerian, Malaysia
[dx] Oral Diagnostics and Surgical Sciences, UWA Dental School, The University of Western Australia, Nedlands, Australia
[dy] Department of Psychology, D.A.V. College, Muzaffarnagar, India
[dz] Department of Psychology, Kashi Naresh Government Post-Graduate College, Gyanpur, India
[ed] Department of Psychology, Middlesex University Dubai, Dubai, United Arab Emirates
[ee] Department of Counselling Psychology and Social Welfare, Handong Global University, Pohang, South Korea
[ef] Institute of Psychology, University of Gdańsk, Gdańsk, Poland
[eg] Faculty of Social and Humanities, University WSB Merito, Gdansk, Poland
[eh] Faculty of Health Care, University of Miskolc, Miskolc, Hungary
[ei] Cyberpsychology Laboratory, Department of Psychoeducation and Psychology, Université du Québec en Outaouais (UQO), Saint-Jérôme, Canada
[ej] Department of Psychology, University of Sargodha, Sargodha, Pakistan
[ek] M.M.D. Public School, Brahmpuri, Muzaffarnagar, India
[el] Department of Research Methods and Diagnosis in Education, University of València, València, Spain
[em] Faculty of Legal and Social Sciences, Simón Bolívar University, Barranquilla, Colombia
[en] Life Science Research Centre, Simón Bolívar University, Barranquilla, Colombia
[eo] Department of Work and Social Psychology, Maastricht University, Maastricht, the Netherlands
[ep] Department of Education, Languages, Intercultures, Literatures, and Psychology, University of Florence, Florence, Italy
[eq] Department of Psychology, Universidad del Norte, Barranquilla, Colombia
[er] Faculty of Medicine of Monastir, Eya Medical Centre, Monastir, Tunisia
[es] Department of Family and Community Medicine, School of Community Medicine, University of Oklahoma, Tulsa, United States of America
[et] Institute of Psychology, University of Pécs, Pécs, Hungary
[eu] Department of Health Sciences, DePaul University, Chicago, United States of America
[ev] Department of Psychology, School of Health Sciences in Katowice, Medical University of Silesia, Katowice, Poland
[ew] Institute of Pedagogy, University of Bielsko-Biala, Bielsko-Biala, Poland
[ex] Department of Psychology, Virginia Wesleyan University, Virginia Beach, United States of America
[ey] Faculty of Human Sciences, University of Tsukuba, Tsukuba, Japan
[ez] Department of Restorative and Prosthetic Dental Sciences, College of Dentistry, Dar Al Uloom University, Riyadh, Saudi Arabia
[fa] Department of Psychology, University of Porto, Porto, Portugal
[fb] Research Center in Business Sciences and Tourism of Consuelo Vieira da Costa Foundation (CICET-FCVC), Porto, Portugal
[fc] Division of Research, Physical Education College of the Brazilian Army, Rio de Janeiro, Brazil
[fd] Physical Education Unit, Chinese University of Hong Kong, Hong Kong, China
[fe] Department of Physiology, Mahatma Gandhi Medical College and Research Institute, Puducherry, India
[ff] Social and Education Sciences Department, School of Arts and Sciences, Lebanese American University, Jbeil, Lebanon
[fg] Institute of Social Sciences, Universidad de O'Higgins, Rancagua, Chile
[fh] Department of Psychology and Behavioural Studies, Ekiti State University, Ado-Ekiti, Nigeria
[fi] Department of Dermatology, Venereology, and Andrology, Alexandria University, Alexandria, Egypt
[fj] Department of Management, University of Agder, Kristiansand, Norway
[fk] Santa Lucia Foundation, Scientific Institute for Research and Healthcare, Rome, Italy
[fl] Department of Psychology, Yonsei University, Seoul, South Korea
[fm] Environment and Sustainability Research Initiative, Khulna, Bangladesh
[fn] Environmental Science Discipline, Life Science School, Khulna University, Khulna, Bangladesh
[fo] Department of Managerial Psychology, The University of Presov, Presov, Slovakia
[fp] Department of Human Anatomy, Histology and Embryology, Faculty of Medicine, Medical University of Plovdiv, Plovdiv, Bulgaria
[fq] Department of Developmental and Educational Psychology, Faculty of Psychology, University of Vienna, Vienna, Austria
[fr] Systems Engineering and Engineering Management, University of North Carolina, Chapel Hill, United States of America
[fs] Slovene Centre for Suicide Research, Andrej Marusic Institute, University of Primorska, Koper, Slovenia
[ft] Department of Psychology FAMNIT, University of Primorska, Koper, Slovenia
[fu] Department of Environmental Ecology and Landscape Management, Faculty of Natural Sciences, Comenius University in Bratislava, Bratislava, Slovakia
[fv] Institute of Zoology, Slovak Academy of Sciences, Bratislava, Slovakia
[fw] School of Social Work, University of Missouri, Columbia, United States of America
[fx] Institute of Psychology, Marie Curie-Skłodowska University, Lublin, Poland
[fy] Institute of Psychology, Jagiellonian University, Kraków, Poland
[fz] Department of Counseling, School, and Educational Psychology, Graduate School of Education, University at Buffalo-SUNY, Buffalo, United States of America
[ga] Arabic Program Department, Modern College of Business and Science, Muscat, Oman
[gb] Department of Psychology, University of Zadar, Zadar, Croatia
[gc] KOSHISH-National Mental Health Self-Help Organization, Kusunti, Lalitpur, Nepal
[gd] Department of Health, Physical Education and Recreation, University of Cape Coast, Cape Coast, Ghana
[ge] Department of Evolutionary Anthropology, University of Vienna, Vienna, Austria
[gf] Human Evolution and Archaeological Sciences, University of Vienna, Vienna, Austria
[gg] Max Planck Institute for Human Development, Berlin, Germany
[gh] School of Applied Psychology, Griffith University, Gold Coast, Australia
[gi] Department of Psychology, Eskişehir Osmangazi University, Eskişehir, Turkiye
[gj] Department of Psychology, Islamic Azad University, Bandar Gaz, Iran
[gk] Department of Psychology, Middlesex University Dubai, Dubai, United Arab Emirates
[gl] Department of Psychology, University of Dhaka, Dhaka, Bangladesh
[gm] Department of Business Administration, Reykjavik University, Reykjavik, Iceland
[gn] Faculty of Social Sciences, Vidzeme University of Applied Sciences, Valmiera, Latvia

[go] Department of Medical Psychology and Psychosomatics, Faculty of Medicine, Masaryk University, Brno, Czechia
[gp] Regional Department for Eating Disorders, Oslo University Hospital, Oslo, Norway
[gq] Department of Psychology, Faculty of Humanities, Chiang Mai University, Chiang Mai, Thailand
[gr] International Centre for Psychological Counselling and Social Research, Puducherry, India
[gs] Department of Psychology, University of the Andes, Bogotá, Colombia
[gt] Department of Psychology, West University of Timişoara, Timişoara, Romania
[gu] Department of Psychology, The Ohio State University, Columbus, United States of America
[gv] Department of Clinical Psychology, United Arab Emirates University, Al Ain, United Arab Emirates
[gw] Faculty of Education, Psychology, and Art, University of Latvia, Riga, Latvia
[gx] Vice-rectory for Teaching, Research, and Extension, Universida Latina de Costa Rica, San José, Costa Rica
[gy] Department of Research Methods and Diagnosis in Education, University of València, València, Spain
[gz] Department of Psychology, Massey University, Auckland, New Zealand
[ha] School of Psychology, University of Nottingham Malaysia, Semenyih, Malaysia
[hb] Department of Psychology, Lingnan University, Hong Kong, China
[hc] Department of Undergraduate Studies, Temple University, Japan Campus, Tokyo, Japan
[hd] Wofoo Joseph Lee Consulting and Counselling Psychology Research Centre, Lingnan University, Hong Kong, China
[he] Department of Physical Education, São Judas Tadeu University, São Paulo, Brazil

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ABSTRACT

The Body Appreciation Scale-2 (BAS-2) is a widely used measure of a core facet of the positive body image construct. However, extant research concerning measurement invariance of the BAS-2 across a large number of nations remains limited. Here, we utilised the Body Image in Nature (BINS) dataset – with data collected between 2020 and 2022 – to assess measurement invariance of the BAS-2 across 65 nations, 40 languages, gender identities, and age groups. Multi-group confirmatory factor analysis indicated that full scalar invariance was upheld across all nations, languages, gender identities, and age groups, suggesting that the unidimensional BAS-2 model has widespread applicability. There were large differences across nations and languages in latent body appreciation, while differences across gender identities and age groups were negligible-to-small. Additionally, greater body appreciation was significantly associated with higher life satisfaction, being single (versus being married or in a committed relationship), and greater rurality (versus urbanicity). Across a subset of nations where nation-level data were available, greater body appreciation was also significantly associated with greater cultural distance from the United States and greater relative income inequality. These findings suggest that the BAS-2 likely captures a near-universal conceptualisation of the body appreciation construct, which should facilitate further cross-cultural research.

1. Introduction

The past decade has witnessed a dramatic growth in research and research-informed practice on *positive body image* (Andersen & Swami, 2021), which Tylka (2018, p. 9) defined as an "overarching love and respect for the body". Emerging consensus suggests that positive body image is not merely the polar opposite of negative body image; that is, positive body image is not the absence of negative body image (for reviews, see Daniels et al., 2018; Tylka, 2019). Instead, positive body image is theorised as a complex construct that is distinct from negative body image (Alleva et al., 2023; Tylka, 2018, 2019; Tylka & Wood-Barcalow, 2015a). Although positive body image consists of multiple facets (e.g., functionality appreciation, body image flexibility; for a review, see Webb et al., 2015), a core component is the facet of *body appreciation*, which Tylka and Wood-Barcalow (2015b, p. 53) defined as "accepting, holding favorable opinions toward, and respecting the body, while also rejecting media-promoted appearance ideals as the only form of human beauty". Recent work has shown that the facet of body appreciation provides the closest and most precise measurement of a core positive body image construct (Swami et al., 2020).

Body appreciation has been shown to be associated with positive outcomes in a broad range of life domains. For instance, body appreciation is a core component of the Acceptance Model of Intuitive Eating (Augustus-Horvath & Tylka, 2011; Avalos & Tylka, 2006), which posits that body appreciation contributes to adaptive eating patterns and lower eating pathology (Linardon, 2021; Linardon et al., 2021; Messer et al., 2022). In addition, body appreciation is inversely associated with a range of indices of psychopathology (e.g., symptoms of depression, anxiety) and positively associated with many adaptive well-being constructs (e.g., life satisfaction, self-compassion, sexual satisfaction; for a review, see Linardon et al., 2022). A wealth of evidence also suggests that body appreciation is positively associated with health-promoting behaviours, including preventive sexual health behaviours, preventive cancer behaviours (for a review, see Nolen & Panisch, 2022), and sports participation (Riddervold et al., 2023). Given this evidence, understanding how body appreciation is operationalised, particularly in different communities, is of vital importance.

To measure the construct of body appreciation, Avalos et al. (2005) developed the Body Appreciation Scale (BAS). The BAS is a 13-item instrument that, in samples of college women from the United States, was found to be unidimensional (Avalos et al., 2005). Although this unidimensional model of the BAS was later reported to be invariant across college women and men from the United States (Tylka, 2013), studies in other national and/or linguistic contexts suggested that scores were multidimensional (for a review, see Swami, 2018). Specifically, it was suggested that BAS scores could be better conceptualised as consisting of a general body appreciation factor and a distinct factor tapping body image investment (i.e., the degree to which individuals focus on, or are concerned by, their bodies; see Swami & Chamorro-Premuzic, 2008; Swami & Jaafar, 2012). Additionally, one BAS item required different wording when being completed by women or men, and some item content no longer kept pace with developments in scholarly understanding of the body appreciation construct. This led Tylka and Wood-Barcalow (2015b) to develop a revision of the BAS, namely the BAS-2.

The BAS-2 is a 10-item instrument in which psychometrically poor-performing items from the BAS were eliminated and in which new items reflecting developments in the conceptualisation of the body appreciation construct (e.g., no longer viewing positive body image as the absence of negative body image) were developed (Tylka & Wood-Barcalow, 2015b). In college and community samples from the United States, Tylka and Wood-Barcalow (2015b) reported that BAS-2 scores corresponding with a unidimensional model had adequate

composite reliability, test-retest reliability over a 3-week period, and convergent, incremental, and discriminant validity. Complementary work indicated that the BAS-2 items are invulnerable to priming effects (i.e., interpretation of items is not influenced by the content of prior administered measures; Dignard & Jarry, 2019) and that a unidimensional factor structure of the BAS-2 is invariant across social identity groups in North America (e.g., across sexual orientations and gender identities; Paquette et al., 2022; Soulliard & Vander Wal, 2019, 2022). Additionally, state (Homan, 2016), child-friendly (Halliwell et al., 2017; see also Swami, Punshon et al., 2022), and short forms (Tylka et al., 2022) of the BAS-2 have been developed, making the BAS-2 and its variants the most widely used instruments for measuring positive body image (Kling et al., 2019; Tylka, 2019).

Importantly, and unlike the BAS, scores on the BAS-2 have also been found to consistently exhibit a unidimensional factor structure in various social identity groups, including within particular national populations (e.g., Behrend & Warschburger, 2022; Casale et al., 2021; Ma et al., 2022; Swami et al., 2017, 2019; Warschburger & Behrend, 2023). This, in turn, raises an interesting question: does the BAS-2 measure the same latent construct of body appreciation *across* diverse social identity groups? In other words, does the BAS-2 achieve measurement invariance (Vandenberg & Lance, 2000), which is typically viewed as a prerequisite of both comparison of latent scores across groups, as well as examination of differential relations between constructs across groups (Boer et al., 2018; Chen, 2008; Guenole & Brown, 2014; Swami & Barron, 2019)? Measurement invariance can be determined at different levels, including configural (i.e., invariance of model form), metric (i.e., equivalence of item loadings on factors), scalar (i.e., equivalence of item intercepts), and strict levels (i.e., equivalence of item residuals of metric and scalar invariance of items) of invariance (for details, see Vandenberg & Lance, 2000; Wells, 2021), with scalar or partial scalar invariance typically considered a minimum threshold for comparison of latent means (Chen, 2007; Putnick & Bornstein, 2016).

To date, only a handful of studies have examined the invariance of BAS-2 scores across national groups. Studies with adolescents have shown that the BAS-2 achieved full scalar invariance across samples from Argentina, Colombia, and Mexico (Góngora et al., 2020) and partial scalar invariance across samples from Denmark, Portugal, and Sweden (Lemoine et al., 2018). In adults, meanwhile, the evidence base is more equivocal. One study using data from two nations (Malaysia and the United Kingdom; Todd & Swami, 2020) and another with data from eight nations (Australia, Belgium, Canada, China, Italy, Japan, Spain, and the United States; Aimé et al., 2020) provided support for partial scalar invariance once intercepts for several items were relaxed. Another comparison of five nations (Iran, Japan, Poland, Serbia, and the United States; Razmus et al., 2020) failed to support either full scalar or metric invariance, with partial metric invariance only achieved once the factor loading of one item was relaxed. Other work has examined cross-national differences in body appreciation, but has done so in the absence of first establishing measurement invariance (Torres et al., 2022).

Beyond invariance across nations, studies have generally supported full or partial scalar invariance of BAS-2 scores across women and men in diverse national settings (e.g., Junqueira et al., 2019; Swami et al., 2019; Tan et al., 2021; Tylka & Wood-Barcalow, 2015b; Warschburger & Behrend, 2023; but for contrasting evidence, see de León et al., 2021; Swami et al., 2017; Zarate et al., 2021). This, in turn, has allowed for comparisons of BAS-2 scores, with one meta-analysis concluding that men had significantly greater body appreciation than women ($d = 0.27$; He et al., 2020). However, two cross-national studies have found evidence of differential item functioning with regards to gender on BAS-2 items (Razmus et al., 2020; Zarate et al., 2021); that is, gender identity shaped responses to some items on the instrument, suggesting that gendered experiences may inform how specific items of the BAS-2 are understood. In contrast, assessments of invariance of the BAS-2 across age groups remain rare, though the unidimensional model has been found to be invariant across early/middle and late adolescents (de Léon et al., 2021) and remains stable in late adulthood (Meneses et al., 2019). There is also some evidence of a positive linear relationship between body appreciation and age (Quittkat et al., 2019; Tiggemann & McCourt, 2013), though it is also possible that lifespan changes affect responding to the BAS-2 (Aimé et al., 2020; Razmus et al., 2020).

1.1. Multinational studies

Large, multinational studies offer unique opportunities to (re-) consider issues of invariance vis-à-vis the BAS-2, but multinational studies to date have either relied on secondary data (which limits the extent of operational equivalence; Swami & Barron, 2019) or have included samples from only a small number of nations worldwide (i.e., a maximum of eight nations in Aimé et al., 2020). Both of these issues limit the sorts of conclusions that can be drawn about the invariance of the BAS-2 on a more global scale, a notable issue given that the BAS-2 is increasingly used in diverse national contexts. Likewise, studies have also failed to assess invariance of the BAS-2 across languages (as separate to national groups). An influential strand of test translation – the *theory of test translation error* (Solano-Flores et al., 2009) – notes that languages encode meaning in different ways and that translations impose severe restrictions in the way meaning can be conveyed. To take one example from the BAS-2: Item #6 ("I feel love for my body") may appear simple, but in a translatory context requires a consistent linguistic understanding of "love" and how such love is conveyed towards one's physical self (see Swami et al., 2019). As such, there is value in considering the extent to which the BAS-2 is invariant across languages, as distinct from national groups.

Multinational studies also offer opportunities to more comprehensively examine the nomological net of body appreciation. For instance, theoretical models of positive body image (e.g., Homan & Tylka, 2018; Iannantuono & Tylka, 2012) that draw from traditions of positive psychology suggest that individuals who appreciate their bodies are likely to experience downstream benefits in terms of psychological well-being and being able to flourish (Davis et al., 2020; Linardon et al., 2022, 2023). That is, greater body appreciation is positioned within these theoretical frameworks as playing an important role in promoting forms of self-acceptance and resilience that lead to improvements in psychological well-being (Romano & Heron, 2022; Tylka, 2018). Consistent with this theorising, studies have reliably shown that greater body appreciation is associated with higher scores on a range of indices of psychological well-being, such as life satisfaction and subjective happiness (e.g., Davis et al., 2020; Swami et al., 2018; Tylka & Wood-Barcalow, 2015b). To date, however, these studies have been limited to singular national contexts and there is little information about the extent to which such relationships may (or may not) vary across national contexts.

Large multinational studies also offer unique opportunities to extend current understanding of body appreciation. For instance, very few studies have assessed differences in body appreciation as a function of sociodemographic characteristics beyond gender identities and age. Certainly, a handful of studies have suggested that rural respondents (as compared to urban respondents; Swami & Kannan, & Furnham, 2012; Swami & Todd, 2022; see also Zhang et al., 2022) and racialised majority groups (as compared to racialised minority groups; Swami et al., 2009, 2019) have significantly greater body appreciation. However, the evidence base is limited to a very small number of nations and is also sometimes equivocal (e.g., some studies report no significant differences in body appreciation between racialised majority and minority groups; Gillen & Dunaev, 2017; Romano & Heron, 2022). Likewise, although there is some evidence that greater body appreciation is associated with higher socioeconomic status (Ramseyer Winter et al., 2021) or proxies of socioeconomic status (e.g., higher education; Swami et al., 2015), there remains a need to more comprehensively examine such associations, particularly in a cross-national setting.

Beyond sociodemographic characteristics, it is notable that the existing body appreciation literature has focussed on individual-level factors (e.g., levels of physical activity, personality; Alleva et al., 2018; Swami et al., 2008) to the exclusion of nation-level factors. Nation-level factors reflect the traditions and common ways of thinking or experiencing the world that make individuals within a nation or region more similar among themselves than with individuals from other nations or regions (Hofstede, 2001). Such country-level factors may, in turn, shape the internalised meanings and experiences that affect individuals' experiences of the social and physical environment (cf. Lazarus, 1991) and, by extension, their relationships with their physical selves (e.g., Swami et al., 2021a; Wollast et al., 2021). Put differently, it is possible that national-level factors shape the meaning and interpretation of self-relevant information and, hence, influence body appreciation. To date, however, associations between body appreciation and such nation-level factors have not been investigated.

1.2. The present study

To summarise, there is a need to better understand issues around measurement invariance of the BAS-2 across national contexts, the stability of the association between BAS-2 scores and psychological well-being across nations, and associations between BAS-2 scores and sociodemographic characteristics and national-level indicators, respectively. These issues are best approached from a multinational perspective, particularly given the historic neglect of such a perspective from body image research (Andersen & Swami, 2021). To address these issues, we utilised data from the Body Image in Nature Survey (BINS; Swami et al., 2022), a collaborative, researcher-crowdsourced project that gathered BAS-2 data between 2020 and 2022 from participants in 65 nations. The BINS dataset presents unprecedented opportunities to advance knowledge on body appreciation on a number of fronts. Indeed, to our knowledge, the BINS dataset contains the largest bank of information on cross-national body image generally, and body appreciation specifically, that has ever been collated.

Thus, drawing on the BINS dataset, we first examined measurement invariance of the BAS-2 across nations, gender identities, and age groups (i.e., emerging adults: 18–24 years; young adults 25–44 years; middle-age and older adults: $\geq$ 45 years; Arnett, 2000; Erikson, 1968). Additionally, and to account for the possibility that linguistic structures may impact measurement invariance (Swami, Todd et al., 2021b), we also conducted the first test of measurement invariance of the BAS-2 across languages (i.e., across the 40 languages represented in the BINS). Based on findings that the BAS-2 minimally achieves partial scalar invariance across national contexts (e.g., Aimé et al., 2020; Góngora et al., 2020; Lemoine et al., 2018; Todd & Swami, 2020), we expected to be able to replicate this across nations, languages, age groups, and gender identities. Should partial or full scalar partial invariance be established, this would allow for an examination of differences in latent BAS-2 scores across nations, languages, gender identities, and age groups (Chen, 2007).

In addition, we also aimed to examine the stability of associations between body appreciation and psychological well-being, operationalised in terms of life satisfaction, across nations. Life satisfaction was selected as our measure of psychological well-being here for practical reasons (i.e., it was the only explicit measure of well-being included in the BINS), but also because of the reliable association between body appreciation and life satisfaction in singular national communities (e.g., Davis et al., 2020; Lee, 2022; Swami et al., 2019; Swami & Todd, 2022). Here, we expected that greater body appreciation would be reliably associated with greater life satisfaction across all nation contexts (cf. Linardon et al., 2022). Next, across nations, we examined associations between body appreciation and sociodemographic characteristics, namely socioeconomic status (operationalised via the proxies of financial security and education), racialised status, and urbanicity. Here, we hypothesised that greater body appreciation would be evidenced in respondents with greater socioeconomic status, of racialised majority status, and living in rural sites (cf. Ramseyer Winter et al., 2021; Swami et al., & Furnham, 2012, 2015, 2019; Swami & Todd, 2022).

Finally, in more exploratory analyses, we examined associations between body appreciation and selected nation-level indicators. Although we had intended to include a range of indicators to reflect cultural, political, economic, and gendered factors, our preliminary analyses (see Section 2.6) indicated that these were better represented as consisting of two components represented by cultural distance from Western, Educated, Industrialised, Rich, and Democratic (WEIRD) nations (or "cultural WEIRDness"; i.e., the degree to which a target nation differs from an anchor nation in terms of broadly defined culture or values; that is, this is a cultural fixation index, with the United States as an anchor; Muthukhrisha et al., 2020) and the Gini coefficient (a measure of wealth inequality; for background, explanation, and meaning, see Tran et al., 2021). Preliminarily, we expected that greater body appreciation would be significantly associated with greater cultural distance from the United States and greater wealth inequality. This was based on our assumption that nations that are more culturally distant from the United States and/or experience greater income inequality are less likely to tie individual self-worth to physical appearance and a willingness to engage in personal body projects (Swami, 2015, 2021).

2. Method

2.1. Overview of the body image in nature survey

The Body Image in Nature Survey (BINS) is a researcher-crowdsourced project involving 253 scientists working collaboratively across 65 nations (for a detailed, published study protocol, see Swami et al., 2022). All data were collected between November 2020 and February 2022 with community sampling, with the majority of recruitment taking place online. The overall project received ethics approval from the School Research Ethics Panel at the first author's institution (approval code: PSY-S19–015) and, unless exempt by national laws, all collaborating teams additionally obtained ethics approval from local institutional ethics committees or review boards. A list of nations, associated sample sizes, data collection methods, ethics approvals, and survey languages is presented in Supplementary Table S1.

2.2. Participants

The BINS dataset consists of 56,968 respondents from 65 nations, of whom 58.9% (n = 33,539) were women, 40.5% (n = 23,083) were men, and 0.6% (n = 346) were of another gender identity. In terms of race, the majority (74.2%, n = 42,269) self-identified as being part of a racialised majority, whereas 11.3% (n = 6448) identified as part of a racialised/ethnic minority group, and 13.5% (n = 7689) were uncertain about their status (race data were not collected in France [n = 562; 1.0%] due to a legal prohibition banning the collection and storage of race-based data). In terms of self-reported residence, 27.1% (n = 15,408) of participants lived in a capital city, 13.7% (n = 7811) lived in a suburb of a capital city, 25.1% (n = 14,319) lived in a provincial city (more than 100,000 residents), 18.7% (n = 10,680) lived in a provincial town (more than 10,000 residents), and 15.4% (n = 8750) lived in a rural area. In terms of educational attainment, 0.5% (n = 255) reported that they had no formal education, 2.1% (n = 1171) had completed primary education, 17.5% (n = 9954) had completed secondary education, 33.5% (n = 19,105) had completed lower tertiary education, 21.5% (n = 12,274) had completed higher tertiary education, 21.5% (n = 12,262) were in full-time education, and 3.4% (n = 1947) had some other qualification. Most participants were single (42.0%, n = 23,955), whereas 19.5% (n = 11,083) were in a committed relationship but not married, 33.5% (n = 19,056) were married, and 5.0% (n = 2874) had another status. With regard to their financial security, 24.9% (n = 14,157) of participants

reported that they felt less secure relative to others of their own age in their nation of residence, 49.6% ($n = 28,266$) equally secure, and 25.5% ($n = 14,545$) more secure. Participants ranged in age from 18 to 99 years ($M = 33.10$, $SD = 13.79$) and in body mass index (BMI) from 12.17 to 60.00 kg/m^2 ($M = 24.46$, $SD = 5.00$). Table 1 presents detailed sample description data for all individual nations (differentiating between survey presentations in different languages in individual nations).

2.3. Measures

2.3.1. Body appreciation

As part of the BINS survey package, participants completed the 10-item Body Appreciation Scale-2 (BAS-2; Tylka & Wood-Barcalow, 2015b) using a 5-point response scale (1 = *never*, 5 = *always*). Unless presented in English (in nations where English is the main or a widely spoken language), or where a previously-validated translation was not available, the BAS-2 was translated for use in BINS using the parallel back-translation procedure (Brislin, 1986). Further information about the translation procedure is available in Swami et al. (2022) but, in brief, this involved a bilingual individual translating the BAS-2 from English into the target language. A second bilingual individual then translated this version back into English. Next, the two versions of the measure were assessed – and any discrepancies settled – by a committee consisting minimally of the two translators and a researcher involved in the project. A list of the languages in which the BINS survey package was presented is reported in Supplementary Table S1.

2.3.2. Life satisfaction

Participants also completed the 5-item Satisfaction With Life Scale (SWLS; Diener et al., 1985) in the BINS survey package, using a 7-point response scale (1 = *strongly disagree*, 7 = *strongly agree*). Scores on this instrument have been shown to achieve full configural and metric invariance across most national groups and languages represented in the BINS (Swami et al., 2023), thus allowing this instrument to be used in correlational analyses with the BAS-2. Median composite reliability, as assessed using McDonald's ω, was .84 across nations and .85 across languages represented in the BINS (Swami et al., 2023). In order to control for measurement error, available factor scores obtained from a partial scalar measurement invariance model (Swami et al., 2023) were used in the present analysis.

2.3.3. Financial security

Following previous cross-national work (Swami et al., 2012, 2020), participants were asked to self-report how financially secure they felt relative to others of their own age in their country of residence (1 = *less secure*, 2 = *same*, 3 = *more secure*).

2.3.4. Urbanicity

To assess urbanicity, participants were asked about their current place of residence, with response options adapted from Pedersen and Mortensen (2001) as follows: *capital city*, *capital city suburbs*, *provincial city (more than 100,000 residents)*, *provincial town (more than 10,000 residents)*, and *rural areas*. Response options were assigned values 1–5 (in the above order) for statistical analysis and collapsed into *urban* versus *rural* for descriptive purposes. This measure of urbanicity has been used in previous cross-national work (Swami et al., 2020).

2.3.5. Body mass index

Participants self-reported their height and weight, which we used to compute self-reported BMI as kg/m^2. Following Swami et al. (2018), data for participants with improbable BMI values (< 12 or > 60 kg/m^2) were recoded as missing values. In keeping with weight-neutral approaches to research practice (e.g., Mensinger et al., 2016), we report BMI values for descriptive purposes only.

2.3.6. Demographics

Participants were asked to provide their demographic data consisting of gender identity (1 = *woman*, 2 = *man*, 3 = *describe gender in another way*), age (open-ended), highest educational qualification (1 = *no formal education*, 2 = *primary education*, 3 = *secondary education*, 4 = *still in full-time education*, 5 = *undergraduate degree*, 6 = *postgraduate degree*, 7 = *other*), marital status (1 = *single*, 2 = *single but in a committed relationship*, 3 = *married*, 4 = *other*), and ethnicity/race (1 = *ethnic/racial majority*, 2 = *ethnic/racial minority*, 3 = *not sure*). For descriptive purposes at the national level and for analyses, response options for highest educational qualification were collapsed into *secondary/tertiary* (secondary education, undergraduate degree, postgraduate degree) versus *other* (all remaining categories) and response options of marital status were collapsed into *committed/married* (single but in a committed relationship, married) versus *other* (all remaining categories). Response options of ethnicity/race were collapsed into *racialised minority* (racial minority) versus *other* (all remaining categories).

2.4. Nation-level indicators

We gathered data on country-level indicators as follows: individualism (Hofstede Insights, 2021; estimates are provided for countries without values), cultural looseness (Uz, 2015), cultural distance (Muthukrishna et al., 2020), global freedom (Freedom House, 2022), the Human Development Index with data from 2019 (United Nations Development Programme, 2022), the Gini coefficient with data from the latest available year (United Nations Development Programme, 2022), and the Gender Inequality Index with data from 2019 (United Nations Development Programme, 2022).

2.5. Procedures, ethics, and data sharing

Full procedural information about the BINS is provided in Swami et al. (2022). The BINS project was conducted in accordance with the principles of the Declaration of Helsinki (World Medical Association, 2013) and following all local institutional guidelines. In brief, once local ethics approval had been obtained or collaborators confirmed that approval was not required as per national laws (see Supplementary Table S1), researchers recruited participants from the community in their respective nations between November 2020 and February 2022. Inclusion criteria were being ≥ 18 years of age, a resident and citizen of the particular nation in which recruitment took place, and being able to complete a survey in the language in which it was presented. In all but nine locales (see Supplementary Table S1), data collection was conducted online. All participants were presented with a standardised information sheet and provided (digital or written) informed consent before completing an anonymous version of the BINS survey package. Upon completion of the survey, participants received debriefing information, which included contact information for the first author as well as a local researcher. The BINS data and our analytic codes are available on the Open Science Framework at https://osf.io/6psj3/.

2.6. Analytic strategy

2.6.1. Tests of measurement invariance

The BINS study protocol (Swami et al., 2022) provides the general analysis plan for the structural and measurement invariance analyses of the key variables of the BINS and, hence, also of the BAS-2. Configural, metric, and scalar measurement invariance was assessed (in this sequence) through the use of multi-group confirmatory factor analysis (MG-CFA; Chen, 2007). Configural invariance tested for whether all ten BAS-2 items loaded onto a single underlying factor in all groups; metric invariance tested for whether item loadings were the same in all groups; and scalar invariance tested for whether item intercepts were the same in all groups.

Four separate analyses were conducted for measurement invariance

Table 1
Sample Descriptions of Data from the Body Image in Nature Survey (BINS).

Nation	Sample size	Mean age in years (*SD*)	Mean BMI in kg/m^2 (*SD*)	% Women	%Ethnic/ racial minority	%Secondary/ tertiary education	%Urban residence	%In committed relationship or married	Mean financial security (*SD*)
Argentina	670	35.36 (13.6)	24.70 (4.35)	57	9	81	98	50	2.13 (0.7)
Australia	1038	35.23 (13.1)	25.73 (5.84)	71	18	77	93	55	1.90 (0.8)
Austria	1279	41.99 (16.5)	25.05 (5.10)	54	9	62	67	63	2.08 (0.7)
Bahrain	441	30.47 (9.8)	27.01 (6.58)	74	8	87	98	51	1.98 (0.6)
Bangladesh	460	29.30 (8.6)	24.15 (3.80)	42	13	80	88	51	1.78 (0.8)
Bosnia & Herzegovina	406	43.93 (10.9)	26.06 (4.14)	64	16	90	87	70	2.15 (0.7)
Brazil	1462	36.77 (12.0)	25.61 (4.56)	58	12	86	99	66	2.21 (0.7)
Bulgaria	248	33.52 (14.1)	23.72 (4.80)	62	4	54	92	52	2.16 (0.6)
Canada (English)	336	24.61 (10.0)	25.13 (6.55)	83	14	36	82	48	2.10 (0.7)
Canada (French)	806	38.22 (12.8)	25.36 (5.21)	88	7	95	78	72	2.29 (0.7)
Chile	422	36.14 (13.6)	25.62 (4.73)	79	8	73	94	41	2.28 (0.8)
China (Cantonese)	409	20.50 (5.9)	20.61 (3.06)	58	2	96	100	2	2.18 (0.7)
China (English)	349	21.93 (5.3)	21.89 (4.30)	65	6	62	97	26	1.79 (0.7)
China (Mandarin)	1231	35.00 (7.3)	22.22 (3.08)	69	4	92	95	86	1.82 (0.6)
Colombia	793	27.15 (11.5)	24.26 (4.09)	60	7	57	96	22	2.01 (0.8)
Croatia	898	39.10 (12.1)	24.67 (4.30)	59	2	91	71	69	2.08 (0.7)
Cyprus	363	34.31 (9.6)	24.64 (4.99)	65	4	69	87	64	2.09 (0.7)
Czechia	700	38.10 (17.0)	23.86 (4.26)	66	2	75	82	62	2.29 (0.6)
Ecuador	863	30.97 (12.3)	24.77 (5.84)	53	11	65	86	33	1.81 (0.8)
Egypt	1627	23.62 (8.7)	25.34 (4.59)	72	6	86	98	27	2.06 (0.6)
Estonia	449	38.93 (14.1)	25.15 (4.87)	63	2	64	80	58	2.10 (0.7)
France	562	36.01 (14.2)	23.44 (4.50)	76	NA	67	64	47	2.08 (0.7)
Germany	620	31.01 (11.9)	24.90 (4.53)	62	12	64	83	58	2.18 (0.8)
Ghana	434	21.97 (4.5)	23.42 (4.98)	41	26	72	84	32	2.08 (0.8)
Greece	556	31.49 (11.8)	24.11 (4.38)	65	5	63	91	55	2.03 (0.7)
Hungary	654	32.80 (13.4)	24.05 (5.09)	69	2	69	72	63	2.07 (0.6)
Iceland (English)	1149	38.50 (17.5)	25.30 (4.41)	50	11	61	92	65	2.27 (0.7)
Iceland (Icelandic)	432	54.91 (15.5)	28.11 (5.06)	54	3	81	75	78	2.05 (0.6)
India (Hindi)	1664	32.07 (11.8)	24.79 (5.51)	45	13	78	73	45	2.14 (0.8)
India (Tamil)	376	36.78 (12.1)	25.36 (5.16)	52	37	65	57	70	1.71 (0.6)
Indonesia	292	19.79 (3.2)	21.68 (4.08)	72	3	43	87	14	1.76 (0.5)
Iran	1318	33.46 (11.3)	24.83 (4.77)	60	29	82	95	61	1.99 (0.6)
Iraq	405	34.13 (12.1)	26.31 (4.18)	33	53	97	100	45	1.49 (0.5)
Ireland	351	33.73 (12.4)	25.31 (5.23)	50	5	80	76	62	2.11 (0.8)
Israel	493	30.77 (11.6)	23.71 (4.27)	62	7	67	87	32	2.13 (0.7)
Italy	2307	33.17 (14.0)	23.16 (3.89)	62	6	67	81	61	1.95 (0.6)
Japan	360	49.44 (16.6)	22.35 (3.84)	100	8	81	90	61	1.79 (0.6)
Kazakhstan	380	30.07 (11.3)	23.72 (4.81)	53	11	76	94	48	2.04 (0.6)
Latvia	827	41.04 (12.8)	25.92 (5.33)	66	4	82	74	69	2.02 (0.7)
Lebanon	1295	25.74 (12.3)	23.19 (4.52)	67	16	63	70	33	1.93 (0.7)

(*continued on next page*)

Table 1 (*continued*)

Nation	Sample size	Mean age in years (*SD*)	Mean BMI in kg/m^2 (*SD*)	% Women	%Ethnic/ racial minority	%Secondary/ tertiary education	%Urban residence	%In committed relationship or married	Mean financial security (*SD*)
Lithuania	491	40.34 (12.8)	25.28 (4.51)	51	3	84	72	74	2.05 (0.6)
Malaysia	1193	27.81 (8.7)	23.81 (5.08)	69	30	84	76	29	1.74 (0.6)
Malta	347	35.52 (15.4)	25.12 (5.34)	72	7	71	78	60	2.10 (0.7)
Nepal	353	25.78 (6.0)	21.41 (2.95)	50	5	98	82	28	1.77 (0.7)
Netherlands	1004	46.81 (16.3)	25.60 (4.96)	53	9	98	61	69	2.05 (0.6)
Nigeria	1274	31.64 (9.2)	23.58 (4.72)	34	14	64	93	63	1.85 (0.8)
Norway	360	41.24 (11.6)	25.31 (4.71)	77	4	92	78	77	2.17 (0.7)
Pakistan	267	20.59 (2.7)	21.34 (4.42)	28	49	47	100	83	2.16 (0.9)
Palestine	401	27.64 (9.5)	24.22 (4.28)	25	7	90	81	42	2.01 (0.6)
Philippines (English)	350	24.87 (11.2)	24.00 (5.94)	0	13	56	97	24	2.03 (0.7)
Philippines (Tagalog)	504	37.43 (11.9)	24.57 (5.52)	73	16	89	97	65	1.83 (0.7)
Poland	1954	30.51 (11.9)	23.98 (4.53)	62	3	63	74	56	1.99 (0.7)
Portugal	363	36.53 (17.9)	24.12 (4.09)	68	5	81	85	37	2.05 (0.7)
Romania	1819	26.94 (10.8)	24.34 (4.19)	53	5	49	80	60	2.05 (0.7)
Russia	206	39.94 (11.8)	24.81 (5.01)	71	8	84	97	67	1.84 (0.5)
Saudi Arabia	380	28.02 (9.7)	25.30 (5.67)	55	20	83	94	33	2.03 (0.7)
Serbia	650	30.72 (11.3)	23.77 (3.93)	56	10	65	95	65	2.20 (0.7)
Slovakia	814	37.79 (14.7)	25.14 (5.09)	54	4	75	65	67	1.92 (0.6)
Slovenia	452	36.84 (14.9)	24.64 (4.14)	59	2	87	49	66	2.16 (0.7)
South Africa	318	35.15 (16.1)	26.91 (8.23)	53	31	73	78	45	1.74 (0.8)
South Korea	381	27.60 (9.7)	22.59 (3.27)	48	52	54	98	43	1.89 (0.6)
Spain	1266	34.54 (16.3)	24.99 (3.80)	52	5	82	88	43	2.17 (0.8)
Switzerland	377	46.48 (15.2)	26.62 (5.77)	52	5	51	62	66	1.98 (0.7)
Taiwan	529	41.36 (13.6)	23.39 (3.56)	60	7	92	90	67	2.48 (0.7)
Thailand	3275	25.85 (10.8)	22.35 (4.51)	62	6	45	87	23	1.76 (0.6)
Tunisia	374	41.62 (15.2)	25.57 (4.34)	55	0	90	96	63	2.10 (0.6)
Türkiye	2518	31.63 (11.5)	23.95 (4.15)	57	14	61	97	57	1.98 (0.8)
Ukraine	141	39.00 (11.7)	25.91 (6.08)	59	9	87	95	71	1.74 (0.6)
United Arab Emirates (Arabic)	204	26.37 (6.7)	23.30 (2.07)	73	10	35	99	39	2.07 (0.4)
United Arab Emirates (English)	904	27.50 (11.8)	25.12 (5.48)	36	31	73	98	43	2.13 (0.8)
United Kingdom	1243	37.99 (13.9)	26.07 (6.04)	54	23	87	84	68	2.03 (0.7)
United States of America	2531	35.35 (12.7)	26.87 (6.71)	62	20	82	85	61	1.93 (0.7)

Note. *SD* = standard deviation.

across: nations, languages, gender identities (women vs. men vs. other gender identities), and age (18–24 years vs. 25–44 years vs. ≥ 45 years). Analyses of languages, gender identities, and age groups applied specifically to the BAS-2 (and the SWLS; Swami et al., 2023) and were not mentioned in the more general BINS study protocol, which only listed the analysis of nations for all key variables. Surveys were presented in more than one language in Canada, China, Iceland, India, the Philippines, and the United Arab Emirates. Thus, prior to testing measurement invariance across nations, invariance of the cross-language survey presentation in these specific countries was first tested.

Item parameters were planned to be relaxed if measurement invariance did not hold, thereby aiming to achieve partial measurement invariance (i.e., equal item parameters across some groups and items, but not all). For this, we also planned to use the alignment method (Asparouhov & Muthén, 2014, 2022) to identify nations that possibly needed to be excluded to achieve acceptable model fit and to identify items that could be used as anchor items (two items as a minimum for the estimation of latent means; Byrne et al., 1989; for a recent simulation study confirming the accuracy of such an approach, see Pokropek et al., 2019). Based on either the full or partial scalar MG-CFA models, where

applicable, standardised latent mean differences between groups in all analyses are presented. For analyses involving nations and languages, the United Kingdom and English respectively were selected as referents, simply because the BINS was set up in the United Kingdom and in English. Reliability estimates (ω total; McDonald, 1999) for the BAS-2 are also presented, based on the configural invariance models.

2.6.2. Tests of correlations

Correlates of body appreciation across nations were examined with multilevel models. The factor scores of the national invariance model were used as the dependent variable. The groupmean-centred variables of financial security, urbanicity, education, marital status, racialised status, and life satisfaction (using factor scores) were used as Level-1 predictors. The nation-level means of all of these variables were used as Level-2 predictors to investigate the associations of these predictors with the outcome at Level 2 between nations. Bayesian estimation (using diffuse priors as specified in the Mplus software default settings) was used to obtain parameter estimates on a standardised scale.

A second model also included nation-level indicators as Level-2 predictors, besides the above-mentioned variables. However, to avoid overfitting, only significant ($p < .05$) nation-level means of the previous analysis were retained in this model. Further, faced with missing data in the nation-level indicators (available for 43 [cultural looseness] to 64 [Human Development Index] of the 65 nations; all seven indicators were available for only 27 nations) and substantial intercorrelations (up to $r = -.91$; see Table S2), we strove to identify the most salient nation-level indicators that were also available for most countries. For this, we applied principal components analysis and parallel analysis (Horn, 1965; using 1000 replications and the 95th percentile of the eigenvalue distributions of random data for comparison), which indicated one dominant component with loadings ≥ .74 for all nation-level indicators, except the Gini coefficient (see Table S3). In contrast, the two-component solution (see Table S3) suggested a high loading of the Gini coefficient on the second component. We interpreted this as evidence that all nation-level indicators, except the Gini coefficient, could be reliably represented by cultural distance (from the United States), which had the highest loading on the first component. Thus, we used cultural distance and the Gini coefficient as the only two nation-level indicators in subsequent analyses. This allowed us to investigate 42 of the 65 nations in the second analysis.

Concerning interpretation, because of the strength and direction of their loadings (see Table S3), any positive nation-level association of cultural distance with body appreciation also hinted at concurrent negative associations with individualism, cultural looseness, global freedom, and the Human Development Index, and a positive association with the Gender Inequality Index. However, the Human Development Index and the Gender Inequality Index also loaded on the second component with reverse signs (see Table S3). Thus, a simultaneous positive association of body appreciation with the Gini coefficient hinted at a relative decrease of the otherwise positive association of body appreciation with the Human Development Index, and a relative increase (i.e., towards 0) of the otherwise negative association with the Gender Inequality Index.

2.6.3. Assessing model fit

For all analyses, Mplus 8.8 (Muthén & Muthén, 1998–2017) was used, using full-information maximum likelihood estimation to account for partially missing data. There were 885 missing values in total (1.55%) across the items of the BAS-2. As stated in the study protocol (Swami et al., 2022), the mean- and variance-adjusted weighted least squares estimator (WLSMV) was used for the structural analyses, being specifically suited to the ordered-categorical item response format of the BAS-2. WLSMV requires the same number of item response options across all groups in a multi-group context. In some items and some groups, the first item response option was only sparsely endorsed, or not at all, owing to the overall (often highly) negatively skewed distributions of item responses in the BAS-2 (across all nations and items skewness ranged from −2.79 to 0.78, $Mdn = -0.55$). Hence, item responses were combined in some of the analyses (see table notes for details).

We report the comparative fit index (CFI) and the Tucker-Lewis index (TLI; values close to .95 indicative of good fit), the root-mean square error of approximation (RMSEA) and its 90% confidence interval (values close to .06 indicative of good fit), and the standardised root mean square residual (SRMR; values close to .08 indicative of good fit; Hu & Bentler, 1999) for the assessment of model fit. For MG-CFAs with more than 10 groups, we used a higher cut-off for the RMSEA of .15 (Jang et al., 2017), as RMSEA values tend to be inflated as the number of groups increases (Rutkowski & Svetina, 2014). However, we primarily relied on the SRMR values, as the other fit indices may be less reliable under WLSMV estimation (Shi & Maydeu-Olivares, 2020). For the comparison of configural, metric, and scalar invariance models in the MG-CFAs, ΔCFI and ΔRMSEA values, and $\Delta\chi^2$ tests are presented. We primarily interpreted ΔCFI and ΔRMSEA values, which were not affected by the large sample size of the current study, but also consulted the overall fit of these models for their comparative evaluation. Cut-offs recommended by Rutkowski and Svetina (2014) were utilised, with ΔCFI ≲.020 and ΔRMSEA ≲.030 taken as indication of good fit of metric invariance models in comparison to configural invariance models, and ΔCFI ≲.010 and ΔRMSEA ≲.01 as indication of good fit of scalar invariance models in comparison to metric invariance models.

3. Results

3.1. Invariance of cross-language survey presentation in six countries

The MG-CFA results concerning the invariance of the cross-language survey presentation in Canada, China, Iceland, India, the Philippines, and the United Arab Emirates (UAE) are presented in Supplementary Table S4. Response categories had to be combined for data from the Philippines and the UAE for analyses. There was evidence that configural, metric, and scalar invariance of the BAS-2 held across languages for all six countries, except for China and the UAE where the metric invariance model did not fully converge. Based on these results, full scalar invariance was assumed for all six countries and the available data were pooled within these countries for further analysis.

3.2. Invariance across nations, languages, gender identities, and age

3.2.1. Overall findings

The MG-CFA results are presented in Table 2. Some response categories had to be combined for analysis. However, across all 65 nations, 40 languages, the three gender identity groups, and three age groups, the BAS-2 demonstrated configural, metric, and scalar invariance. Scale reliabilities (ω total) ranged from .67 (Iraq) to .98 (Saudi Arabia) across nations, with a median of .95 ($P_{25} = .94$, $P_{75} = .96$), and from .85 (Tamil) to .97 (Lithuanian) across languages, with a median of .95 ($P_{25} = .94$, $P_{75} = .95$). Scale reliabilities were .95 each for women, other gender identities, and all age groups; scale reliability was .94 for men.

3.2.2. Nations

The ordering and magnitude of standardised latent mean differences (Cohen's *d*) between nations (as compared to the United Kingdom, which served as a common comparator in this analysis) in the scalar invariance model are provided in Fig. 1 (individual Cohen's *d* values are provided in Supplementary Table S5). The largest positive differences between nations, as compared to the United Kingdom, were observed for (in descending order) Malta, Taiwan, and Bangladesh and were in the range of $d = 1.48$–1.65 (see Fig. 1, left), suggesting that participants from these countries reported the highest body appreciation. The largest negative differences were observed for India and Australia (the UK itself was third from last) and were $d = -0.44$ and − 0.53, respectively.

Table 2
Invariance Concerning Nations, Language, Gender Identity, and Age.

							Model comparisons			
Grouping variable	χ^2 (*df*)	CFI	TLI	RMSEA	90% *CI*	SRMR	ΔCFI	ΔRMSEA	Configural	Metric
Nations[a]										
Configural invariance	23938.77(2275)	.984	.979	.104	[.103, .105]	.033				
Metric invariance	27795.40(2851)	.981	.981	.100	[.099, .101]	.037	.003	-.004	5742.80(576)	
Scalar invariance	48622.68(4131)	.966	.976	.111	[.110, .112]	.045	.018	.007	25945.92(1856)	
Language[b]										
Configural invariance	22184.18(1400)	.986	.982	.102	[.101, .103]	.029				
Metric invariance	22882.49(1751)	.985	.985	.092	[.091, .093]	.031	.001	-.010	3576.69(351)	
Scalar invariance	39418.97(2648)	.975	.983	.099	[.098, .100]	.039	.010	.007	19964.79(1248)	18282.53(897)
Gender identity										
Configural invariance	16832.61(105)	.986	.982	.092	[.090, .093]	.020				
Metric invariance	13312.54(123)	.989	.988	.075	[.074, .076]	.020	-.003	-.017	265.84(18)	
Scalar invariance	11896.95(181)	.990	.993	.058	[.057, .059]	.021	-.001	-.017	1457.32(76)	1283.50(58)
Age										
Configural invariance	18838.91(105)	.984	.979	.097	[.096, .098]	.021				
Metric invariance	14527.26(123)	.988	.986	.076	[.077, .080]	.021	-.004	-.021	96.53(18)	
Scalar invariance	12725.58(181)	.989	.992	.060	[.060, .061]	.022	-.001	-.016	1300.89(76)	1284.97(58)

Note. All *ps* of χ^2 and $\Delta\chi^2$ tests (model comparisons) were $< .001$, except where noted otherwise. Gender identity compared groups of women, men, and other gender identity, age compared groups of participants with 18–24 years, 25–44 years, $\geq$ 45 years of age.
[a] Response categories 1 and 2 of all items except Item #6 were combined for analysis.
[b] Response categories 1 and 2 of all items except Items #6, #7, #8 and #10 were combined for analysis.

3.2.3. Languages

The ordering and magnitude of standardised latent mean differences (Cohen's *d*) between languages (as compared to English, which served as a common comparator here) in the scalar invariance model are provided in Fig. 1 (individual Cohen's *d* values are provided in Supplementary Table S6). The largest positive differences between languages, as compared to English, were observed for Nepali, Tagalog, and Bangla and were in the range of $d = 0.56$–1.26 (Fig. 1, right). The largest negative differences were observed for Italian, Cantonese, and Japanese and were in the range of $d = -0.30$ to -0.83.

3.2.4. Gender identities and age groups

Gender identities differed in latent means by Cohen's $d = 0.14$ ($p < .001$; men vs. women) and $d = -0.26$ ($p < .001$; other gender identities vs. women); that is, body appreciation was highest in men and lowest in those identifying their gender in another way. Age groups differed in latent means by $d = -0.08$ ($p < .001$; 25–44 years vs. 18–24 years) and $d = 0.03$ ($p = .006$; $\geq$ 45 years vs. 18–24 years); that is, respondents aged 25–44 years reported slightly lower body appreciation than those aged 18–24 years and $\geq$ 45 years.

3.3. Correlates of body appreciation

3.3.1. Overall findings

The overall multilevel model (see Table 3) included 62 nations. Data on racialised status were not collected in France and there were no life satisfaction factor scores for Iraq and Nigeria, because data from these nations did not conform to the partial measurement model that was applicable to all other countries (Swami et al., 2023). At Level 1, greater body appreciation was associated with higher life satisfaction, being single (versus being married or in a committed relationship), and greater rurality (versus urbanicity). Life satisfaction was the single most important correlate (see Table 3). Converting the associations of the two dichotomous predictors of urbanicity (urban vs. rural) and marital status (committed/married vs. other) into standardised mean differences resulted in Cohen's $d = -0.04$ and -0.03, respectively. Higher life satisfaction was also associated with the body appreciation country-level means on Level 2.

3.3.2. Nation-level indicators

The model with all 42 nations with nation-level indicators (Table 3) recovered all associations of the predictors in the overall model with 62 nations. Additionally, both cultural distance and the Gini coefficient were positively associated with the body appreciation country-level means on Level 2. That is, nations that differed culturally more strongly from WEIRD norms and nations whose wealth inequality was greater (relative to other nations) reported higher body appreciation means at the national level.

4. Discussion

In the present study, we used the BINS dataset – with data from 56,968 respondents across 65 nations and 40 languages – to conduct the most comprehensive assessment to date of the measurement invariance of the BAS-2. Overall, the present results provided evidence of scalar invariance of the BAS-2 (after combining some response categories) across all nations, languages, gender identities, and age groups represented in the BINS. Thus, the BAS-2 appears to be measuring the same latent construct of body appreciation across all four of these respondent categories in the BINS dataset (i.e., mean differences in the latent BAS-2 construct capture all mean differences in the shared variance of the BAS-2 items across national groups, languages, gender identities, and age groups). These results are consistent with some previous assessments of measurement invariance conducted across a much smaller subset of national groups (Aimé et al., 2020; Góngora et al., 2020; Lemoine et al., 2018; Todd & Swami, 2020). Additionally, further analyses showed that there were a number of important correlates of body appreciation across national groups, both in terms of sociodemographic and nation-level indicators. Below, we highlight how our study uniquely adds to the literature on the construct of body appreciation.

4.1. Measurement invariance across national groups and languages

The results of our analyses supported full scalar invariance of the BAS-2 across all 65 national groups and 40 languages represented in the BINS. This is especially notable in view of the fact that full scalar invariance is often an unrealistic goal for datasets with a larger number of groups (Marsh et al., 2018). Indeed, previous cross-national studies have typically only been able to establish partial scalar invariance (Aimé et al., 2020; Lemoine et al., 2018; Todd & Swami, 2020) or partial metric invariance (Razmus et al., 2020), even with a smaller number of national groups. One reason for this discrepancy across studies may be due to the lack of operational equivalence in previous studies; that is, previous studies have sometimes relied on secondary data, with large differences

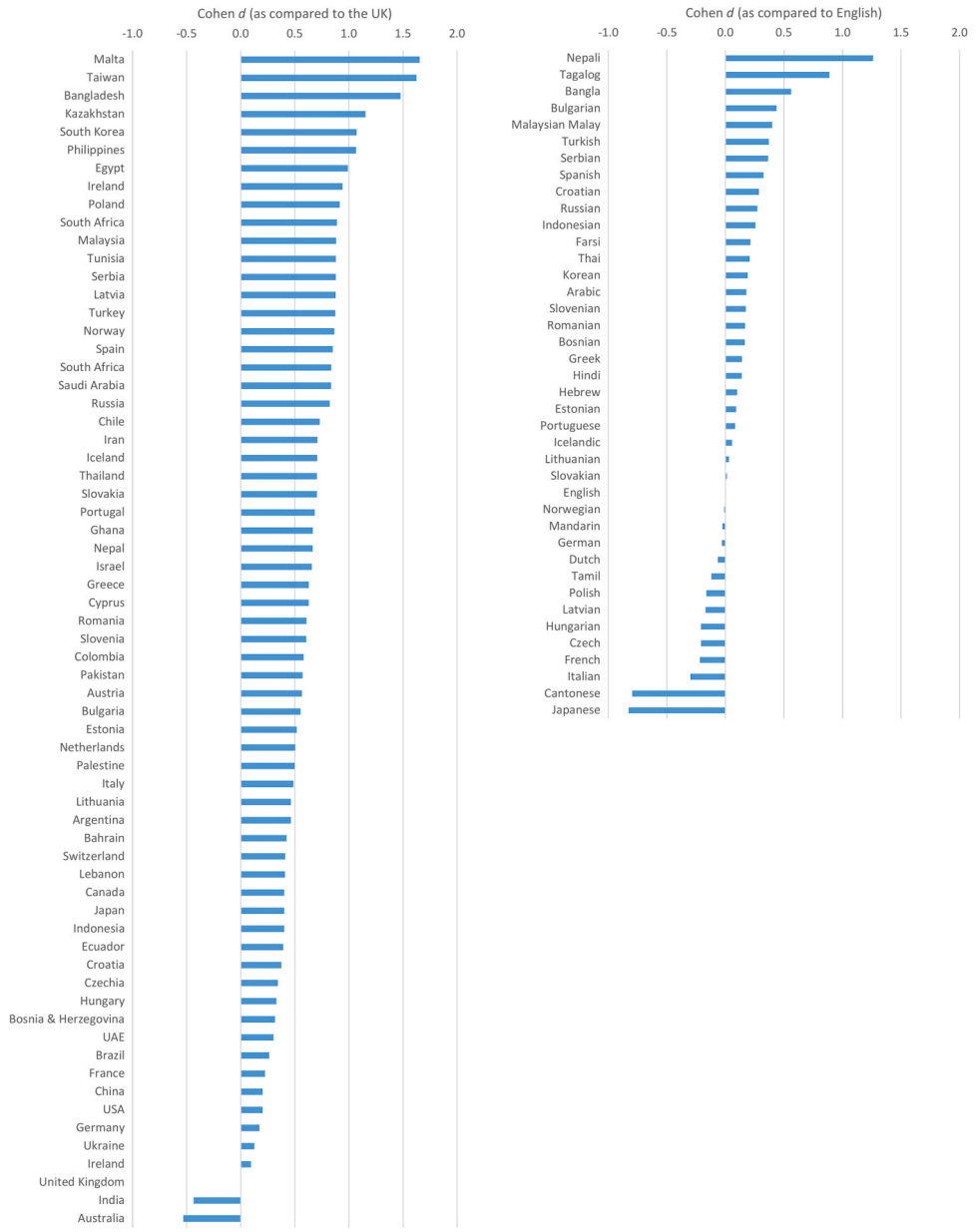

Fig. 1. Ordering and Magnitude of Standardised Latent Mean Differences (Cohen's *d*) Between Nations (as Compared to the UK; Left) and Languages (as Compared to English; Right).

in the method and format of survey presentation, participant recruitment methods, sampling, and other potentially relevant study procedural details. This was less of a concern in the BINS, particularly in terms of the survey format, which was standardised across research settings. Ensuring operational equivalence may have been one reason why we were able to achieve full scalar invariance in the present study (Swami & Barron, 2019).

Beyond invariance across national groups, ours is also the first study to explicitly examine invariance of the BAS-2 across languages, including cross-language survey presentation within nations. Our results again indicated full scalar invariance across all 40 of the languages represented in the BINS. This finding is especially important in view of the suggestion that languages may encode meaning in different ways and that translations may impose restrictions in the way that meaning can be conveyed (Solano-Flores et al., 2009). More to the point, although the BAS-2 items include some terms that may be cross-linguistically and translationally problematic or nuanced (e.g., how to translate the term "love" that occurs in Item #6), our results suggest that these issues do not unduly affect how the BAS-2 items are understood. Put differently, whether examined through the lens of national groups or languages, one broad conclusion is that the BAS-2 assesses the same latent construct of body appreciation across groups. This, in turn, has important implications both for theories of positive body image, as well as body image research and practice.

In terms of theory, our findings lend weight to the suggestion that there is a common – indeed, perhaps universal or near universal – understanding of the construct of body appreciation. That is, body appreciation as a repertoire of attitudinal dispositions involving appreciation of "the body for what it is able to do, what it represents, and its unique features" (Tylka & Wood-Barcalow, 2015a, p. 122) appears to transcend national and linguistic boundaries. In this sense, the construct of body appreciation fulfils widely regarded criteria for identifying positive phenomena (Pawelski, 2016a, 2016b): that such phenomena are preferable over their absence, are long-lasting, have positive flow-on effects, are of relevance to a large number of people, and are transferable across structural contexts, including culture. While previous theoretical and

Table 3
Results of the Multilevel Analysis on the Correlates of Body Appreciation.

	Overall model (62 nations)			With nation-level indicators (42 nations)		
Predictor	Estimate (posterior *SD*)	95% credibility interval	*p* (one-tailed)	Estimate (posterior *SD*)	95% credibility interval	*p* (one-tailed)
Level 1						
Financial security	0.00 (0.004)	[− 0.004, 0.01]	.21	0.00 (0.005)	[− 0.01, 0.01]	.49
Urbanicity	**-0.02 (0.004)**	**[− 0.03, − 0.01]**	**< .001**	**-0.02 (0.005)**	**[− 0.03, − 0.01]**	**< .001**
Education	0.01 (0.004)	[− 0.001, 0.01]	.04	-0.001 (0.004)	[− 0.01, 0.01]	.42
Marital status	**-0.02 (0.004)**	**[− 0.03, − 0.01]**	**< .001**	**-0.01 (0.005)**	**[− 0.02, − 0.003]**	**< .001**
Racialised status	0.00 (0.003)	[− 0.01, 0.01]	.35	-0.003 (0.005)	[− 0.01, 0.01]	.22
Life satisfaction	**0.44 (0.004)**	**[0.43, 0.45]**	**< .001**	**0.43 (0.004)**	**[0.42, 0.44]**	**< .001**
Level 2: Country-level means						
Financial security	-0.14 (0.13)	[− 0.43, 0.09]	.12			
Urbanicity	0.04 (0.11)	[− 0.19, 0.25]	.22			
Education	0.06 (0.10)	[− 0.14, 0.23]	.31			
Marital status	-0.20 (0.13)	[− 0.43, 0.09]	.07			
Racialised status	0.14 (0.10)	[− 0.003, 0.38]	.06			
Life satisfaction	**0.49 (0.10)**	**[0.27, 0.66]**	**< .001**	**0.39 (0.09)**	**[0.23, 0.54]**	**< .001**
Level 2: Nation-level indicators						
WEIRDness distance				**0.38 (0.11)**	**[0.14, 0.54]**	**< .001**
Gini coefficient				**0.30 (0.10)**	**[0.10, 0.47]**	**< .001**
Random Effects						
Intercept residual variance	0.60 (0.09)	[0.46, 0.77]	< .001	0.50 (0.10)	[0.35, 0.69]	< .001
Explained variance (Level 1/Level 2)	19% / 40%			18% / 50%		

Note. Estimates are on a standardised scale. *SD* = standard deviation. Significant (one-sided $p < .025$) estimates are highlighted in boldface.

empirical work (e.g., Linardon et al., 2022; Tylka & Wood-Barcalow, 2015a, 2015b) has provided evidence in favour of the first three of these criteria, the present study provides perhaps the most robust and comprehensive evidence to date in favour of the latter two criteria.

This, in turn, has important implications for how body appreciation can and should be measured in cross-cultural research. Specifically, our findings suggest that the BAS-2 can be effectively used to measure a common latent construct of body appreciation across national groups and languages, without much – if any at all – loss of meaning. Of course, as Swami (2018) has suggested, this may reflect the fact that the BAS-2 was designed to exclude items that had previously been shown (in the BAS) to be problematic cross-culturally. Nevertheless, the present evidence suggests that the BAS-2 can be effectively used in cross-cultural research and to compare body appreciation across national and linguistic groups. Indeed, based on our results, there appear to be large cross-national and cross-language differences in body appreciation (see Fig. 1). Understanding why such differences exist is difficult – and we begin discussions of possible reasons below – but clearly research on body appreciation would now benefit from greater consideration of the ways in which positive body image is constructed, negotiated, and maintained both within and across cultural groups. Nevertheless, for now, we suggest that the BAS-2 measures a common and singular construct of body appreciation across diverse national-linguistic contexts.

4.2. Measurement invariance across gender identities and age groups

Beyond invariance across national groups and languages, the present study offers the largest examination of the invariance of the BAS-2 across gender identities and age groups to date. In terms of gender identity, we were able to achieve full scalar invariance, which is consistent with findings in some national groups (e.g., Junqueira et al., 2019; Swami et al., 2019; Tan et al., 2021; Warschburger & Behrend, 2023). As such, it would seem unlikely that one's gendered experiences substantively affect the way in which the construct of body appreciation, as measured using the BAS-2, is understood (Tylka & Wood-Barcalow, 2015b). Moreover, and consistent with the findings of a previous meta-analysis ($d = 0.27$; He et al., 2020), our results indicated that men had significantly greater body appreciation than women, with a small effect size ($d = 0.14$). This gendered difference likely reflects a range of structural (e.g., systemic patriarchal), societal (e.g., exposure to sexual violence), and inter-individual (e.g., self-objectification) that serve as challenges to the development of positive body image in women compared to men (Holmqvist Gattario et al., 2020; Swami, 2021; Tiggemann, 2015).

To date, however, few studies have examined measurement invariance of the BAS-2 beyond the gender binary of women and men. Here, our findings showed that the BAS-2 achieved full scalar invariance across women, men, and individuals who identified their gender in another way. Broadly speaking, this is consistent with findings in Canadian adolescents showing that the BAS-2 achieved partial scalar invariance across cisgender and transgender individuals (Paquette et al., 2022). Additionally, our results showed that those who identified their gender in another way had significantly lower body appreciation than both women and men. Although this finding is interesting and consistent with other work showing that those who identify as transgender or gender-expansive are less likely to experience positive body image compared to cisgender individuals (Jones et al., 2016; see also Barnhart et al., 2023), it should also be remembered that respondents who identified as another gender in the present study were relatively small in number (0.6% of the total dataset) and were likely heterogeneous in their experiences (i.e., widely differing experiences across nations). Certainly, this is an aspect of our study that is worthy of further investigation, particularly as some research has suggested that those who are further along in consolidating gender identities may have more positive body image (McGuire et al., 2016).

In terms of age, our results indicated that the BAS-2 achieved full scalar invariance across emerging adults (18–24 years), young adults (25–44 years), and middle-age and older adults (≥ 45 years). In broad outline, these results are consistent with previous work showing that differential item functioning of the BAS-2 in terms of age in a sample of German adults was minimal (Warschburger & Behrend, 2023) and that the unidimensional model of the BAS-2 is stable from adolescence (de Léon et al., 2021) through to late adulthood (Meneses et al., 2019). However, where previous smaller-sample studies have suggested that there is a positive linear relationship between body appreciation and age (Quittkat et al., 2019; Tiggemann & McCourt, 2013), our findings showed that body appreciation dipped slightly in young adulthood before reaching a peak in middle and older adulthood. Overall, however, differences in body appreciation between age groups was negligible-to-small in terms of effect sizes, and it thus appears that body appreciation is relatively stable in adulthood. Of course, because we conducted our analyses at the level of groups, we may have missed briefer changes in body appreciation (e.g., during the transition to adulthood) or those that are life-event-related (e.g., childbirth). It is also

possible that the transition from adolescence to emerging adulthood is particularly important, with previous qualitative work showing that this developmental window is vital for the development of positive body image (Holmqvist Gattario & Frisén, 2019).

4.3. Correlates of body appreciation

Theoretical models of positive body image (e.g., Homan & Tylka, 2018; Iannantuono & Tylka, 2012) and a raft of supporting empirical work (e.g., Davis et al., 2020; Linardon, 2021; Linardon et al., 2022, 2023) suggests that body appreciation plays an important role in facilitating forms of self-acceptance and resilience that, in turn, are associated with improved psychological well-being. Our findings support this perspective, showing that greater body appreciation was significantly and strongly associated with higher life satisfaction across nations. While this finding has been previously reported in singular national groups (e.g., Davis et al., 2020; Lee, 2022; Swami et al., 2019; Swami & Todd, 2022), our findings suggest that this association remains robust at a more global level. While our analyses were correlational and, therefore, preclude strong causal conclusions, it is likely that assisting individuals to develop greater respect, care, and gratitude for the body (e.g., in clinical practice) will help promote greater psychological well-being (Tylka, 2018, 2019), including higher life satisfaction.

Beyond life satisfaction, our findings also showed that greater body appreciation was significantly associated with greater rurality and being single (i.e., not married or in a committed relationship). The first of these findings is consistent with the suggestion that urbanicity is associated with greater pressure to engage in forms of body work (e.g., conforming to rigid beauty ideals, viewing the body as a commodity to be invested in, beauty practices leading to body disparagement) that hamper efforts to develop body appreciation (Swami, 2015, 2021; Swami & Todd, 2022). Conversely, individuals in rural areas may also experience greater exposure to factors that promote body appreciation, such as the natural environment (e.g., Swami et al., 2018). On the other hand, the finding that greater body appreciation was associated with being single appears to be novel, and may reflect the greater space that single individuals have to develop positive body image (e.g., engaging in a range of activities that promote body appreciation) compared to those in relationships. For example, it is possible that single individuals have greater freedom (i.e., time, agency, lack of financial constraints) to engage in activities that promote joyful movement (e.g., physical activity, yoga) that, in turn, promote body appreciation (Alleva et al., 2023). It is worth noting, however, that the associations with rurality and marital status were relatively weak. Conversely, neither socioeconomic status (operationalised via the proxies of financial security and education) nor racialised status were significantly associated with body appreciation, although this may reflect the relatively blunt methods in which these factors were necessarily operationalised in our study (Swami et al., 2012).

The present study also extended the focus of research beyond inter-individual factors to focus on nation-level indicators for the first time (though these analyses were run with 42 of the nations where data were available). Our results showed that greater cultural distance (i.e., a greater divergence from WEIRD norms, exemplified by the United States) and greater relative income inequality were significantly associated with higher body appreciation. Interestingly, the associations between body appreciation and cultural distance and relative income inequality, respectively, may help explain some of the cross-national variance seen in BAS-2 scores (see Fig. 1). For instance, it is possible that nations that are more culturally distant from the United States and/or experience greater income inequality are less likely to tie individual self-worth to physical appearance and a willingness to engage in personal body projects (Swami, 2015, 2021). In these nations, macro-level cultural factors – such as patriarchal structures, beauty systems, and the fashion-beauty complex that engenders feelings of personal inadequacy (Bartky, 1990; Bordo, 1993; Jeffreys, 2005) may operate less forcefully, which in turn allows for different or fuller expressions of care, respect, and appreciation of the body. It is also possible that, in nations that are more culturally distant from the United States and/or that experience greater income inequality, there is greater space to focus on the physical self in terms of the body's functionality rather than appearance and to dis-engage from unhealthy body work (Swami & Todd, 2022). Stronger trends toward collectivism in such nations may also foster stronger experiences of body acceptance by others, which in turn promotes greater body appreciation (Swami et al., 2021a).

Of course, it should be noted that this aspect of our analyses was more exploratory and, at this broad level of abstraction, it is difficult to draw more precise conclusions. Nevertheless, the present results are noteworthy because, for the first time, we show that nation-level factors may shape the way in which body appreciation is experienced and manifests across national groups. That is, in contrast to extant research, which has tended to focus on inter-individual factors that may promote positive body image, our study suggests that it may also be important to consider the myriad ways in which groups of individuals differ at a national level. Indeed, it is our hope that the present findings generate discussion and future research about how body appreciation, and positive body image more generally, varies across cultures and nations. Certainly, based on our findings, future scholars will be able to create more formalised models for understanding body appreciation, as well as the conditions under which heightened body appreciation can be maintained.

4.4. Constraints on Generalisability

Although our work provides one of the largest cross-national databases on body image currently available, our findings should be considered in light of a number of constraints on the generalisability (Simons et al., 2017). First, our findings may be limited in terms of their generalisability because of sampling and recruitment constraints. Most important in this regard is the fact that our samples were recruited opportunistically and, as such, cannot be considered representative of their respective nations. Similarly, although we strove toward operational equivalence in the BINS (Swami et al., 2022), small differences in recruitment and survey completion were unavoidable (e.g., while a majority of surveys were completed online, a small number were completed offline using paper-and-pencil format). Additionally, while the BINS dataset provides a snapshot of body appreciation across a diverse set of nations, it remains the case that the project was under-represented in several world regions, especially Africa, Central Asia, the Caribbean, and Central America.

A further point to consider is that specific conditions during the period of data collection may have varied substantially across nations. Indeed, the period of data collection was extended (i.e., over about two years) and occurred in the shadow of the COVID-19 pandemic, which may have introduced nation-specific biases. For instance, there is evidence to suggest that pandemic-related experiences, such as COVID-19 stress and anxiety (e.g., Czepczor-Bernat et al., 2021; Swami et al., 2021), negatively impacted body image outcomes across diverse populations (for a review, see Schneider et al., 2022). This makes it difficult to know to what extent our data are temporally reliable and whether specific pandemic-related experiences (e.g., being in lockdown, severity of the pandemic, national and international responses to the pandemic, all of which were not measured in our survey) may have affected our findings. Still, given consistency of factor structures across groups, any biases in results are likely to be reflected in latent group differences and possibly in correlates of body appreciation. Additionally, we also cannot rule out common-method biases, given that the BINS dataset consists of self-reported data. On this note, there was some evidence of ceiling effects in our BAS-2 data, which suggests that the response scale may not be sufficiently fine-grained to differentiate high levels of body appreciation. Finally, the present analyses were limited by variables that were available in the BINS dataset and, as such, we were unable to assess

other factors that may have affected our findings, such as sexual orientation and religious identity.

4.5. Conclusion

The present work provides robust evidence that the BAS-2 consistently and reliably measures a common latent construct of body appreciation across a diverse and large number of nations. Given that body image research has historically focused on a small number of national groups centred on North America, Western Europe, and Australia (Andersen & Swami, 2021), the present work highlights the possibility of extending scholarly understanding of positive body image across world regions through the use of the BAS-2. In addition, our work adds to a growing body of evidence indicating that body appreciation is associated with more positive psychological well-being, and also highlights a number of factors that may be leveraged in public policy, interventionist work, or clinical practice to promote greater body appreciation across populations worldwide. Indeed, we are confident that the present work will help scholars better understand the meaning and manifestation of body appreciation across nations, and will be of value to practitioners and policy-makers seeking to promote more positive body image outcomes in diverse national, cultural, and linguistic groups.

CRediT authorship contribution statement

Viren Swami: Conceptualisation, Methodology, Validation, Resources, Writing – original draft, Project administration. **Ulrich S. Tran**: Conceptualisation, Methodology, Formal analysis, Data curation, Writing – original draft; **Stefan Stieger**: Conceptualization; Methodology; Validation; Writing – review & editing; **Martin Voracek:** Conceptualization, Methodology, Validation, Writing – review & editing. **All Remaining Authors:** Data curation; Investigation; Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data Availability

The BINS data and our analytic codes are available on the Open Science Framework at https://osf.io/6psj3/.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.bodyim.2023.07.010.

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