QUALITY OF LIFE RESEARCH

Measurement invariance across gender and age in the Connor-Davidson Resilience Scale (CD-RISC) in a Spanish general population

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Online supplementary Table S1

Studies that analyze the factorial structure of the CD-RISC 25-items version.

Authors (year)	Country (city or region) Language	Method (aditional information)	Sample size and characteristics	Factors (number of items)
Connor & Davidson (2003) [1]	U.S. (*) English	Exploratory factor analysis (Ortho-max rotation)	577 adults from the general population * female Mean age = * (SD = *) Age range = *-*	5 factors Personal Competence, High Standards, and Tenacity (8 items) Trust in One's Instincts, Tolerance of Negative Affect, and the Strengthening Effects of Stress (7 items) Positive Acceptance of Change and Secure Relationships with Others (5 items) Control (3 items) Spiritual Influences (2 items)

Gillespie, Chaboyer, & Wallis (2007) [2]	Australia (several territories) *	Principle component analysis (Varimax rotation)	735 nurses, members of the Australian College of Operating Room Nurses (ACORN) 94% female Mean age 46.1 (SD = 9.4) Age range = *-*	5 factors Personal Competence (7 items) Trust in Own Intuition (7 items) Accept Change (5 items) Control (4 items) Spiritual Influences (2 items)
Yu & Zhang (2007)[3]	China (Guangdong and Beijing) Chinese	Principal component analysis (Varimax rotation)	560 general adult population 50% female Mean age = * (SD = *) Age range = *-*	3 factors Tenacity (13 items) Strength (8 items) Optimism (4 items)
Jørgensen & Seedat (2008) [4]	South Africa (Cape Town) English	Principal component analysis (Varimax rotation with Kaiser normalization) Confirmatory factor analysis (*)	701 adolescents from different public schools 57% female Mean age = 16.0 (SD = 1.4) Age range = 12-19	3 factors Tenacity (11 items) Adaptation (11 items) Spirituality (3 items)

Lamond et al. (2008) [5]	U.S. (*) English	Principal component analysis (Varimax rotation)	1,395 older women 100% female Mean age = 72.7 (SD = 7.2) Age range = 60-91	4 factors Personal Control and Goal Orientation (9 items) Adaptation and Tolerance for Negative Affect (10 items) Leadership and Trust in Instincts (4 items) Spiritual Coping (2 items)
Khoshouei (2009) [6]	Iran (Isfahan) Persian	Exploratory factor analysis (Maximum Likelihood, ML; Oblimin with Kaiser normalization)	323 university students 52% female Mean age = 21.96 (SD = 3.53) Age range = 19-34	4 factors Achievement Motivation (5 items) Self-confidence (9 items) Tenacity (4 items) Adaptability (7 items)

Baek, Lee, Joo, Lee, & Choi (2010) [7]	Korea (*) Korean	Principal component analysis (Varimax rotation with Kaiser normalization)	576 participants including hospital nurses, university students, and firefighters 86.3% female Mean age = 27.4 (SD = 5.16) Age range = 20-52	5 factors: Hardiness (9 items) Persistence (8 items) Optimism (3 items) Support (2 items) Being Spiritual in Nature (2 items)
Burns & Anstey (2010) [8]	Australia (Canberra and Queanbeyan) *	Confirmatory factor analysis (Maximum likelihood estimation, ML) Exploratory factor analysis (Principal axis factoring, PAF; Oblique direct oblimin rotation) Multi-groups confirmatory factor analysis	1,775 young-adults 54.1% female Mean age = * (SD = *) Age range = 20-24	1 factor * (22 items)

Karairmak (2010) [9]	Turkey (*) Turkish	Principal component analysis (Varimax rotation with Kaiser normalization) Confirmatory factor analysis (Maximum likelihood estimation, ML)	246 earthquake survivors 61% female Mean age = 35.8 (SD = 8.6) Age range = 18-58	3 factors Tenacity and Personal Competence (15 items) Tolerance of Negative Affect (6 items) Tendency toward Spirituality (3 items)
Sexton, Byrd & Von Kluge (2010) [10]	U.S. (*) English	Principal component analysis (Varimax rotation)	40 women experiencing infertility 100% female Mean age = 33.3 (SD = 5.0) Age range = 18-*	5 factors Emotional/Interpersonal Stability (9 items) Self-efficacy (7 items) Adaptability (4 items) Spirituality (3 items) Confidence in Decision-making (2 items)

Singh & Yu (2010) [11]	India (Delhi) *	Principal component analysis (*)	256 students 34.8% female Mean age = 22.75 (SD = 1.36) Age range = 17-27	4 factors Hardiness (7 items) Optimism (7 items) Resourcefulness (6 items) Purpose (5 items)

Yu et al. (2011) [12]	China (Chengdu, Sichuan) (*)	Confirmatory factor analysis (*)	2914 Chinese adolescents secondary students affected by the Sichuan earthquake 46% female Mean age = 14.4 (SD = 1.7) Age range = 13-17	1 high-order simple factor Resilience (5 factors) 5 second-order factors Personal Competence, High Standards, and Tenacity (8 items) Trust in One's Instincts, Tolerance of Negative Affect, and the Strengthening Effects of Stress (7 items) Positive Acceptance of Change and Secure Relationships (5 items) Control (3 items) Spiritual Influences (2 items)

Jung et al. (2012) [13]	Korea (all the territories) Korean	Exploratory factor analysis (Principal axis factoring, PAF; Varimax rotation)	194 general population 48.9% female Mean age = 34.4 (SD = 9.8) Age range = 18-65 127 psychiatric outpatients 52% female Mean age = 35.0 (SD = 12.2) Age range = 18-65	5 factors Sense of Control and Tenacity (7 items) Self-efficacy, Tolerance of Negative Affect and Easy Recovery (7 items) Acceptance of Change and Secure Relationships (5 items) Leadership and Trust in One's Instincts (3 items) Spiritual Influence (2 items)
Serrano-Parra et al. (2012) [14]	Spain (Cuenca) Spanish	Principal component analysis (Varimax rotation) Confirmatory factor analysis (Maximum likelihood estimation, ML)	168 non-institutionalized elder 65.5% female Mean age = 67.15 (SD = 7.55) Age range = 60-75	3 factors Tenacity- Self-efficacy (9 items) Personal Control (6 items) Social Competence (2 items)

Fujikawa et al. (2013) [15]	Canada (*) *	Confirmatory factor analysis (*)	274 persons with spinal cord injuries members of the Canadian Paraplegic Association (CPA) 33% female Mean age = 46.82 (SD = 13.46) Age range = 18-82	1 high-order simple factor Resilience (5 second-order factors) 5 factors Personal Competence, High Standards, and Tenacity (8 items) Trust in One's Instincts, Tolerance of Negative Affect, and Strengthening Effects of Stress (7 items) Positive Acceptance of Change and Secure Relationships (5 items) Control (3 items) Spiritual Influence (2 items)

Manzano-García & Ayala Calvo (2013) [16]	Spain (Logroño) Spanish	Principal component analysis (Varimax rotation with Kaiser normalization) Confirmatory factor analysis (Partial least squares, PLS)	783 entrepreneurs operating in the business services sector 32.2% female Mean age = 44.8 (SD = *) Age range = 20-50	3 factors Hardiness (9 items) Resourcefulness (7 items) Optimism (7 items)
Crespo, Fernández-Lansac, & Soberón (2014) [17]	Spain (*) Spanish	Principal component analysis (*)	111 non-professionals caregivers (family members) of dependent elderly 73.9% female Mean age = 62.02 (SD = 11.76) Age range = *-*	4 factors Coping and Persistence in Stress Situations (8 items) Strengthening Effect of Stress and Orientation to Targets (5 items) Positive Appraisal (6 items) Confidence (2 items)

Green et al. (2014) [18]	U.S. (*) English	Exploratory factor analysis (Principal axis factoring, PAF; Promax rotation) Confirmatory factor analysis (*)	1,981 post-9/11 U.S. veteran military 20% female Mean age = 37.33 (SD = 10.05) Age range = 19-68	1 factor Adaptability (8 items)
Fu, Leoutsakos, & Underwood (2014) [19]	China (Sichuan) Mandarin Chinese	Exploratory factor analysis (Robust Weighted least squares, WLSMV)	2132 child and adolescent earthquake survivors (analysis were performed with only observations from controls; non specified) 50% female Mean age = 11.7 (SD = 2.18) Age range = 6-16	2 factors Rational Thinking (20 items) Self-awareness (5 items)

Arias González, Crespo Sierra, Arias Martínez, Martínez-Molina, & Ponce (2015) [20]	Spain (*) Spanish	Exploratory factor analysis (Unweighted least squares; ULS; Direct oblimin rotation) Rasch rating scale model (RSM)	279 college students 165 aged participants who participated at the University of Experience Program 75.5% female Mean age = 36.18 (SD = 19.5) Age range = *-*	1 factor Resilience (22 items)

				6 factors Opportunity to Strengthen Yourself with Stressful Situations (7 items) Utilization of Past Successes to Deal with New Stressful Situations (7 items) Individual Ability (5 items) Emotional Stability (2 items) Positive Acceptance of Change and Secure Relationships with Others (2 items) Personal Competence (2 items)
Csilla et al. (2015) [21]	Hungary (*) Hungarian	Exploratory factor analysis (Principal axis factoring, PAF; Varimax rotation)	100 patients with autoimmune diseases 100% female Mean age = 51.49 (SD = 12.87) Age range = 18-*	
Fernandez, Fehon, Treloar, Ng, & Sledge (2015) [22]	U.S. (*) English	Exploratory factor analysis (Weighted least squares with mean and variance adjustment; WLSMV; Geomin rotation)	120 end-stage liver disease patients 39.2% female Mean age = 56.1 (SD = 8.64) Age range = 18-*	1 factor * (20 items)

			1,892 individuals participated in the Personality and Total Health (PATH) Through Life Project study 54% female Mean age = * (SD = *) Age range = 28-32 years	
Liu, Fairweather-Schmidt, Burns, & Roberts (2015) [23]	Australia (Canberra and Queanbeyan) English	Confirmatory factor analysis (Maximum likelihood estimation, ML) Multiple group analysis	2,062 individuals participated in the Personality and Total Health (PATH) Through Life Project study 52.6% female Mean age = * (SD = *) Age range = 48-52 1,826 individuals participated in the Personality and Total Health (PATH) Through Life Project study 48.6% female	1 factor Single Resilience (22 items)

			Mean age = * (SD = *) Age range = 68-72	
Sarubin et al. (2015) [24]	Germany (*) German	Principal component analysis (Promax rotation)	201 general population 53.0% female Mean age = 65.86 (SD = 6.39) Age range = 47-75	1 factor Resilience (24 items)
Mealer, Schmiege, & Meek (2016) [25]	U.S. (*) English	Exploratory factor analysis (Principal axis factoring, PAF; Oblimin rotation) Confirmatory factor analysis (Maximum likelihood estimation, ML)	744 critical care nurses, members of the American Association of Critical Care Nurses (AACN) 91% female Mean age = 43.6 (SD = 11.0) Age range = *-*	3 factors Personal Competence (6 items) Perseverance (6 items) Leadership (4 items)

				5 factors Personal Competence, High Standards and Tenacity (8 items) Trust in One's Instincts, Tolerance of Negative Affect and the Strengthening Effects of Stress (7 items) Positive Acceptance of Change and Secure Relationships with Others (5 items) Control (3 items) Spiritual Influences (2 items)
Sharma & Sharma (2016) [26]	India (Chandigarh) English	Principal component analysis (Varimax rotation with Kaiser normalization) Confirmatory factor analysis (Maximum likelihood estimation, ML)	152 Indian information technology (IT) executives 31.6% female Mean age = * (SD = *) Age range = 21-*	

Xie, Peng, Zuo, & Li (2016) [27]	China (*) Chinese	Exploratory factor analysis (Robust weighted least squares, WLSMV) Confirmatory factor analysis (Weighted least squares means and variance, WLSMV)	1,573 military 22.1% female Age range = 18-41 2,784 military 13% female Mean age = 23.75 (SD = 5.31) Age range = 18-44	3 factors Competency (9 items) Toughness (6 items) Adaptability (6 items)
Zhong, Wu, Xia, Nie, & Liu (2016) [28]	China (Changsha, Wugang, Hengyang, Shuangfeng, Jishou and Baojing)	Exploratory factor analysis (*)	439 community elderly 51.3% female Mean age = 69.07 (SD = 7.06) Age range = 60-91	4 factors Toughness (9 items) Ability (10 items) Control (4 items) Seek Help (2 items)

Sidheek, Satyanarayana, Sowmya, & Chandra (2017) [29]	India (Bangalore) Kannada	Principal component analysis (Varimax rotation)	606 college students from low-income families 100% female Mean age = 17.65 (SD = *) Age range = 16-18	4 factors Hardiness (7 items) Optimism (5 items) Resourcefulness (5 items) Purpose (3 items)
Wu, Tan, & Liu (2017) [30]	China (*) Chinese	Exploratory factor analysis (*) Confirmatory factor analysis (*)	3,960 new employees 0% female Mean age = 18.7 (SD = 1.5) Age range = 16-24	4 factors Tolerance for Stress, Tenacity, and Goal Orientation (15 items) Adaptability and Acceptance of Change (5 items) Optimism and Sense of Security (3 items) Trust in One's Instinct (2 items)

Guihard et al. (2018) [31]	France (Nantes) French	Exploratory factor analysis (*) Confirmatory factor analysis (Maximum likelihood estimation, ML)	203 medical students 63.5% female Mean age = 21.8 (SD = 2.2) Age range = *-* 321 dental students 54.5% female Mean age = 22.7 (SD = 2.3) Age range = *-* 686 health students (first course) 85% female Mean age = 19.2 (SD = 1.5) Age range = *-*	3 factors Tolerance to Negative Affect (11 items) Tenacity (6 items) Self-confidence (4 items)

Perera & Ganguly (2018) [32]	Australia (South East Queensland) *	Confirmatory factor analysis (Robust diagonal weighted least squares with a mean-and-variance adjusted test statistic, WLSMV) Exploratory structural equation (Robust diagonal weighted least squares with a mean-and-variance adjusted test statistic, WLSMV; Modelling target and bifactor target rotations)	274 postsecondary students with disabilities 64.6% female Mean age = 38.79 (SD = 12.70) Age range = *-*	1 general factor Resilience (24 items) 5 specific factors Competence (5 items) Control (2 items) Spirituality (2 items) Tolerance and Trust (3 items) Acceptance (2 items)

Note. We include the symbol * when any of the information given in the table is missing from the paper.

Online supplementary Table S2

Studies that analyze the factorial structure of the CD-RISC 10-items version.

Authors (year)	Country (city or region) Language	Method (aditional information)	Sample size and characteristics	Factors (number of items)
Campbell-Sills & Stein (2007) [33]	U.S. (San Diego State University) English	Exploratory factor analysis (Maximum likelihood estimation, ML; Promax rotation) Confirmatory factor analysis (Maximum likelihood estimation, ML)	1,743 undergraduates 73.4% female Mean age = 18.8 (SD = 2.2) Age range = *-*	1 factor Resilience (10 items)
Wang, Shi, Zhang, & Zhang (2010) [34]	China (Beichuan County) Chinese	Principal component analysis (Maximum likelihood estimation, ML)	341 earthquake victims, primary and secondary school teachers 54.3% female Mean age = 39.0 (SD = 9.6) Age range = 20–63	1 factor Resilience (10 items)

Gucciardi, Jackson, Coulter, & Mallett (2011) [35]	Australia (*) *	Confirmatory factor analysis (Maximum likelihood estimation, ML) Multiple-group confirmatory factor analysis (Sequential model testing approach)	321 adults: Australian cricketers 19% female Mean age = 26.07 (SD = 6.81) Age range = 20-36 199 adolescents Australian cricketers 23% female Mean age = 16.89 (SD = 1.88) Age range = 12-18	1 factor * (10 items)
Notario-Pacheco et al. (2011) [36]	Spain (Cuenca) Spanish	Principal component analysis (*) Confirmatory factor analysis (*)	681 first-year university students 73.9% female Mean age = 20.08 (SD = 4.12) Age range = 18-30	1 factor Resilience (10 items)

Rodrigues Lopes & Fernandes Martins (2011) [37]	Brazil (*) Brazilian Portuguese	Principal component analysis (Varimax rotation)	432 general population 33.9% female Mean age = 28.0 (SD = 9.7) Age range = 18-68	1 factor Resilience (10 items)
Coates, Phares, & Dedrick (2013) [38]	U.S. (Southeastern) English	Confirmatoy factor analysis (Robust diagonal weighted least squares with a mean-and-variance adjusted test statistic, WLSMV)	127 low-income, African American men 0% female Mean age = 31.57 (SD = 7.91) Age range = 19-52	1 factor * (10 items)
Goins, Gregg, & Fiske (2013) [39]	U.S. (Southeastern) *	Confirmatory factor analysis (Maximum likelihood estimation, ML)	160 older American Indians 31.3% female Mean age = 67.9 (SD = 9.9) Age range = 55-*	1 factor * (10 items)

Serrano-Parra et al. (2013) [40]	Spain (Cuenca) Spanish	Principal component analysis (*) Confirmatory factor analysis (*)	500 older adults 57.2% female Mean age = 67.5 (SD = 8.6) Age range = 60-75	1 factor Resilience (10 items)
Burrow-Sánchez, Corrales, Ortiz Jensen, & Meyers (2014) [41]	U.S. (Mountain States) English and Mexican Spanish	Confirmatory factor analysis (Maximum likelihood estimation, ML)	106 Mexican American adolescents with substance use disorders 91.5% female Mean age = 15.3 (SD = 1.27) Age range = 13-18	1 factor Hardy (7 items)

			252 Dutch 69.5% females Mean age = 35.3 (*) Age range = *-*	
Markovitz, Peters, Schrooten, & Schouten (2014) [42]	Nederland and Belgium (Limburgo y Gent) Dutch	Confirmatory factor analysis (*)	110 Belgian 100% female Mean age = 53.1 (*) Age range = *-* 102 breast cancer patients 100% female Mean age = 53.8 (*) Age range = *-*	1 factor * (10 items)

Notario-Pacheco et al. (2014) [43]	Spain (Zaragoza) Spanish	Principal component analysis (*) Confirmatory factor analysis (*)	208 patients with fibromyalgia 95.7% female Mean age = 52.4 (SD = 8.4) Age range = 31-66	1 factor Resilience (10 items)
Sarubin et al. (2015) [24]	Germany (*) German	Principal component analysis (Promax rotation)	201 general population 53.0% female Mean age = 65.86 (SD = 6.39) Age range = 47-75	1 factor Resilience (10 items)
Aloba, Olabisi, & Aloba (2016) [44]	Nigeria (Southwestern) *	Principal component analysis (Oblimin rotation) Confirmatory factor analysis (*)	449 nursing students 87.5% female Mean age = 20.29 (SD = 2.38) Age range = 17-40	2 factors Toughness (6 items) Motivation (4 items)

Gonzalez, Moore, Newton, & Galli (2016) [45]	U.S. (*) English	Confirmatory factor analysis (Maximum likelihood estimation, ML)	405 competitive post-collegiate American long distance runners 45.2% female Mean age = 34.84 (SD = 10.05) Age range = 18-*	1 factor * (10 items)
Madewell & Ponce-Garcia (2016) [46]	U.S. (Southwestern) English	Confirmatory factor analysis (Maximum likelihood estimation, ML)	412 emerging adulthood (undergrads) participants reporting significant stress or trauma 77.2% female Mean age =19.14 (SD = 1.39) Age range = 18-25	1 factor * (10 items)
Riveros Munévar, Bernal Vargas, Bohórquez Borda, Vinaccia Alpi, & Margarita Quiceno (2016) [47]	Colombia (Bogotá and Villavicencio) Colombian Spanish	Principal component analysis (Varimax rotation) Confirmatory factor analysis (*)	265 university students 75.8% female Mean age = 22.30 (SD = 3.82) Age range = 19-42	1 factor Resilience (10 items)

Soler Sánchez, Meseguer de Pedro, & García Izquierdo (2016) [48]	Spain (*) Spanish	Exploratory factor analysis (Principal axis factoring, PAF; Oblimin rotation) Confirmatory factor analysis (Maximum likelihood estimation, ML)	386 workers 50.3% female Mean age = 35.59 (SD = 12.01) Age range = 18-63 238 workers 47.5% female Mean age = 36.33 (SD = 11.86) Age range = 17-63	1 factor * (10 items)
Bernal Vargas, Riveros Munévar, Vinaccia Alpi, & Quiceno Sierra, (2017) [49]	Colombia (Villavicencio) Colombian Spanish	Exploratory factor analysis (Unweighted least squares, ULS; Varimax rotation)	52 Chronically ill * female Mean age = * (SD = *) Age range = *-*	1 factor Resilience (10 items)

Ehrich, Mornane, & Powern (2017) [50]	Australia (*) English	Confirmatory factor analysis (Maximum likelihood estimation, ML) Rasch analyses (Polytomous Rasch model, PRM; partial credit parameterization)	288 undergrads- and postgraduate students 71.5% female Mean age = * (SD = *) Age range = 18-47	1 factor Resilience (8 items)
Ye et al. (2017) [51]	China (Southeastern) Chinese	Principal component analysis (Direct oblique rotation) Confirmatory factor analysis (Maximum likelihood estimation, ML)	460 parents of children with cancer diagnosis * female Mean age = * (SD = *) Age range = *-*	1 factor Resilience (10 items)
Hébert, Parent, Simard, & Laverdière (2018) [52]	Canada (Quebec) Canadian French	Exploratory factor analysis (Principal axis factoring, PAF) Confirmatory factor analysis (Robust statistics)	784 college students 100% female Mean age = 25.3 (SD = 6.2) Age range = *-*	1 factor Resilience (10 items)

Tomyn & Weinberg (2018) [53]	Australia (Victoria) English	Exploratory factor analysis (Maximum likelihood, ML)	1,000 young adults 53.4% female Mean age = 20.75 (SD = 2.63) Age range = 16-25	1 factor Resilience (10 items)
Blanco, Guisande, Sánchez, Otero, & Vázquez (2019) [54]	Spain (Galicia) Spanish	Exploratory factor analysis (Principal axis factoring, PAF; Varimax rotation) Confirmatory factor analysis (Weighted least squares, WLS)	294 non-professional caregivers 89.8% female Mean age = 55.3 (SD = 10.9) Age range = *-*	1 factor Resilience (10 items)

Note. We include the symbol * when any of the information given in the table is missing from the paper.

Online supplementary Table S3

Item-Factor correspondence for the studies that use CD-RISC in general population.

Number of factors	Final number of items	Study	Correspondence items-factor
5	25	Connor & Davidson (2003) [1]	High Standards and Tenacity (F1; items 10, 11, 12, 16, 17, 23, 24, 25) Trust in One's Instincts, Tolerance of Negative Affect and Strengthening Effects of Stress (F2; items 6, 7, 14, 15, 18, 19, 20) Positive Acceptance of Change and Secure Relationships (F3; items 1, 2, 4, 5 8) Control (F4; items 13, 21, 22) Spiritual Influences (F5; items 3, 9)
5	24	Jung et al. (2012) [13]	Sense of Control and Tenacity (F1; items 6, 10, 21, 22, 23, 24, 25) Self-efficacy, Tolerance of Negative Affect and Easy Recovery (F2; items 8, 12, 13, 14, 16, 17, 19) Acceptance of Change and Secure Relationships (F3; items 1, 2, 4, 5, 11) Leadership and Trust in One's Instincts (F4; items 15, 18, 20) Spiritual Influences (F5; items 3, 9)

3	25	Yu & Zhang (2007) [3]	Tenacity (F1; items 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23) Strength (F2; items 1, 5, 7, 8, 9, 10, 24, 25) Optimism (F3; items 2, 3, 4, 6)
1	22	Liu et al. (2015) [23]	Resilience (F1; items 1, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25)
1	10	Rodrigues Lopes & Fernandes Martins (2011) [37]	Resilience (F1; items 1, 4, 6, 7, 8, 11, 14, 16, 17, 19)

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