Routledge
Taylor & Francis Group

International Journal of Disability, Development and Education

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/cijd20

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To cite this article: María Auxiliadora Robles-Bello , David Sánchez-Teruel , Nieves Valencia Naranjo & Rafael Delgado Rodríguez (2020): Preliminary Study on Emotional Competence in Adults with Down Syndrome, International Journal of Disability, Development and Education, DOI: 10.1080/1034912X.2020.1840532

To link to this article: https://doi.org/10.1080/1034912X.2020.1840532

INTERNATIONAL JOURNAL OF DISABILITY, DEVELOPMENT AND EDUCATION
https://doi.org/10.1080/1034912X.2020.1840532

Preliminary Study on Emotional Competence in Adults with Down Syndrome

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ABSTRACT

The social functioning of adults with Down Syndrome (DS) specially influences their quality of life. Emotional intelligence (EI) plays a key role in social outcomes because it is defined as a variety of social and emotional skills that enable people to be more effective in their personal and social lives. Thus, validated EI tests for use among adults with DS must be reliable. This study aimed to evaluate psychometric properties of the Bar-On Emotional Quotient Inventory: Youth Version (EQ-i:YV) in adults with DS. A two-stage cross-sectional investigation was conducted. First, a pilot study (n = 10) was performed to test internal consistency and item analysis of the subscales; second, exploratory (n = 90) and confirmatory (n = 96) factor analyses were carried out. The 5-factor structure of the EQ-i:YV was confirmed: general mood, stress management, adaptability, interpersonal and intrapersonal. The internal consistency (alpha and split halves) of all five dimensions and the total calculated score of the EQ-i:YV yielded high values. This new version of the EQ-i:YV represents a valid and reliable tool to assess EI in Spanish adults with DS.

KEYWORDS

Adults; assessment; Down Syndrome; emotional competence; psychometric properties

Introduction

Although there are several tests to measure emotional intelligence (EI), the Trait Meta-Mood Scale (TMMS) is one of the most frequently used for this purpose (Salovey, Mayer, Goldman, Turvey, & Palfai, 1995). The TMMS was designed to measure adult individual differences in EI (Ciarrochi, Forgas, & Mayer, 2006), and it has been used in studies aiming to examine the role of EI in psychological problems such as depression (Ciarrochi, Deane, & Anderson, 2002; Schutte, Malouff, Thorsteinsson, Bhullar, & Rooke, 2007), addiction (Austin, Saklofske, & Egan, 2005), and stress (Piñar-Chelso & Fernández-Castro, 2011). Tsaousis and Nikolaou (2005) found high levels of EI, measured using the TMMS, to be associated with good psychological health, whereas other studies linked low EI levels to increased depression and anxiety in adolescents (Fernández-Berrocal, Alcaide, Extremera, & Pizarro, 2006).

The existence of several models of EI has contributed to the fact that various definitions of this construct can be found in the scientific literature. For example, Salovey and Mayer

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(1990) described a more ability-oriented approach, whereas Bar-On's (1997) is focused on competencies and personality traits. These differing definitions have led to the development of different scales to assess EI (Extremera, Fernández-Berrocal, Mestre, & Guil, 2004).

It has been recognised (Finlay & Lyons, 2001) that new evaluation instruments are needed to improve the EI assessment of clinical populations with intellectual disabilities such as Down syndrome (DS). Efforts should be made to create valid and reliable tools for this clinical population. Some studies have used parental reporting to clinically assess individuals with intellectual disabilities; however, the relevance of obtaining information directly from the individuals themselves has been emphasised (Chappell, 2000; Finlay & Lyons, 2001). Because of the early intervention that people with developmental disorders such as DS who were born in 1990s have received, these individuals have improved their cognitive levels, reading skills, and academic skills compared to subjects with the same problems born between the 1960s and 1980s (Couzens, Cuskelly, & Haynes, 2011; Couzens, Haynes, & Cuskelly, 2012). For these reasons, when the recruited population with intellectual disabilities is from a more recent cohort, they may be eligible for psychological screening using self-report measures (Robles-Bello & Sánchez-Teruel, 2020; Sánchez-Teruel & Robles-Bello, 2020; Stern, Gadgil, Blakeley-Smith, Reaven, & Hepburn, 2014; Van Riper & Cohen, 2001). Because the current study assessed adults with DS aged between 20 and 25 years, the subjects could answer a self-report questionnaire on EI, especially an EI test based on Bar-On's theory. Bar-On defines EI as a 'set of emotional traits and personality traits that interact constantly in the subject to ensure their adaptation to the environment' (Bar-On, 1997, p. 17). Emphasis is placed on the 'non-cognitive factors', unlike the earlier traditional models, where cognitive factors were at the core of emotional information processing. Bar-On aimed to identify the key factors behind the social and emotional aspects of human functioning that lead people to improve their psychological well-being (Bar-On & Parker, 2000). Individuals with high levels of EI are generally optimistic, flexible, down-to-earth and successful at solving problems and coping with stress without losing control (Bar-On, 2006). This is the only theory that emphasises and evaluates non-cognitive factors on a practical level; consequently, it may be the theory that best suits DS needs when EI is assessed due to the cognitive problems associated with this population.

The interest in studying socio-emotional competences and EI in the DS population has appeared recently because the majority of research on that population has focused on their cognitive and linguistic characteristics (Abbeduto, Warren, & Conners, 2007; Galeote, Sebastián, Checa, Rey, & Soto, 2011; Pochon, Touchet, & Ibernon, 2017). According to Pujol et al. (2015) and Flórez, Garvía, and Fernández-Olaria (2015), there is a structural imbalance between emotional brain regions – which are notably preserved – and those cerebral areas related to cognitive and executive functioning – the least well-preserved – in DS. These brain characteristics could lead to behavioural phenotypes in DS characterised by relative strengths in socio-emotional functioning and relative weaknesses in cognitive functioning (Fidler, 2005). Pochon and Declercq (2013, 2014)) reported difficulties amongst children with DS (6–15 years) in an emotion recognition task employing emotion labels; however, no significant difficulties were found in emotion vocalisation during a face-matching task that did not use emotional labels. Their conclusions indicated that children with DS may have specific emotional lexicon deficits rather than problems recognising emotional expressions per se. Nevertheless, it is not clear whether those

conclusions can be extended across all the emotions they studied. A recent study (Pochon et al., 2017) found only marginal differences in the recognition of various emotions between individuals with DS and typically developing individuals when it was not necessary to use emotional vocabulary. These results did not corroborate the hypothesis that postulates that there is a deficit of emotional knowledge in DS; moreover, it emphasises the importance of using dynamic stimuli – which are more ecological – and strictly nonverbal tasks in populations with language disorders such as DS. Pochon et al. (2017) also investigated the developmental trajectories in DS and typically developing subjects and found a developmental difference: the nonverbal reasoning level (assessed by Raven's matrices) did not predict success on the experimental tasks (in which language skills were not required) in the clinical group, unlike the typically developing individuals. In addition to emotional recognition tasks, subjects were presented with neutral recognition tasks in the research of Pochon et al. (2017). When results from both tasks were compared, the DS group achieved better results on the control task than on the emotional task (such differences were not found in typically developing individuals). Therefore, one might wonder whether the emotional nature of the stimuli makes the task more demanding for adolescents with DS than for typically developing children, which would explain their differential performances between recognition tasks. This finding raises questions about the abilities of DS subjects to process emotional information, and this, therefore, constitutes a limitation on the results of Pochon and colleagues. Nevertheless, their study constitutes a major methodological advance because it shows that the assessment of emotional facial expression recognition without using emotional vocabulary is viable and what is crucial in DS due to the substantial language problem associated with this syndrome (Abbeduto et al., 2007; Galeote et al., 2011).

Prior to these findings and still regarding emotional facial expression recognition, Cebula, Moore, and Wishart (2010) reviewed studies that showed the problems experienced by children and adults with DS that could be associated with specific features noted in studies of social referencing. Various studies reported deficits in children and adolescents with DS related to fear, surprise and anger recognition (Cebula, Wishart, Willis, & Pitcairn, 2017; Porter, Coltheart, & Langdon, 2007). However, the results were conflicting in adults with DS; while some authors (Carvajal, Fernández-Alcaraz, Rueda, & Sarrión, 2012) did not report specific difficulties in processing emotional expression in this population, Hippolyte, Barisnikov, Van der Linden, and Detraux (2009) found problems in recognising surprise, sadness and neutral expression. As it has been previously noted by authors as Cebula (Cebula et al., 2010), more research is needed to conclude that there is a specific emotion recognition profile characterising DS.

Considering the socio-emotional features of behaviours in the DS population, Bar-On's model might be a more accurate framework to investigate EI in DS. In fact, the cognitive difficulties faced by this group cast doubt on the relevance of using a model that conceptualises EI as the ability to process and understand emotional information (Salovey & Mayer, 1990) in regard to measuring that population's EI. In the ability-oriented approaches, the perception of emotion-based factors is basic in nature, whereas cognitive factors are deemed essential when applying emotional intelligence, given that doing so entails perceiving and processing emotional information.

There is a short version of Bar-On and Parker (2000) original Emotional Quotient Inventory: Youth Version (EQ-i:YV) scale validated for the Spanish population (aged between 6 and

18 years) by Ferrándiz, Hernández, Bermejo, Ferrando, and Sáinz (2012), who confirmed the 5-factor internal structure of the instrument. This scale provides information on emotional and social competencies (Bar-On & Parker, 2000) that have been linked to physical and psychological health, well-being (Bar-On, 2004), social interaction (Bar-On, 1997), academic performance (García-Ros & Pérez-González, 2011), and work-related performance (Bar-On, 2006). This short version has also been validated for use among Hungarian adolescents, the results of which also confirmed the original 5-factor structure (Kun et al., 2012). The initial factor structure for the youth version has been replicated in several samples comprising the general population of young people from the United States (Bar-On, 2004), Lebanon (Hassan & Sader, 2005), Peru (Ugarriza & Pajares, 2005) and Spain (Sáinz, Ferrándiz, Fernández, & Ferrando, 2014), the latter encompassing gifted and talented students.

The behavioural phenotype in DS is not shown rigidly and consistently. It varies between individuals in its forms and in the intensity of its manifestations, suggesting that, rather than one behavioural phenotype, there may be subgroups of people with DS showing different strengths and weaknesses (Marchal et al., 2016; Tsao & Kindelberger, 2009). What is clear is that intellectual disability is a characteristic that usually manifests itself at different levels in people with DS (Valencia-Naranjo & Robles-Bello, 2017). In addition, it has been observed that this behavioural phenotype is positively influenced by environmental factors such as early developmental outcomes, particularly from around the age of two years onwards, and that these are the best predictors of performance later in life for children with DS (Cunningham, 1996). In addition, characteristics of the child's environment and the child itself also influence developmental outcomes; nevertheless, the findings across studies are inconsistent (Cebula et al., 2017).

This study aimed to cover the need previously cited in the literature related to the lack of validated instruments to assess EI in the clinical population with intellectual disabilities such as DS. To the best of our knowledge, there are no studies investigating EI in the DS population from the social and emotional-oriented perspective that best suits those with DS needs because emphasis is placed on the 'non-cognitive factors'. Specifically, the current study aimed to test the psychometric properties of the EQ-i:YV in a sample of Spanish adults with DS, analysing the scale's structure and internal consistency as well as its validity.

Methods

Participants

One hundred ninety-six (196) Spanish adults with trisomy 21 (DS) aged between 20 and 25 years (M= 22, SD = 2.02) participated in this study. The sample comprised individuals selected from five DS associations in central and southern Spain who were enrolled in basic vocational training courses. All participants had intelligence quotients (IQ) higher than 50 (M = 53.31, SD = 1.06) assessed using the Kaufman Brief Intelligence Test (*K-BIT;* Kaufman & Kaufman, 1997; Spanish adaptation by Cordero & Calonge, 2000), good levels of reading comprehension (Table 1), and good qualifications in vocational training courses. Participants with significant physical or sensory disabilities that might impede their ability to fairly complete the assessment were excluded from participation.

Table 1. Mean and standard deviation obtained from the K-BIT in study participants (n = 196).

K-BIT	M	SD
Vocabulary	54.01	1.09
Matrices	60.93	1.08
TOTAL	53.31	1.06

M = Mean; SD = Standard deviation

The total sample was randomly divided into three groups: a pilot group (n = 10) and two groups for structural analysis purposes: 90 and 96 subjects for exploratory and confirmatory factor analyses, respectively. All participants were matched for gender and age. The most relevant sociodemographic variables are shown in Table 2.

Measures

Emotional Quotient Inventory

Youth Version (EQ-i:YV; Bar-On & Parker, 2000; Spanish version by Ferrándiz et al., 2012). This scale is based on the 60-item adult version that assesses several EI dimensions on a 4-point Likert scale, ranging from 1 'it never happens to me' to 4 'it always happens to me'. The EQ-i: YV in Spanish measures Emotional–Social Intelligence (ESI), considering five components: intrapersonal (INTRA), interpersonal (INTER), adaptability (A), stress management (SM), and general mood (GM). The English version contains a 'positive impression' component that was eliminated in the Spanish version. Despite being for children and adolescents, this test was applied because it was the only EI test adapted into Spanish in which adults with DS did not have reading comprehension problems. To select the more appropriate test, questionnaires of EI adapted into Spanish (Sánchez-Teruel & Robles-Bello, 2018) were tested with 10 adults with DS. Participants had problems with reading comprehension with all the tests except the Spanish version (Ferrándiz et al., 2012) of the EQ-i:YV (Bar-On & Parker, 2000).

Procedure

Presidents and directors of every Down syndrome association in Spain were informed of this study both in writing and orally; nevertheless, only five positive responses were received: two from central Spain and three from southern Spain. The participants were selected from these five associations. The study was approved by the Ethics Committee of the University of Jaén.

Table 2. Sociodemographic characteristics of adults with Down syndrome.

	Total	Pilot sample	Sample 1	Sample 2	*F*
Gender					
Female	95	5(2.1)	42(21.3)	48(21.6)	1.25**
Male	101	5(2.1)	48(28.3)	48(28.8)	
Mean age (SD)	22(1.8)	22(2.02)	22(1.3)	22(1.4)	1.48**
Work	40	6(2.5)	16(35.8)	18(36.6)	2.98*
In training	156	4(1.6)	71(13.8)	81(13.8)	
TOTAL	196				

Sample 1 = exploratory analysis; Sample 2 = confirmatory analysis; *F* = Between-group test statistic; *p <.05; ** p <.01; Work = working with a regular employment contract; In training = participating in a job training course.

With the backing of the associations, a letter was sent to parents outlining the study objectives. Contact was then made with those users whose parents voluntarily and gladly gave consent for their sons and daughters to be assessed over two one-and-a-half hour-long sessions. During the first session, they were individually assessed using the K-BIT in order to obtain their IQs and some relevant sociodemographic variables. Teachers from vocational training courses were also contacted during this first session to obtain information about DS students' marks. Those DS adults with an IQ higher than 50, a good level of reading comprehension and good academic qualifications were scheduled for the second session, which was carried out the next day in order to avoid participants' fatigue and attention problems. During the second session, the EI of DS adults was assessed using the EQ-i:YV (subjects were individually assessed). Questionnaires were completed by the participants themselves in the presence of the psychologist who works with the association to which they belong. Sessions took place during the morning at the centre where participants attended basic vocational training courses. To maximise the active participation of the participants, interviewers were encouraged to rephrase questions when needed, and they were provided with specific training (which was undertaken by trainers who had extensive experience with people with intellectual disabilities).

All families that agreed to participate in this study received a report detailing the results, but they were not financially compensated for their participation.

Data Analysis

Analyses were carried out in two stages. First, internal consistency testing and item analysis of the subscales were performed in the pilot study. Second, exploratory and confirmatory factor analyses were separately conducted with each group to determine whether the Spanish version of the EQ-i:YV answered by adults with DS reveals the original 5-factor structure found by Ferrándiz et al. (2012).

Exploratory Factor Analyses

The unweighted least squares (ULS) method was used as the factor extraction procedure because it is the only method to calculate the proportion of explained shared variance for each of the extracted factors (Lorenzo-Seva, 2013). The ULS method is also the most robust and suitable procedure when the target samples include fewer than 300 cases (Lloret-Segura, Ferreres-Traver, Hernández-Baeza, & Tomás-Marco, 2014). An oblique rotation method – specifically, the direct oblimin rotation procedure with a delta value equal to 0 – was used to obtain maximum parsimony when interpreting the factor solution (Jennrich, 1979).

Confirmatory Factor Analyses

The scale's original factor structure (five subdimensions) was maintained for undertaking analyses. The method used in the confirmatory analysis was the maximum likelihood (ML) estimate joined by bootstrap procedures (given multivariate non-normality) (Rodríguez-Ayán & Ruiz-Díaz, 2008). The fit indices used were the following: the $\chi 2/df$ ratio, GFI, AGFI, and the root mean square error of approximation (RMSEA). The goodness-of-fit model is deemed satisfactory if the CFI is close to 0.90 and the RMSEA is close to 0.08 (Kline, 2005).

Results

Item Analysis in a Pilot Sample of Adults with DS

The results of applying the EQ-i:YV to the pilot sample comprising adults with DS (n = 10) gave a total score ranging from 67 to 134 points (M = 110.26; SD = 7.77). All response options were utilised for all items (minimum 1 and maximum 4). The item mean ranged from.80 (item 3: 'I can keep calm when I'm angry') to 3.96 (item 28: 'I find it difficult to talk about my inner feelings'). Considering the scale items collectively, the data did not show univariate normality (Shapiro–Wilk test for small-sized samples), most likely due to the distribution of scores for items 3, 15, 24, 26, 28 and 30, whose skewness and kurtosis indices were especially high (Table 3). Regarding the corrected item–total correlations, all exceeded a value of .30 (Nunnally & Bernstein, 1995) except items 2, 3, 6, 7, 9, 12, 29, 30, 34, 38, 40 and 44; furthermore, deleting these items would increase the Cronbach's alpha (α_{-i}) (Table 3). For this reason, they were removed. Specifically, it was found that 12 items did not load on the expected factor: item 2 on the interpersonal subscale, item 7 on the intrapersonal subscale, items 12, 30, 34, 38 and 44 corresponding to adaptability, items 3 and 6 corresponding to stress management, and items 9, 29 and 40 on the general mood subscale. It is important to note that five of the ten adaptability items were not suitable for this sample.

Exploratory Factor Analysis ($N_1 = 90$)

An exploratory factor analysis using the FACTOR 10.3 program was performed to determine whether the data obtained were suitable for conducting the EQ-i:YV factor analysis. The Kaiser–Meyer–Olkin measure of sampling adequacy index (KMO = .89), Bartlett's test of sphericity ($\chi^2 = 2146.2$; $p < .001$), and the determinant of the correlation matrix (.005) showed data suitability for factor analysis.

Five dimensions were extracted using exploratory factor analysis, which explained 22.20% (Factor I), 19.23% (Factor II), 16.27% (Factor III), 14.67% (Factor IV), and 11.50% (Factor V) of the variance (based on eigenvalues). These factors correspond to those found in earlier studies (Ferrándiz et al., 2012) on the EQ-i:YV: general mood (GM), stress management (SM), adaptability (A), interpersonal (INTER), and intrapersonal (INTRA). Factor I (GM) brought together 11 items with a single factor saturation of ≥ .51. Factor II (SM) produced a further 10 items with a factor saturation of ≥ .59. Factor III (A) provided another 5 items with a factor saturation of ≥.55. Factor IV (INTER) brought together 11 items with a factor saturation of ≥ .55. Finally, Factor V (INTRA) produced 5 more items with a factor saturation of ≥ .51 (Table 4).

Confirmatory Factor Analysis ($N_2 = 96$)

The results garnered from the univariate and multivariate normality analysis in the second sample of adults with DS ($n_2 = 96$) showed that there was neither univariate nor multivariate normality in item distribution (Mardia = 437.51) (Mardia, 1970). The results in Table 5 show that the EQ-i:YV produced very good goodness-of-fit indices in the adults with DS sample. Specifically, an adequate and significant χ^2/df was observed. All remaining indices

Table 3. Descriptive statistics, skewness and kurtosis indices, and item analysis of the EQ-i:YV in the pilot sample with Down syndrome (n = 10).

EQ-i:YV	M (SD)	*K-S*	S *SE(−.01)*	K *SE(2.69)*	*r item-total*	*α if item deleted*
Item 2 (INTER)	2.02 (1.23)	.18**	.22	−.93	.11	.79
Item 5 (INTER)	2.68 (.88)	.25*	−.18	−.46	.31	.53
Item 10 (INTER)	2.68 (1.08)	.25**	−.04	−.78	.50	.51
Item 14 (INTER)	3.41 (.59)	.32**	.01	−.43	.41	.51
Item 20 (INTER)	3.25 (.71)	.26**	.16	−1.04	.54	.53
Item 24 (INTER)	2.05 (1.31)	.25**	−.18	−.46	.78	.48
Item 36 (INTER)	1.95 (1.35)	.14**	.28	−1.12	.70	.53
Item 45 (INTER)	2.61 (.99)	.28**	−.36	−.91	.35	.56
Item 41 (INTER)	2.62 (1.01)	.27**	−.36	−.94	.45	.53
Item 51 (INTER)	3.30 (.70)	.26**	−.82	1.14	.32	.52
Item 55 (INTER)	2.62 (1.02)	.16**	−.32	−.86	.43	.49
Item 59 (INTER)	3.17 (.73)	.24**	.28	−1.09	.62	.52
Item 7 (INTRA)	2.20 (1.34)	.90**	−.12	−1.17	.17	.83
Item 17 (INTRA)	2.44 (1.03)	.81**	−.30	−.23	.36	.50
Item 28 (INTRA)	3.96 (1.12)	1.29*	3.43	−4.04	.47	.54
Item 31 (INTRA)	1.50 (1.14)	.91**	.28	−.45	.31	.53
Item 43 (INTRA)	2.50 (1.07)	.86**	.10	−.81	.52	.51
Item 53 (INTRA)	2.18 (1.47)	.86**	−.24	−1.20	.49	.48
Item 12 (A)	2.12 (1.96)	.87**	.10	−1.12	.15	.79
Item 16 (A)	2.30 (1.12)	.91**	−.03	−.92	.35	.56
Item 22 (A)	2.05 (1.99)	.97**	.06	−.78	.45	.53
Item 25 (A)	2.24 (1.29)	.55**	−.10	−1.07	.32	.52
Item 30 (A)	1.08 (1.20)	.87**	.18	−1.01	.17	.80
Item 34 (A)	1.33 (1.48)	1.27*	.08	−1.11	.11	.77
Item 38 (A)	1.88 (1.06)	.81**	3.32	−3.47	.20	.69
Item 44 (A)	2.42 (1.21)	.38**	−.33	−.82	.19	.73
Item 48 (A)	2.02 (1.13)	1.35**	−.42	−1.29	.40	.52
Item 57 (A)	1.03 (1.11)	.17**	−.41	−.48	.42	.54
Item 3 (SM)	.80 (1.31)	.00**	−.01	1.90	.13	.89
Item 6 (SM)	1.14 (1.86)	.90**	−.08	−.97	.11	.79
Item 11 (SM)	2.04 (1.19)	.90**	.07	−.83	.59	.50
Item 15 (SM)	2.74 (1.18)	.80**	.49	−.61	.72	.52
Item 21 (SM)	1.05 (1.15)	.86**	.20	−1.02	.48	.49
Item 26 (SM)	1.24 (1.94)	.83**	−.06	−.89	.38	.51
Item 35 (SM)	2.50 (1.20)	.87**	−.04	−1.28	.85	.50
Item 39 (SM)	1.80 (1.16)	.89**	−.16	−.67	.42	.46
Item 46 (SM)	1.96 (1.09)	.90**	.28	−.22	.66	.52
Item 49 (SM)	2.60 (1.70)	.67*	−1.95	2.56	.55	.73
Item 54 (SM)	2.56 (0.99)	.70**	−2.61	2.25	.71	.66
Item 58 (SM)	2.38 (1.01)	.83**	−.95	.55	.47	.54
Item 1 (GM)	1.02 (1.13)	.90**	.17	.72	.67	.45
Item 4 (GM)	2.06 (1.28)	.81**	−.14	−1.11	.49	.48
Item 9 (GM)	1.07 (1.45)	.80**	.03	−.77	.02	.81
Item 13 (GM)	2.07 (1.28)	.86**	−.05	1.01	.31	.48
Item 19 (GM)	2.05 (1.24)	.89**	−.09	−.92	.35	.50
Item 23 (GM)	2.08 (1.11)	.80**	.05	−.86	.41	.52
Item 29 (GM)	1.22 (1.75)	.87**	.09	−.81	.21	.87
Item 32 (GM)	2.04 (1.78)	.86**	.07	−.78	.72	.52
Item 37 (GM)	1.62 (0.38)	.90**	.13	−.88	.35	.50
Item 40 (GM)	2.32 (1.06)	.67*	.49	−.91	.19	.89
Item 47 (GM)	1.64 (1.32)	.70**	−.37	−.26	.59	.50
Item 50 (GM)	1.40 (0.93)	.83**	.49	−.61	.72	.52
Item 56 (GM)	2.22 (1.11)	.88**	−.42	−1.02	.74	.51
Item 60 (GM)	1.60 (1.23)	.75**	.56	−.64	.48	.49
TOTAL	72.26 (7.77)	.98**	.05	1.68	1	.57

M = Mean; SD = Standard deviation; S = Skewness; K = Kurtosis; SE = Standard error of skewness and kurtosis; K-S = Kolmogorov-Smirnov test; *Significant correlation at the 0.05 level (bilateral); **Significant correlation at the 0.01 level (bilateral); Intra = Intrapersonal; Inter = Interpersonal; A = Adaptability; SM = Stress Management; GM = General Mood

Table 4. EQ-i:YV exploratory factor analysis in the subsample with Down syndrome ($n_1 = 90$).

EQ-i:YV	*Dimensions*					
	1	2	3	4	5	h^2
GM						
Item 1	.53					
Item 4	.63					.43
Item 13	.49					.39
Item 19	.48					.48
Item 23	.55					.83
Item 32	.63					.53
Item 37	.62					.89
Item 47	.52					.52
Item 50	.59					.71
Item 56	.56					.54
Item 60	.72					.63
SM						
Item 11		.54				.52
Item 15		.59				.54
Item 21		.57				.48
Item 26		.56				.60
Item 35		.89				.72
Item 39		.77				.85
Item 46		.55				.52
Item 49		.90				.91
Item 54		.71				.49
Item 58		.82				.51
A						
Item 16			.66			.97
Item 22			.55			.21
Item 25			.91			.62
Item 48			.79			.75
Item 57			.59			.67
INTER						
Item 5				.96		.15
Item 10				.79		.54
Item 14				.55		.77
Item 20				.73		.39
Item 24				.91		.98
Item 36				.58		.83
Item 41				.52		.73
Item 45				.67		.61
Item 51				.95		.21
Item 55				.64		.97
Item 59				.75		.88
INTRA						
Item 17					.61	.44
Item 28					.96	.27
Item 31					.66	.91
Item 43					.72	.97
Item 53					.51	.76
% variance	22.20	19.23	16.27	14.67	11.50	

h^2 = Commonalities; GM = General Mood; SM = Stress Management; A = Adaptability; Inter = Interpersonal; Intra = Intrapersonal

were excellent; an RMSEA value (95% CI) below .08 and GFI and AGFI values above the .85 limits were obtained, achieving consensus among the goodness-of-fit indices under evaluation. Based on these results, its acceptability and goodness-of-fit were strong (Table 5).

Figure 1 shows a path diagram of the EQ-i:YV results for adults with DS. As it can be observed, the standardised weight values (β coefficients) ranged from around .50 for item

Table 5. Goodness-of-fit indices for the EQ-i:YV in the DS subsample ($n_2 = 96$).

	χ^2	df	χ^2/df	*p*	RMSEA (95% CI)	RMR	GFI	AGFI
EQ-i:YV	139.12	68	2.04	.00	.01	.03	.89	.86

χ^2 = Chi-square; df = degrees of freedom, χ^2/df = Chi-square goodness-of-fit index; p = significance level; RMSEA = Root mean square error of approximation; RMR = Root mean residual (similar to the RMSR for Factor 10.3); GFI = Gamma index; AGFI = Adjusted goodness-of-fit index.

37 (general mood) to .96 for item 28 (intrapersonal). High factor loadings were found for most items, with the exception of item 13 (.51) for general mood, item 11 (.51) for stress management, item 22 (.51) for adaptability, and item 53 (.51) for intrapersonal. Furthermore, the covariance between general mood and adaptability and between general mood and the intrapersonal subdimensions were high (between .31 and .68, respectively). All of these covariations among the various subdimensions of the test indicate the possibility of factor dependency between these EQ-i:YV factors in the sample of adults with DS.

The results related to reduced-scale normality after having deleted the items lacking in suitability showed that, with the exception of adaptability and the emotional quotient in the EQ-i:YV test, none of the remaining measured variable distributions (EQ-i:YV; K-BIT) presented univariate normality. This finding is supported by data obtained through the skewness and kurtosis indices that yielded extreme scores (−2; 2) (Table 6). Furthermore, the results corresponding to the internal consistency (alpha and split halves) of all five dimensions and the EQ-i:YV's total calculated score yielded high alphas across all dimensions and in the total score.

Finally, the split-half reliability procedure for each dimension, as well as for the reduced scale with the deleted items that were indicated (42 items), gave equally adequate coefficients (Table 6).

Discussion

This study aimed to examine the psychometric properties, validation and internal consistency of the Spanish version of the EQ-i:YV (Ferrándiz et al., 2012; original version by Bar-On & Parker, 2000) in a population of Spanish adults with DS. The ultimate aim was to establish its potential clinical use as an assessment tool for DS populations.

A pilot study involving DS adults was conducted prior to factor analysis to validate the EQ-i:YV in this population. This study showed a dispersion of item responses, with the item means ranging from .80 to 3.96 using a 4-point Likert scale. In addition, variability was between 67 and 134 points. These results showed that the EQ-i:YV was suitable for use among adults with DS from this sample, thereby enabling the performance of exploratory and confirmatory factor analyses on the scale. Exploratory and confirmatory factor analyses were performed in two different samples of adults with DS (with a total of 90 and 96 subjects, respectively).

Factor analyses revealed resulting components similar to the dimensional structure proposed in the original scale (Bar-On & Parker, 2000) given that the majority of items loaded on expected factors were in line with Bar-On's (2006) theory. In the same vein, factor analyses confirmed the dimensional structure of the Spanish version of the EQ-i:YV validated in children and adolescents (Ferrándiz et al., 2012). Thus, it can be said that the adult population with DS conforms to the five original factors.

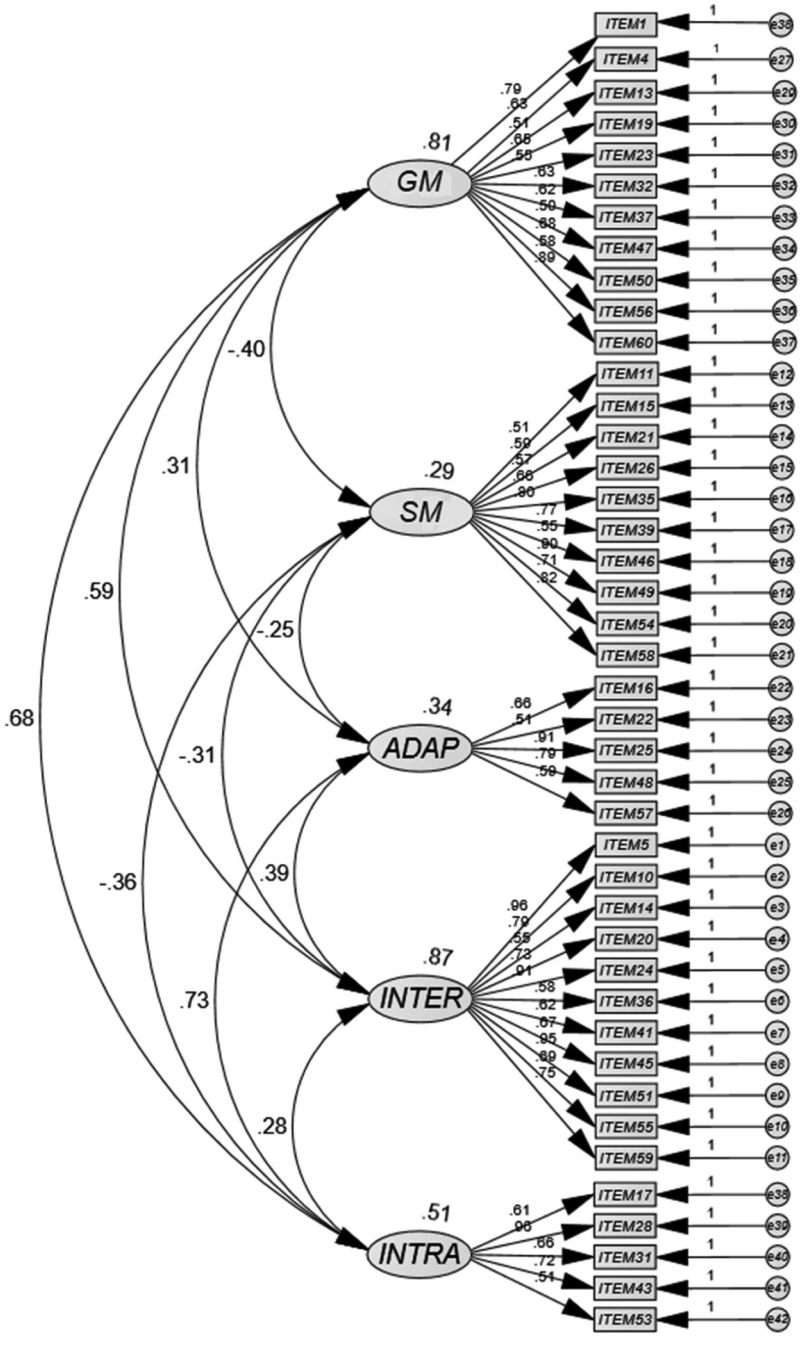

Figure 1. Path diagram of the four-dimensional model corresponding to the EQ-i:YV in adults with DS. Note. The correlations between each dimension are represented by bidirectional arrows. The standardised B coefficients are displayed above each unidirectional arrow. The weighted covariances between dimensions are indicated inside bidirectional arrows.

Table 6. Variable descriptive for the adults with DS (N = 196) sample.

Variable	M	SD	Min.	Max.	K-S	*p*	r_{xx}	α	S. SE (.32)	K. SE(.63)
EQ-i:YV	101.34	12.29	79	126	.09	.22	.76	.88	.20	−.44
Intrapersonal	15.11	2.29	11	24	.25	.00	.73	.81	1.37	3.88
Interpersonal	33.02	5.14	26	48	.12	.04	.59	.79	.92	.64
Stress management	31.50	3.63	24	43	.21	.00	.69	.71	.33	1.26
Adaptability	21.54	5.45	13	55	.09	.20	.36	.43	.43	−.04
General mood	39.12	5.15	11	33	.10	.00	.78	.89	.12	.23

M = Mean; SD = Standard deviation; Min = Minimum value; Max = Maximum value, K-S = Kolmogorov-Smirnov test; p = Significance level; S = Skewness; K = Kurtosis; SE = Standard error of skewness and kurtosis; r_{xx} = split halves; α = Cronbach's alpha

It is important to highlight the high percentage of explained variance (83.87%) resulting from the five factors observed in the current study on adults with DS, which provides evidence of high validity. This result surpasses the variance accounted for by the five extracted components in the study of Ferrándiz et al. (2012) with Spanish children and adolescents.

Specifically, each one of the five dimensions extracted from the exploratory factor analysis explained the following percentages of the variance: 22.20% (Factor I), 19.23% (Factor II), 16.27% (Factor III), 14.67% (Factor IV), and 11.50% (Factor V). Factor I GM brought together 11 items of the original 14, Factor II SM had 10 items of the original 12, Factor III A covered 5 items of the 10 proposed by Bar-On (1997), Factor IV INTER had 11 items of the original 12, and Factor V INTRA covered 5 items of the original 6. In this sense, the GM Factor – which Bar On defines as the ability to enjoy life, integrating both happiness and optimism (Bar-On, 1997; Bar-On & Parker, 2000) – remains being highly relevant among adults with DS, much as in the original version, as it contains the greatest number of items. This outcome was expected if one takes into consideration that the ability to enjoy life, coupled with a happy disposition and an optimistic outlook, is an important point for individuals with DS (Brown, Taylor, & Matthews, 2001; Carr, 1995; Rosner, Hodapp, Fidler, Sagun, & Dykens, 2004; Skotko, Levine, & Goldstein, 2011a; Wishart & Johnston, 1990). The testimonies of the parents of individuals with DS (having overcome their initial disconcerted reaction) generally reflect shared opinions, highlighting the kindness, friendliness and affection shown by their sons and/or daughters with DS, at least during the early years of life (Skotko, Levine, & Goldstein, 2011b). The aforementioned aspects, together with the optimism that falls outside their intellectual disability, seems to demonstrate that the group enjoys a rich emotional world (Hippolyte et al., 2009). Their pro-social attitude may contribute to their positive interpersonal relationships (Fidler, Barrett, & Most, 2005). The interpersonal factor seems to also be highly relevant among adults with DS. This factor might be associated with findings in the scientific literature that revealed that during their adulthood – especially approximately 30 years of age – a high percentage of individuals with DS are said to make friends easily and regularly exchange visits with friends (Carr, 2008). This finding highlights the fact that the population with DS establishes mutually satisfying relationships and relates well with others, an important aspect of this interpersonal factor. Factor III (Adaptability), which covered only 5 items of the original 10, is particularly affected. Nevertheless, this finding should not be surprising, as this factor evaluates the ability to deal with everyday problems (ability to identify, define and generate and implement possible solutions),

the ability to objectively validate one's own emotions and thinking with external reality, and the flexibility or ability to adapt and adjust one's emotions, thoughts and behaviours to changing situations and conditions. These abilities have been considered weaknesses associated with the behavioural phenotype of the population with DS (Bybee & Zigler, 1998; Fidler, 2005; Iarocci, Yager, Rombough, & McLaughlin, 2008; Jahromi, Gulsrud, & Kasari, 2008; McGuire & Chicoine, 2002).

Regarding the path diagram of the EQ-i:YV, the majority of items correlated with the corresponding dimension, revealing the validity of the scale. Furthermore, significant covariances in general were observed across most dimensions. Thus, GM (strength of DS: Iarocci et al., 2008; McGuire & Chicoine, 2002) had a positive covariance with all dimensions. The SM dimension, however, showed a negative covariance with all other dimensions, which would seem to indicate that stress is a key factor to consider, which may influence the emotional level exhibited by this group of adults with DS. The A dimension had a positive covariance with all dimensions. Finally, the INTER dimension also had good covariance with the remaining dimensions. The internal consistency analysis showed that eliminating the problematic items increased the Cronbach's α from .57 to .89 for the total EI index, although the reliability indices (Cronbach's α) for the five dimensions ranged from .29 (SM) to .87 (INTER). The reliability index for GM was the second highest (.81) in the current study. This result stressed that the importance that Bar-On (2006) places on the GM dimension within the theoretical concept of EI is also maintained in this sample of DS adults.

The aforementioned importance of GM in this population also emerges when the most typical phenotype of adults with DS is described. This phenotype consists of relative strengths in socio-emotional functioning (e.g., being characterised as affectionate, happy and optimistic people) and relative weaknesses in cognitive functioning (Fidler, 2005). This phenotype is supported by studies that examined the architecture of the brain in this population, stressing a volume reduction in brain areas related to cognitive processes and a normal volume in cerebral areas implicated in several aspects of emotional behaviours (Aylward et al., 1999; Pinter, Eliez, Schmitt, Capone, & Reiss, 2001; Śmigielska-Kuzia et al., 2011). Previous results indicated a structural imbalance between emotional brain areas – that are notably preserved in DS (Vicari, 2006) – and 'executive' brain areas related to cognitive skills – the least preserved in DS (Pujol et al., 2015). It can be said, therefore, that the influence of the emotion might override any other influences (i.e., cognitive/executive) in DS individuals, so that the resultant behaviour, as the final expression of the individual's global intelligence, is strongly marked by that emotional influence. This interpretation might be supported by a recent study that used functional magnetic resonance imaging and found higher functional connectivity in brain areas involved in emotional processes and lower functional connectivity in those cerebral areas more implicated in general executive control operations (Pujol et al., 2015). Taken together, the assessment of the development of emotional competences in DS individuals is important because it allows focusing on strong points in this population, strengthening them to supply, to the extent possible, their deficits.

The results of the current study have shown that the adaptation of the EQ-i:YV to adults with DS is a reliable and valid tool to measure EI in this population. Although the resulting questionnaire included fewer items than the Spanish version of the EQ-i:YV validated in children and adolescents (Ferrándiz et al., 2012), its final number of 42 items seems to be

more appropriate for adults with DS. Because the deficit of cognitive functioning may affect the understanding of some social contents, especially those from the adaptability dimension, known as a weak point for DS (Bybee & Zigler, 1998; Fidler, 2005; Iarocci et al., 2008; Jahromi et al., 2008; McGuire & Chicoine, 2002), items with low correlation values may reflect understanding difficulties in the current sample. Nevertheless, the remaining items seem to be appropriate for DS adults, as they showed appropriate correlation values. Moreover, the psychometric properties of the test are satisfactory, confirming the 5-factor structure of Bar-On's (1997) original scale. These results suggest that it is possible to use the EQ-i:YV to assess EI in adults with DS. The use of a test originally adapted for children and adolescents for adults with DS should not be surprising. Tests adapted for younger populations include items adjusted to their receptive vocabulary ability to make it understandable for this target population. As it is known, cognitive problems of individuals with DS influence their language skills (Byrne, Buckley, MacDonald, & Bird, 1995; Hesketh & Chapman, 1998), which have been related to socio-emotional competence (Abbeduto & Murphy, 2004; Frith, Happe, & Siddons, 1994; Hippolyte, Iglesias, Van der Linden, & Barisnikov, 2010; Thirion-Marissiaux & Nader-Grosbois, 2008).

The validation of self-report questionnaires for people with intellectual disabilities, which were originally created for typically developing subjects, might have methodological limitations. For example, understanding the meaning of the items may imply intact abilities that can be affected in individuals with intellectual disabilities (Emerson, 2010; Finlay & Lyons, 2001; Mazzone, Ruta, & Reale, 2012; Robles-Bello & Sánchez-Teruel, 2020). Despite this fact, researchers and clinicians have emphasised the importance of obtaining information directly from the individuals with disabilities (Chappell, 2000; Finlay & Lyons, 2001). Therefore, it is necessary to allocate resources to overcome eventual limitations and adapt self-report tests to clinical population as DS, as this enables the understanding of the characteristics of these populations themselves, appreciating the possibilities and variability shown by adults with DS. These limitations were addressed by selecting a test adapted for children and adolescents (Ferrándiz et al., 2012) – which is less cognitively demanding by employing language adapted for a younger population – and by examining item suitability for adults with DS. However, in future studies, the test answers of DS adults might be ascertained through parental reporting (Fisher, Mello, & Dykens, 2014).

Another limitation worth highlighting is that only 10 adults with DS were included in the pilot study for assessing internal consistency, and they were only assessed once, so a repeatability index could not be calculated. Future studies testing the internal consistency of the test should include higher numbers of adults with DS and should calculate the repeatability index. In addition, the convergent validity could not be studied by comparing the EQ-i:YV with other scales that also assess EI. In the current sample, this validity was not established because of all the scales used, the EQ-i:YV was the only one whose results were managed to be used coherently. Furthermore, it may be considered that the special kind of emotional sensitivity shown by participants with DS from the current study may have been concealed by difficulties in verbally expressing themselves and their lower ability to take the initiative and voice their preferences. The lack of normality of all dimension of the EQ-i:YV, with the exception of adaptability and the emotional quotient, can also be cited as a limitation.

In conclusion, the existence of a valid and reliable tool to assess EI in DS adults enables researchers and clinicians to gain a more thorough understanding of how this population behaves on both general and preventive levels in order to teach EI properly. Such an understanding is especially relevant in a clinical setting where emotional distress signs and suspicions arise.

Disclosure Statement

This manuscript may be disseminated in any written or digital medium.

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