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Development and validation of the Winchester Adolescent Wellbeing Scale: a holistic measure of children's wellbeing

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ABSTRACT

Many existing measures of adolescent wellbeing tend to overlook the perspectives of children and are frequently one-dimensional or designed for specific contexts. We argue that a comprehensive assessment of wellbeing should cover multiple aspects of a child's wellbeing and that this cannot be done using a single dimension or a limited selection of items. This study aimed to develop and show the initial validation for the Winchester Adolescent Wellbeing Scale (WAWS). We adopted a person-based participatory approach where the inclusion of children's perspectives was used to define wellbeing and develop the structure of the scale. This ensured children's voices and experiences were central to the instrument's creation. The five-factor scale, validated with 422 adolescents aged 11–16, demonstrated robust model fit (RMSEA = 0.07, $\chi 2/d.f. = 2.23$, TLI = 0.91, CFI = 0.92) and internal reliability (Cronbach's alpha exceeding 0.8 across subdimensions). The WAWS has theoretical significance through incorporating adolescents' perspectives and offering a context-independent and multifaceted wellbeing scale.

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Wellbeing; scale development; measurement; adolescence; children; psychometric validation

Introduction

The importance of explicitly defining a latent construct, such as wellbeing, and understanding its underlying theory is frequently emphasized in scale development literature (Boateng et al., 2018; Carpenter, 2018; Streiner et al., 2015). While there are multiple measures of children's wellbeing available (Bradshaw et al., 2007; Land et al., 2001), some of these may benefit from further refinement in terms of their definitions, theoretical underpinnings, or psychometric rigour (Ryff et al., 2021). Instead, some measures are based on definitions that have not incorporated the perspectives of children, or they rely on descriptive accounts of wellbeing (such as, The Children's Society, 2006; Clarke et al., 2011; Liddle & Carter, 2015). Furthermore, existing measures often focus on specific contexts, such as the school environment, for assessing adolescent's wellbeing (such as, Arslan et al., 2021; Cummins & Lau, 2005; McLellan & Steward, 2015), which is logical given the quantity of time children spend there and the importance of schools in delivering mental health services (Link & Falkenberg, 2021). However, wellbeing is a multifaceted and holistic concept (Boyko et al., 2017; Dodge et al., 2012; VanderWeele et al., 2021). Consequently, there is a need for a measure that reflects adolescent's own understanding of wellbeing and assesses their overall wellbeing across various aspects of life, not limited to a specific context. While their comprehension may be limited, including children in research on their own wellbeing is crucial because it recognizes the significance

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of their perspectives and the importance of listening to their voices. Just as it is vital for adults to have these rights in society, the same principles apply to children, who have the entitlement to be heard and fulfil roles as citizens with rights and responsibilities (Schweiger, 2015).

To address this gap, the present study adopted a person-based approach to develop a comprehensive measure of adolescent wellbeing. Following Yardley and colleagues' (2015) recommendations, the voices of children were actively included throughout the scale development and validation process. This person-based participatory approach aims to create a more explicit, holistic, and relevant measure of adolescent wellbeing. We followed recommendations from scale development literature (MacKenzie et al., 2011), to develop and provide the initial validation for the Winchester Adolescent Wellbeing Scale (WAWS).

Literature review

Defining wellbeing remains a challenge for researchers (Dodge et al., 2012). This challenge arises from the absence of a consensus on the underlying philosophies, such as hedonic, eudaimonic, or a combination of both. Additionally, researchers use terms such as happiness, wellbeing, and life satisfaction interchangeably which adds to the complexity. Moreover, the role of context further complicates the matter. Despite differing viewpoints on the conceptualization of wellbeing, one key point researchers agree on is the importance of understanding wellbeing for evaluating the state of individuals and the importance of this for developing strategies and initiatives aimed at enhancing children's wellbeing (Tadić-Vujčić et al., 2022)

The study of wellbeing is grounded in two philosophical traditions: hedonia and eudaimonia. Hedonia focuses on seeking intrinsic pleasure associated with happiness (Deci & Ryan, 2008; Smith & Reid, 2017). It entails experiencing pleasure regardless of its source and maximizing wellbeing through increased enjoyment and pleasure in life (Boyko et al., 2017). On the other hand, eudaimonia is centred around acts of kindness, personal growth, and the utilization of one's best potentials in pursuit of life's purpose (Boyko et al., 2017; Waterman et al., 2010). It emphasizes human flourishing, long-term life satisfaction, and the search for meaning and fulfilment (Smith & Reid, 2017). The philosophical debate surrounding hedonic and eudaimonic wellbeing has not hindered the study of wellbeing (Alexandrova, 2017). Many models of wellbeing have been developed, some being underpinned by hedonia, some by eudaimonia, and others by both or neither (see, Diener et al., 2010; Huppert & So, 2013; Keyes, 2005; Seligman, 2011; Strelhow et al., 2020). These variations in research approaches have resulted in different interpretations of the true meaning of wellbeing across various academic disciplines (Dodge et al., 2012).

Wellbeing is a subjective and multifaceted concept that varies across age groups, cultures, and individuals (Fegter et al., 2010; McLellan & Steward, 2015; Ryan & Deci, 2001). Capturing the complexity of wellbeing requires a holistic approach (Boyko et al., 2017; VanderWeele et al., 2021). One frequently cited influence on wellbeing is the quality of relationships individuals have with each other, as emphasized in models like PERMA and 5-Ways to Wellbeing (Seligman, 2004; Government Office for Science, 2008 [online]). Moreover, happiness and life satisfaction are often associated with wellbeing and used interchangeably. Happiness is related to short-term emotions, whereas life satisfaction involves a cognitive evaluation of one's life as a whole (Alexandrova, 2017; Ryan & Deci, 2001). Additionally, physical health, access to physical activity, and the absence of illness are fundamental components of wellbeing (Dodge et al., 2012). Understanding and considering these key elements are essential in comprehensively defining wellbeing.

The inclusion of children in discussions about children's wellbeing is crucial as it acknowledges them as active members of society and ensures that our efforts as researchers are informed by their perspectives. Children's insights are essential for developing accurate indicators and understanding what truly matters to them in their lives (Ben-Arieh, 2005). In a metasynthesis exploring qualitative research on adolescent wellbeing, Carrillo et al. (2021) identified five pivotal determinants of children and adolescent's wellbeing. First, 'Positive notion

of oneself' relates to adolescents having a positive self-perception and the recognition of their capacities. Previous studies within the happiness field found that children tended to associate happiness solely with positive feelings (López-Pérez et al., 2016) and often used concrete examples like school grades and feedback as influencing their happiness (López-Pérez & Fernández-Castilla, 2018). The second determinant, 'Good treatment and support relations', relates to the significance of interpersonal relationships that provide support and foster feelings of protection and safety. This echoes with Sastre (1999), where young adults (18–25 years old) emphasized family and positive relationships as crucial aspects of wellbeing. Third, the 'Recognition' determinant highlights the value of being acknowledged and respected as unique individuals. Fourth, 'Significant activities' reveal how daily activities impact wellbeing, focusing on enjoyable experiences that allow for self-reflection and connections with others. Bharara et al. (2019) report that adolescents from New Zealand identified straightforward and tangible pathways to enhance wellbeing, such as engaging in sports. Lastly, 'Contextual aspects' highlight the importance of social contexts for accessing resources and services, such as schools. Understanding and addressing these determinants contributes to a comprehensive approach to promoting the wellbeing of adolescents (Carrillo et al., 2021).

This paper focuses on the measurement of adolescent's wellbeing. Adolescence is defined as 'the phase of life between childhood and adulthood, from ages 10 to 19' years (World Health Organisation, 2023 [online]). In a recent overview of this research field, Tadić-Vujčić et al. (2022) highlighted that existing frameworks of children's wellbeing have made valuable contributions, but have predominantly relied on adults' conceptualizations of wellbeing, which might not fully capture the complexities related to adolescents' wellbeing (Ben-Arieh et al., 2014; Savahl et al., 2021). These complexities include considerations such as how developmental age impacts adolescents' wellbeing and their understanding of it and the cognitive capacity of children to comprehend the concept of wellbeing and contribute effectively to research. Furthermore, these complexities involve the distinction between current wellbeing and the notion of 'well-becoming', the unfolding of the life course (Ben-Arieh et al., 2014).

The measurement of adolescent's wellbeing has not hindered progress within the research field, but it is a prominent issue (Savahl et al., 2021). Despite this progress, existing measures often lack children's perspectives in their definition of wellbeing. For instance, the widely used UK scale, Warwick-Edinburgh Mental Well-being Scale, was adapted and validated for teenagers (Clarke et al., 2011), however, the measure is based on 'Affectometer 2,' a measure of general happiness developed over four decades ago (Kammann & Flett, 1983). This approach overlooks the adolescent voice in today's context. In contrast, the Children's Society took a child-centred approach when developing the Good Childhood Index, involving children in discussions about what constitutes a 'good life.' However, the Children's Society does not provide an explicit definition of wellbeing based on their initial enquiry. Explicitly defining a concept is considered imperative for validity in scale development literature (Boateng et al., 2018; MacKenzie, 2003; MacKenzie et al., 2011).

Transparency in reporting scale development is essential for reliable and valid measurement (Flake & Fried, 2020). McLellan and Steward (2015) developed a scale for children's wellbeing in a school context but provided little explanation for removing certain items because they were 'wordier or less applicable' (p.326). Developing a scale entails a careful balance of theoretical, methodological, and statistical considerations. Removal of 'wordier' items, while ambiguous, may be practically important to mitigate questionnaire fatigue as McLellan and Steward's (McLellan & Steward, 2015) scale was aimed for completion by a young audience. Without further clarification of what constitutes a 'wordier' item though, it is difficult to assess the robustness of these choices.

The measurement of adolescent's wellbeing has seen progress over time with various measures developed, but conceptual shortcomings and a lack of transparency in scale development remain critical challenges. A child-centred approach is crucial to ensure a measure captures what truly matters to children. Additionally, comprehensive reporting of the scale development process is needed so that the robustness of decisions can be determined by readers.

The present study follows evidence-based procedures to develop and initially validate the WAWS. The focus of this paper will address key stages of the scale development framework proposed by MacKenzie et al. (2011), including the development of measures, model specification and scale evaluation and refinement. The objective is to provide a detailed account of the WAWS development process, using the authors' previous work that adopted a child-centred approach to explore and define adolescent wellbeing. By aligning with MacKenzie et al. (2011) recommendations for scale development and drawing on prior child-centred research, the aim is to establish a robust measurement tool for assessing adolescent wellbeing in the United Kingdom.

Conceptualization – the Winchester Adolescent Wellbeing Scale

The first stage of scale development is 'Conceptualization' which involves defining the construct and it's conceptual domain and identifying and defining potential sub-dimensions (MacKenzie et al., 2011). Given the intricate nature of conceptualizing adolescent's wellbeing, we conducted primary research with adolescents (aged 11–16 years old) to explore their interpretation of the term wellbeing, and what makes them feel good (reported in Gennings et al., 2021).

Lundy et al. (2011) concluded from their research on working with children as co-researchers that it is essential to recognize the experience and expertize of professionally trained individuals, as this recognition serves the best interests of the child. Based on this, this research enquiry began with interviewing experts within the field of adolescent wellbeing. The collected data was thematically analysed, and findings were used to inform focus group interviews with children (for example, by crafting the interview guide and designing activities for the focus group). Together, data collected with the experts and children was then used to develop a definition of adolescent wellbeing and a framework informed by children's perspectives on wellbeing. This definition and framework underpin the current study that aims to develop a psychometric measure of adolescent's wellbeing.

Our previous work defines adolescent wellbeing as 'A multifaceted perception of an interaction between an individual's positive feelings and external influences' (see, Gennings et al., 2021, p. 84) and identifies specific positive feelings and external influences that are important in expert and adolescent's understanding of children's wellbeing. Recent research has advocated for the inclusion of children's views in evaluating their wellbeing and to inform assessment methods (López-Pérez et al., 2022; Savahl et al., 2022). Building upon our prior research, which provided a clear definition of adolescent wellbeing, the present study will translate the identified themes into subdimensions. These subdimensions will form the structure of a new measure of adolescent wellbeing. Table 1 presents relevant themes identified during the initial inquiry, along with the rationale for their inclusion in the present study.

The retained themes outlined in Table 1 were identified based on the conceptualizations of children aged 11–16 years old. They were then translated into sub-dimensions for the WAWS and subsequently defined. The dimensions were defined using criteria outlined by Podsakoff et al. (2016) regarding construct definition development. The subdimensions, their definitions and how they link to existing measures of wellbeing are outlined in Table 2.

These subdimensions were derived from adolescent's perspectives (Gennings et al., 2021) and have support from existing literature within the field that discusses the importance of positive relationships with others (Carrillo et al., 2021; Savahl et al., 2022; Seligman, 2004), both physical and mental health (Dodge et al., 2012; Tabor & Yull, 2018), acceptance (Carrillo et al., 2021) and personal growth (Sastre, 1999). The subdimensions show both similarities and differences when considered alongside existing measures of wellbeing. Several subdimensions, such as 'Health' and 'Flourishing,' show commonality across various wellbeing measures, indicating a consensus in the importance of assessing these aspects of wellbeing. In contrast, subdimensions like 'Judgment,' 'Family,' and 'Friends' are more specific and nuanced, addressing facets such as social judgement, self-acceptance, relationships with parents, and interpersonal connections, respectively. These

Table 1. Themes identified in Gennings et al. (Gennings et al., 2021) that were translated into subdimensions for the WAWS.

Overarching Themes	First order themes	Identified by	Retained for WAWS	Justification for removal or retention
Positive feelings	Flourishing	E	✓	Flourishing was retained as it seemed central to expert's descriptions of wellbeing. The term also captured the meaning of children's discussions within focus groups. This theme had some overlaps with the 'determination' theme identified by children.
	Health	B	✓	This theme was central to discussions in all interviews/focus groups where participants discussed both mental and physical health. The potential splitting of health into mental and physical sub-dimensions for the scale was discussed.
	Determination	A	✓	Determination was identified during focus groups. Discussions had some overlap with expert's descriptions of flourishing. It was agreed to keep determination and flourishing as separate dimensions for the initial analyses although they shared similar properties.
External Influences	Connections	E	✓	This theme was identified in the expert interviews where experts broadly discussed connections in relation to friends and family.
	Basic needs	E	✗	This theme was only identified as important by the expert sample and findings highlighted that children might not comprehend the link between basic needs and wellbeing. Therefore, it was not retained for the scale development.
	Social interactions	A	✓	Adolescents highlighted a difference in feeling connected to family and feeling socially connected.
	Upbringing & parental dependence	A	✓	Specifically, family was identified by children as being important for their wellbeing.
	Fitting in & judgement	A	✓	This theme was identified by adolescents, where belonging seemed particularly important to their perception of wellbeing.
	Material goods	A	✗	This theme related to adolescents not viewing material goods as important for their wellbeing. Based on children's communication that this was not important for their wellbeing, this theme was not included as a subdimension.

Abbreviations: Expert (E); Adolescent (A); Both expert and adolescent (B).

subdimensions provide a more comprehensive overview of the factors influencing wellbeing beyond the broader categories typically measured.

An outline of the scale structure with subdimension definitions were sent to researchers within the field of positive psychology for scrutiny ($n = 6$). Once the scale structure was identified as appropriate and the dimension definitions were concluded to be explicit and representative of the findings from Gennings et al. (2021), the next stage of scale development was approached.

Development of measures – the Winchester Adolescent Wellbeing Scale

The next stage in the development of the WAWS involved the creation of items designed to embody the concept of wellbeing and its defined subdimensions, followed by an assessment of content validity (MacKenzie et al., 2011). As outlined in the scale development guidance, item generation can be informed by many sources including literature, experts and representatives of the population (Ibid.) Based on this, experts in the field of scale development and psychology ($n = 6$) were invited to assist in the generation of an item pool. Guidance notes for this specified

Table 2. Initial subdimension definitions.

Sub-dimensions	Definitions	Similar dimensions/items in existing wellbeing measures
Health	Perceptions of feeling well within one's self	General health – Psychological General Wellbeing Index (Grossi & Compare, 2014) Health – Child and Youth Well-Being Index in the United States (Land et al., 2001) Health – Personal Well-being Index: School Children (Cummins & Lau, 2005) Positive emotional state – The Stirling Children's Wellbeing Scale (Liddle & Carter, 2015) 'I feel active and vigorous', WHO-5 Wellbeing Index (World Health Organization, 1998)
Flourishing	Perceptions of accomplishment from achieving goals	Engagement – PERMA-Profiler (Butler & Kern, 2016) 'My daily life has been filled with things that interest me' – WHO-5 Wellbeing Index (World Health Organization, 1998) 'I've been feeling optimistic about the future' & 'I've been interested in new things' – WEMWBS (Clarke et al., 2011)
Determination	Perceptions of drive to achieve personal goals	Achievement – Personal Well-being Index: School Children (Cummins & Lau, 2005) Self – Youth Empowerment Scale – Mental Health (Walker et al., 2010) Sense of mastery – Resilience Scale for Adolescents (Goldstein, 2008) Accomplishments – PERMA-Profiler (Butler & Kern, 2016)
Judgement*	Perceptions of being viewed negatively by others	Community connectedness – Child and Youth Well-Being Index in the United States (Land et al., 2001) Community – Personal Well-being Index: School Children (Cummins & Lau, 2005) 'I've been feeling good about myself' & 'I've been feeling close to other people' – WEMWBS (Clarke et al., 2011) 'I think lots of people care for me' – Stirling Children's Well-being Scale (Liddle & Carter, 2015)
Family*	Perceptions of comfort afforded by parents/carers	Family – Multidimensional Students Life Satisfaction Scale (Huebner, 1991). Children's relationships – An index of child well-being in the European Union (Bradshaw et al., 2007)
Friends*	Perceptions of feeling connected to others	Social relationships – Child and Youth Well-Being Index in the United States (Land et al., 2001) Children's relationships – An index of child well-being in the European Union (Bradshaw et al., 2007) Relationships – Personal Well-being Index: School Children (Cummins & Lau, 2005) Friends – Multidimensional Students Life Satisfaction Scale (Huebner, 1991) Relationships – PERMA-Profiler (Butler & Kern, 2016) 'I've been feeling interested in other people' –WEMWBS (Clarke et al., 2011)

*To enhance the clarity of the content within the subdimensions, certain themes were given new names during the translation process. Friends represents the 'social interaction'/'connections' theme, Judgement represents the 'fitting in & judgement' theme and Family represents the 'upbringing & parental dependence' theme from Gennings et al. (2021).

that items should be clear and only elicit one interpretation. Accordingly, complex syntax was eliminated, and double-barrelled items were split into separate items. To facilitate item development, Ostrom's ABC model of attitudes was used as a guiding tool (Ostrom, 1969). The model prompted us to consider items from diverse perspectives within each subdimension, encompassing affective, behavioural, and cognitive states. While we did not strictly adhere to this framework during the analysis phase, it provided valuable guidance for crafting items that could be assessed from a range of viewpoints, thereby encouraging participants to assess their perceptions across three distinct categories, leading to a more comprehensive and accurate evaluation (Giles et al., 2020). Initially, 140 items were generated, so further analyses could remove undesirable items (Boateng et al., 2018).

The content validity of the items in relation to their subdimensions was assessed via Lynn's (1986) Content Validity Index (CVI). Here, a new sample of experts within the field of wellbeing and scale development ($n = 6$) were asked to rate each item from 1 (not relevant) to 4 (highly relevant) in relation to the subdimension definition. Polit and Beck's (Polit & Beck, 2006) criteria for assessing item level CVI was adopted whereby items scoring < 0.78 were removed from the item pool. Overall, the CVI removed 60 items. Then, in alignment with a child-centred approach, this process was repeated with a sample of adolescents aged 11–16 years old ($n = 6$), resulting in a further 32 items being removed.

The overarching anchor 'Over the last month, I . . . ' was developed and a 5-point Likert scale was selected as research suggests it is easily understood by young people (Coaley, 2010), and often used within existing literature in this field (The Children's Society, 2006; Clarke et al., 2011; Liddle & Carter, 2015; McLellan & Steward, 2015). Simple adjectives suggested by Vagias (2006) were used for the measurement scale, *Never, rarely, sometimes, often, always*.

Model specification – the WAWS

The third stage of MacKenzie et al. (2011) scale development framework requires the measurement model to be specified as formative or reflective. This determination influences subsequent data analysis and interpretation. A formative measure contributes to defining the concept it represents, while a reflective measure merely reflects it. Using Jarvis and colleagues (Jarvis et al., 2003) decision rules for determining whether a construct is formative or reflective, we specified the WAWS as reflective due to the direction of causality between the construct to the measures and the measures being related. With this specification, the model progressed to the next stage in MacKenzie et al. (2011) framework, 'scale evaluation and refinement'. This paper addresses this stage by piloting the WAWS with adolescents and analysing the collected data through factorial analyses which is the focus of the rest of the paper.

Materials and methods

Protocol

Institutional level ethical approval was obtained. Parents of participants and the adolescents themselves provided informed consent to participate in an online survey. The online survey was piloted on Jisc, an online survey platform. Item order was randomized, and responses were anonymous. Data was collected over an eight-month period and consisted of two phases of data collection. The first phase was analysed before proceeding with the next.

Participants

The study relied on a volunteer/convenience sample where an invitation to complete the WAWS was distributed via schools, sports clubs, and social media. The only inclusion criteria were that adolescents had to confirm their age between 11 and 16 years and their residence in the UK. In total, the study included 422 UK based adolescents aged between 11 and 16 years old. The first phase ($n = 180$) of data collection was used for an exploratory factor analysis (EFA) and the second phase ($n = 242$) for a confirmatory factor analysis (CFA). Sample characteristics are presented in Table 3 and sample size is addressed within the limitations section of this paper.

Table 3. Sample characteristics.

		Phase 1		Phase 2	
		n	***%***	***n***	***%***
	n	180		242	
Gender					
	Male	73	40.56	91	37.60
	Female	104	57.78	147	60.74
	Other	2	1.11	3	1.24
	Rather not say	1	0.56	1	0.41
Ethnicity					
	White	150	83.33	223	92.15
	Mixed	15	8.33	16	6.61
	Black	4	2.22	0	0.00
	Asian	5	2.78	1	0.41
	Other	6	3.33	2	0.83
Age					
	Mean	13.55		13.91	
	sd	1.55		1.78	

Phase 1 Analysis and Results

Analysis: Phase 1

An EFA was carried out with the phase 1 data to examine the psychometric properties of the scale. IBM SPSS (v. 28) was used to assess the data for normal distribution, via a Shapiro-Wilk Normality Test. A Spearman's Correlation Coefficient was also run to assess the multicollinearity of items. The EFA was conducted using principal component analysis and orthogonal varimax rotation to identify correlations between items and the latent construct. Principal component analysis and orthogonal varimax rotation were selected as the subscales were theorized to be independent but related. Varimax rotation was selected as it provided a simple structure and is often recommended for factor analysis (Pett et al., 2003). Before interpreting the EFA, data was checked for suitability of factor analysis by inspection of the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity (Carpenter, 2018). In addition, a method of item extraction based on guidelines from the literature was identified (e.g. Comrey & Lee, 2013; Harrington, 2009; Pett et al., 2003; Tabachnick & Fidell, 2014). Item extraction involved several steps: (1) inspecting the correlation matrix for coefficients greater than 0.8 and subsequently removing those items, (2) identifying and removing items that mis-loaded or cross-loaded, with a focus on items that appeared on an incorrect factor or on more than one factor, and (3) eliminating items with singular loadings of ≤ 0.5. The impact of item removal on sampling adequacy and eigenvalues was continuously checked (Kaiser, 1960). Factor retention was guided by Eigenvalues (acceptable >1) and parallel analysis where eigenvalues obtained from the actual data were compared with the eigenvalues obtained from 1,000 random datasets generated through Monte Carlo simulations (O'Connor, 2000). On completion of item removal, the internal consistency of each factor was assessed via Cronbach's alpha.

Results: phase 1

Data was non-parametric ($p < 0.05$). No items displayed multicollinearity, as correlation coefficients were all < 0.8. The KMO value of sampling adequacy and Bartlett's test of sphericity verified the suitability of data for analysis. The KMO measure of sampling adequacy was categorized as 'marvellous' (KMO = 0.95; Kaiser & Rice, 1974) and Bartlett's test of sphericity was significant ($p < 0.05$). Considering this, the data was concluded to be suitable for factor analysis. Table 4 shows an overview of the EFA decision making process.

Table 4. Decision making process throughout EFA.

EFA	Items Removed	Factor Loading	Reason
1	J3	−.071	Negative loading
	F6	0.46–0.41–0.46	CL
2	F9	0.5–0.45–0.4	CL
	F8	0.65–0.41	CL
	Fr5	0.6–0.48	ML and CL
3	F5	0.51–0.46	CL
	He8	0.46–0.54	CL
4	F3	0.54–0.41	CL
	He3	0.5–0.51	CL
5	F7	0.41–0.66	CL
	He2	0.47–0.42	CL
6	F4	0.45–0.4	CL
	Fr3	0.45–0.53	CL
7	Fr4	0.65	ML
	F1	0.44	ML
	F2	0.49	ML

Abbreviations: Exploratory Factor Analysis (EFA); Mis-load (ML); Cross-load (CL); Flourishing (F); Judgement (J); Friends (Fr); Health (He).

As a result of the EFA and removal of items, one factor was dropped (Flourishing) and another sub-divided (Health). Health included items reflecting physical health, while items reflecting mental health loaded with the subdimension Judgement. Importantly, these changes seemed logical and in accordance with existing literature.

After item removal, the resulting scale had 5 factors, explaining 73.53% of the total variance (see Table 5). The retention of 3 factors was supported by the parallel analysis (refer to Table 6). However, eigenvalues exceeding 1 were observed for all five theorized factors. Given the theoretical significance of these five factors to the scale and the presence of eigenvalues exceeding the threshold, we opted to retain all five factors. As a result of the EFA, the subdimension 'Judgement' was re-named 'Acceptance' to better reflect the dimension. All five factors showed high internal consistency ($\alpha > 0.8$; Kline, 2000) apart from factor five ($\alpha = 0.68$). This factor only included two items (potentially explaining its low internal consistency). As the items had high factor loadings, factor five was retained, and a new item (Fr99) was developed to reflect the dimension definition, so that the factor was adequately represented in the scale (Carpenter, 2018).

Justification of decision making: phase 1

Flourishing was removed during the EFA (Phase 1). The distinctiveness of the subdimensions Determination and Flourishing was discussed during the initial scrutiny of the scale structure where it was hypothesized that the subscales may collapse together. In the latter stages of the EFA process, the remaining flourishing items were loaded with the determination factor; however, these had low factor loadings (<0.5) and were therefore removed from the scale. While the decision to remove the Flourishing subdimension may seem to undermine the theorized model, this subdimension was the only subdimension included in the scale structure that originated solely from the expert interviews. All other subdimensions derived from themes from focus groups with adolescents or are subdimensions mentioned in both expert interviews and focus groups with adolescents (see Table 1 for an overview). Based on this, it was not unexpected that this factor was removed during the analyses.

Similarly, during the generation of the item pool, experts identified that the subdimension Health could be divided during the factor analysis to reflect mental and physical health. This division did occur, but it was not viewed as problematic due to this outcome being anticipated. The definition given for the Health subscale (seen in Table 2) is broad, but feeling well within oneself is adequately reflected in the subdimensions Acceptance and Physical Health.

Table 5. Summary of exploratory factor analysis.

Variable	Item	Factor 1: Acceptance	Factor 2: Family	Factor 3: Determination	Factor 4: Physical Health	Factor 5: Friends
Factor Loadings						
	J6	**0.78**	0.23	0.12	0.07	0.26
	He6	**0.76**	0.29	0.20	0.31	0.03
	J1	**0.75**	0.30	0.26	0.05	0.13
	J4	**0.74**	0.37	0.27	0.12	0.07
	J5	**0.73**	0.36	0.28	0.15	0.03
	J2	**0.71**	0.23	0.17	0.10	0.30
	He10	**0.68**	0.35	0.30	0.30	−0.03
	He1	**0.68**	0.33	0.19	0.32	−0.05
	He5	**0.57**	0.20	0.09	0.36	−0.13
	Fa6	0.36	**0.81**	0.18	0.13	0.06
	Fa5	0.22	**0.79**	0.27	0.15	0.09
	Fa2	0.36	**0.79**	0.27	0.03	−0.04
	Fa3	0.32	**0.72**	0.18	0.19	−0.05
	Fa7	0.39	**0.69**	0.16	0.19	0.08
	Fa1	0.11	**0.69**	0.30	0.28	0.15
	Fa4	0.29	**0.65**	0.05	0.08	0.08
	D4	0.19	0.27	**0.82**	0.07	0.05
	D2	0.26	0.20	**0.79**	0.18	0.05
	D5	0.19	0.26	**0.72**	0.23	0.07
	D1	0.14	0.10	**0.67**	0.27	0.09
	D3	0.37	0.22	**0.65**	0.31	0.05
	He9	0.23	0.21	0.34	**0.79**	0.09
	He4	0.20	0.20	0.29	**0.79**	0.14
	He7	0.39	0.24	0.34	**0.69**	0.08
	Fr1	−0.01	0.00	−0.01	0.17	**0.89**
	Fr2	0.32	0.17	0.26	−0.02	**0.75**
Eigenvalues						
		12.99	2.01	1.62	1.39	1.09
Variance Explained (%)						
		49.97	7.72	6.24	5.36	4.21
Cronbach alpha						
		0.94	0.92	0.88	0.89	0.68

Table 6. Parallel analysis.

	Raw data	Means from PA
Factor 1	12.99	1.77
Factor 2	2.00	1.64
Factor 3	1.62	1.55
Factor 4	1.39	1.47
Factor 5	1.09	1.40

Abbreviation: PA = Parallel analysis.

The Judgement factor was re-named 'Acceptance' as items that loaded onto this factor reflected a broad sense of belonging related to one's self and within a community. Arslan (2018) found a significant positive association between belonging and wellbeing among adolescents within a school context. Sagone and Caroli (2014) also stated that self-acceptance is a frequently cited element of eudaimonic wellbeing, which reflects the underpinning theory of the WAWS. The inter-

relationships between belonging, acceptance, mental health, and wellbeing, support the changes that occurred to the scale structure during factor analysis.

Summary: phase 1

After an EFA, the WAWS consisted of five subscales representing external influences (Family and Friends) and positive feelings (Determination, Physical Health, and Acceptance), which reflected the underpinning conceptualization of wellbeing (Gennings et al., 2021). The scale contained strong factor loadings and each subscale obtained acceptable internal consistency scores. Next, phase 2 data was collected and analysed via a Confirmatory Factor Analysis (CFA) to assess the fit of the emergent model, thereby fulfilling the final component of MacKenzie and colleagues (MacKenzie et al., 2011) 'scale evaluation and refinement' stage in the development of the WAWS.

Phase 2 analysis and results

Analysis: phase 2

A CFA was conducted using data collected during phase 2 to assess the suitability of the model identified in the EFA. The normality of the data was examined in IBM SPSS (v. 28). The measurement model was constructed using IBM SPSS Amos Graphics Version 29, where the estimation method was Maximum Likelihood. We used Hoe's (2008) criteria for the root mean square error of approximation (RMSEA, <0.8 indicates acceptable fit), the Tucker-Lewis Index (TLI) and Comparative Fit Index (CFI, >0.9 indicates good fit), and Kline's (1998) recommendation for the chi-square to degrees of freedom ratio ($\chi 2$/d.f., ratio of < 3 indicates reasonably good fit) to assess model fit. These values cover the two classifications of fit indices, absolute (RMSEA) and incremental (TLI; CFI) Additionally, modification indices were consulted to make decisions when the threshold exceeded 20, following guidelines by Harrington (2009).

Results: phase 2

Data was non-parametric ($p > 0.05$) with no extreme kurtosis, KMO was classified as 'marvellous' (KMO = 0.93; Kaiser & Rice, 1974) and Bartlett's test of sphericity was significant ($p < 0.05$). Data was screened for multicollinearity via a regression analysis, and the variance inflation factor (VIF) identified that the item 'Fr2' exhibited a VIF greater than 0.5 (0.52) and was therefore removed from the scale.

The CFA suggested the five-factor model was an acceptable and good fit. The modification indices suggested that six error terms should be covaried (all suggestions met the threshold of ≥ 20). Each covaried error term was within the same subdimension and made theoretical sense. After adjusting the model in accordance with the modification indices, the results of the confirmatory factor analysis (CFA) met the fit criteria with the following values: RMSEA = 0.07 (90% CI [0.06–0.08]), $\chi 2$/d.f. = 2.23, TLI = 0.91, and CFI = 0.92.

Table 7 includes regression weight estimates and reliability scores for each factor. Data suggests that items are positively related to their respective subdimensions, indicating a good association between the items and the subdimensions. Additionally, the reliability scores demonstrate good internal consistency for each factor, with Cronbach's alpha values exceeding 0.8 (Kline, 2000), affirming the reliability of the measurement model.

Justification of decision making: phase 2

The WAWS includes one subdimension, Friends, that consists of only two items. Scale development literature suggests that subdimensions should ideally include a minimum of three items to

Table 7. Regression weight estimates, standardized and unstandardized, along with internal reliability scores of the WAWS.

Items (original label)	Subdimension	Standardized regression weight	Unstandardized regression weight	Standard error	Cronbach alpha
A4 (J4)	Acceptance	0.83	1.40	0.12	0.93
A3 (He1)		0.73	1.14	0.09	
A5 (J6)		0.78	1.24	0.11	
A6 (J1)		0.78	1.25	0.11	
A2 (He10)		0.69	1.00		
A8 (He5)		0.66	1.15	0.12	
A7 (J2)		0.82	1.41	0.12	
A1 (J5)		0.75	1.05	0.10	
A9 (He6)		0.86	1.55	0.13	
Fa4	Family	0.60	0.41	0.04	0.93
Fa3		0.80	0.91	0.05	
Fa5		0.90	0.92	0.04	
Fa6		0.92	0.92	0.04	
Fa2		0.85	0.92	0.05	
Fa1		0.89	1.00		
Fa7		0.63	0.59	0.05	
D2	Determination	0.67	1.02	0.12	0.85
D1		0.74	1.10	0.12	
D4		0.62	1.00		
D5		0.71	1.07	0.12	
D3		0.80	1.44	0.15	
Fr1	Friends	0.70	1.00		0.93
Fr99		0.72	1.33	0.19	
PH2 (He4)	Physical Health	0.74	0.71	0.05	0.85
PH1 (He9)		0.92	1.00		
PH3 (He7)		0.79	0.73	0.05	

accurately represent a dimension within a measure (Carpenter, 2018; MacKenzie et al., 2011). To address this limitation, we introduced a new item (Fr99: spent time talking to friends) designed to complement the existing items (Fr1: Found the time to talk to friends; and Fr2: Spent time with friends). However, upon inspection of multicollinearity, Fr2 was subsequently removed, placing the subdimension again at risk of inadequate representation within the scale. While it is essential to acknowledge that the recommendation of having three items per subscale is considered the 'gold standard,' it should not stop the development of a measure. The subdimension Friends exhibits high internal consistency and robust factor loadings. Furthermore, while developing the underlying theory, it was evident that friendships played a pivotal role in influencing adolescent's wellbeing, a finding consistent with wider research (see, Adams et al., 2011; Carrillo et al., 2021; Hartup & Stevens, 1997; Seligman, 2011). Despite the subdimension 'Friends' falling short of the recommended three-item criteria, it was deemed essential to retain within the scale. This decision was driven by the considerable emphasis on the role of friends among adolescents during the initial investigation and within existing literature. The importance of this factor outweighed strict adherence to the 'gold standard' recommendation. This scenario serves as an example of the intricate balance between theoretical, structural, and statistical decision-making inherent in the scale development process. By presenting this within the analysis process, we aim to enhance the clarity of the scale development process of the WAWS, thereby enabling readers ability to assess the robustness of our decision-making.

Summary: phase 2

The CFA provided evidence of acceptable and good model fit, supporting the face validity and internal reliability of the WAWS. The scale consists of five subdimensions and 26 items.

Table 8. Scale structure and items.

Subdimension	Items
Acceptance	A1 Was able to be myself
Perceptions of belonging within self and in a community	A2 Felt well within myself
	A3 Remember feeling mentally well
	A4 Felt like I belonged
	A5 Could be myself around others
	A6 Felt accepted by others
	A7 Was confident in being myself around others
	A8 Felt well-rested
	A9 Felt positive about myself
Determination	D1 Put in effort towards a task
Perceptions of drive to achieve personal goals	D2 Invested my efforts in something worthwhile
	D3 Kept going when things were too hard
	D4 Kept going when things got tough
	D5 Felt determined to achieve a goal
Family	Fa1 Felt encouraged by my family
Perceptions of emotional and social support afforded by parents / carers	Fa2 Felt my family were there for me when I needed them
	Fa3 Felt like my family listened to me
	Fa4 Felt safe at home
	Fa5 Remember when my family supported me
	Fa6 Felt supported by my family
	Fa7 Felt comfortable at home
Friends	F1 Found the time to talk to friends
Perceptions of feeling socially connected to others	F99 Spent time talking to friends
Physical Health	PH1 Felt physically fit
Perceptions of feeling well within one's self	PH2 Felt comfortable with how much physical activity I do
	PH3 Remember feeling physically healthy

Discussion

The present study sought to address the gap within measurement literature focused on adolescent's wellbeing. The scale development and validation process followed the recommendations outlined by MacKenzie et al. (2011) for scale development. The initial stages, including the development of measures, model specification, scale evaluation and refinement were systematically addressed. We hypothesized that by incorporating the perspectives of adolescents, alongside input from wellbeing experts, it would be possible to create a robust measure of adolescent wellbeing. Our findings provide initial support for this hypothesis, as the present study has demonstrated preliminary validity and reliability for the WAWS. This paper also shows that adolescents have the cognitive ability to meaningfully contribute to research focused on the measurement of wellbeing. The WAWS comprises five subdimensions: Determination, Physical Health, Acceptance, Family, and Friends. Definitions of these subdimensions and the corresponding items representing each dimension are summarized in Table 8.

The subdimensions were inductively developed from themes generated in the underpinning research. Strelhow et al. (2020) expressed the need for an integration of hedonic and eudaimonic traditions within indicators of wellbeing. This is based on theoretical and statistical support of the overlap/correlation between hedonic and eudaimonic philosophy. While the items of the WAWS are not explicitly linked to hedonia or eudaimonia, as this was not the aim of the study, the items encompass both hedonic and eudaimonic characteristics. Item development was guided by Ostrom's ABC model, where each subdimension initially had item stems that were reflective of affective, behavioural and cognitive states (e.g. I felt …I was …I remember …). Based on this, the structure of the items mirrored affect and cognitive states, aligning with hedonic and eudaimonic characteristics, respectively. Furthermore, the content of the items reflects eudaimonic characteristics with a number of

the subscales reflecting Ryff's (1989) six dimensions of wellbeing (such as, self-acceptance, positive relationships and personal growth) and hedonic characteristics (such as positive feelings and experiences). By including diversity within the item's structure and content, the scale recognizes the link between hedonic and eudaimonic wellbeing, which has been acknowledged in wider literature (Deci & Ryan, 2008; Waterman et al., 2008). Casas and González-Carrasco (2021) outline that there has been limited exploration into whether the correlation between hedonic and eudaimonic wellbeing exists within studies focused on adolescent wellbeing however this is something future research could explore while using the WAWS, while also exploring how the WAWS correlates with measures focused exclusively on hedonic and eudaimonic wellbeing.

Inclusion of adolescent voice in scale development

The integration of children's perspectives in developing WAWS addresses the acknowledged but under-implemented perspective of involving children in research concerning their wellbeing and its assessment (Ben-Arieh & Goerge, 2001; Savahl et al., 2022). Historically, child indicator research has predominantly relied on adult viewpoints, overlooking the distinctive experiences and needs of children (Hanafin & Brooks, 2007). By actively involving children in the development process, the WAWS acknowledges that children are experts in their own lives and possess valuable insights into what truly matters for their wellbeing (Carrillo et al., 2021; Schweiger, 2015). Consultation with experts within the wellbeing field informed the conceptualization of wellbeing, subscale selection, and item development. Ben-Arieh (2005) explains that children should have a proportionate role in researching their wellbeing, given its substantial impact on their lives. Hence, the WAWS prioritized children as a primary source of information, and the inclusion of expert perspectives further enhanced the rigour of the scale structure. Within the context of this study, 'experts' refer to adults with specialized knowledge in the wellbeing field, while children are recognized as the 'experts' of childhood and their own wellbeing in today's context.

The difference in adolescent's perceptions of wellbeing in comparison to adults was evidenced in the initial research underpinning the WAWS (Gennings et al., 2021). In the initial investigation, two pivotal themes, 'Upbringing and parental dependence' and 'Fitting in and judgment,' emerged as central to children's wellbeing, despite their absence in expert consultations. These themes are reflected in the WAWS as the 'Acceptance' and 'Family' subdimensions, which also have limited overlap with existing measures in the field (as shown in Table 2). The subdimension 'Acceptance' shares meaning with existing scales that focus on community connectedness, but the subdimension for the WAWS also focuses on whether an adolescent feels comfortable within themselves which is what the items 'Could be myself around others', 'Felt well within myself', 'Was confident in being myself around others' and 'Was able to be myself' represent. This is an important development considering that self-acceptance is associated with wellbeing (MacInnes, 2006) and that within the UK there is growing emphasis on acceptance of marginalized communities who have been evidenced to have low self-acceptance (for example, Camp et al., 2020).

Regarding the subdimension of 'Family,' existing measurement tools predominantly emphasize general connectedness with others. In contrast, the WAWS takes a more nuanced approach by differentiating between relationships with friends and family. To illustrate, the PERMA-Profiler incorporates a subdimension labelled 'Relationships,' which assesses the support individuals receive from *others* and the extent to which they feel loved. The WAWS, however, focuses on these relationships by distinguishing between family and friends. In line with this, Bradshaw et al. (2007) highlight the significance of children's relationships with their parents, as they argue family dynamics play a pivotal role in children's overall wellbeing. This emphasis on family is likewise reflected in Huebner's (1991) life satisfaction measure which also focuses on family in addition to friends.

Applications of the WAWS

By encompassing various subdimensions, the WAWS acknowledges that wellbeing is a complex interplay of positive feelings and external influences. This aligns with the understanding that a comprehensive measure of wellbeing must encompass all essential aspects of an individual's wellbeing, and this cannot be achieved through a single dimension or a restricted set of items (Ruggeri et al., 2020). Comprising five distinct subdimensions, the scale provides in-depth insights into specific aspects of adolescent's wellbeing that may require targeted attention. Consequently, it aids researchers and organizations in the development of interventions tailored to address particular subdimensions of the WAWS.

The call by the Organisation for Economic Co-operation and Development (OECD) in July 2021 for a multidimensional, child-centred measure of wellbeing highlights the alignment of the WAWS with key policy recommendations. As a result, the WAWS stands as a reliable and valid tool for use with children aged 11–16 years. Due to its context-independent nature, the application of the measure could be vast. The WAWS can be utilized in different settings involving children across various contexts such as education and healthcare. Due to the age range the scale is validated with, it would be simple to implement within a UK-based secondary school environment where it can be used to monitor the wellbeing of pupils and assess the impact of interventions. However, caution should be taken when using this scale in contexts outside the scope of UK-based children as wellbeing and the subdimensions of the WAWS were developed within this context. The variables that influence an individual's wellbeing are influenced by culture (Diener et al., 2003), and the subdimensions of the WAWS may not capture the full range of factors relevant to wellbeing in other settings.

Limitations: sample

There are a variety of suggestions for adequate sample sizes for factor analyses and a simplistic rule is that larger samples tend to yield more robust results (Osborne et al., 2014). Bagozzi et al. (2012) argue that researchers should target a sample size exceeding 100 and while maximum likelihood estimation is evidenced as robust with nonparametric data, researchers should evaluate their data for the presence of extreme kurtosis. Within the context of this study, there was only extreme kurtosis for two items within phase 1 and none within phase 2. Importantly, the suitability of data was checked before conducting factor analysis, including inspection and reporting of sampling adequacy, factor loadings, and sphericity (Tabachnick & Fidell, 2014).

Data collection for this study coincided with the Coronavirus pandemic and the closing of UK schools, making potential participants hard to access. When recruiting for the different phases of data collection, potential participants and their parents either did not respond to participation calls, explained they did not want an additional burden during unprecedented times, or did not want to assess their wellbeing during the global pandemic. We acknowledge that the sample sizes for each phase of data collection would ideally be larger, but due to the context this data was collected, it was not possible. To mitigate issues with the sample size, we carefully inspected the suitability of data before conducting analyses and the cut-off criteria for these measures were met. The limited sample sizes provide further need for additional validation studies of the WAWS such as predictive, concurrent, and discriminant validity thus satisfying the final stages of MacKenzie and colleagues (2011) scale development framework. Future research should aim for larger samples, or consider sample to item ratio recommendations (Mundfrom et al., 2005). In addition, the characteristics (including gender balance and ethnic diversity) of the sample was limited to mostly white British children. It is not within the scope of this study to explore gendered or ethnic influences on the WAWS however future work could implement the scale with a more diverse sample to look at influences on the measure and its validity.

As data was collected during the coronavirus pandemic, the survey was shared with participants online and no other modes of delivery could be explored (in-person or via telephone), this is something future research may wish to explore.

Conclusion

The theoretical importance of the WAWS lies in its commitment to incorporating children's voices and in providing a multifaceted, context-independent assessment of wellbeing. These aspects contribute to a more comprehensive assessment of adolescents' wellbeing. The WAWS has emerged from a rich integration of theory and primary research with adolescents (Gennings et al., 2021). The hypothesis that the underpinning theory would be translated into a comprehensive and psychometrically rigorous scale was supported. The WAWS consists of five subscales representing external influences (Family and Friends) and positive feelings (Determination, Physical Health, and Acceptance). The factor analyses confirmed the structure of the model and highlighted good internal consistency. Changes to the scale resulting from the factor analyses were logical and in accordance with underpinning theory and literature. It is also important to recognize that factorial validity and item development are only one 'piece of the puzzle', with the psychometric validation of an instrument an ongoing and iterative process (Batten et al., 2019). Within MacKenzie et al. (2011) scale development framework, there are further validation and norm development suggestions that future research could fulfil. Specifically, looking at discriminant and convergent validity, multigroup analyses and exploring how the scale performs in different contexts. Embracing an open approach to the reporting of further validation studies will enhance the comprehensiveness and robustness of findings.

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