



Evidence for the Psychometric Validity, Internal Consistency and Measurement Invariance of Warwick Edinburgh Mental Well-being Scale Scores in Scottish and Irish Adolescents

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ABSTRACT

Mental well-being is an important indicator of current, but also the future health of adolescents. The 14-item Warwick Edinburgh Mental Well-being Scale (WEMWBS) has been well validated in adults world-wide, but less work has been undertaken to examine the psychometric validity and internal consistency of WEMWBS scores in adolescents. In particular, little research has examined scores on the short 7-item version of the WEMWBS. The present study used two large samples of school children in Scotland and Northern Ireland and found that for both forms of the WEMWBS, scores were psychometrically valid, internally consistent, factor saturated, and measurement invariant by country. Using the WEMWBS full form, males reported significantly higher scores than females, and Northern Irish adolescents reported significantly higher scores than their Scottish counterparts. Last, the lowest overall levels of well-being were observed among Scottish females.

1. Introduction

Adolescence is a period characterised by intense physical, emotional and psychological development, and the challenges that these factors present can be stressful (Moksnes et al., 2010). In fact, scholars have argued that adolescence is partly shaped by the course of mental health and well-being. Further still, mental health problems that emerge in adolescence often persist into adulthood (Belfer, 2008; Call et al., 2002; Roza et al., 2003), therefore understanding adolescent mental health and well-being is an important public health priority. Research suggests that mental health and well-being are not mutually exclusive. Instead, mental well-being is more than just the absence of mental illness, or mental disorder (WHO, 2005). Mental well-being accounts for the ability to withstand day-to-day stressors, and to make a productive contribution in everyday life. Recent studies have demonstrated the positive influence of mental well-being on other constructs of consequence in adolescence, including resilience (Davydov, 2010). Positive mental well-being covers both hedonic (i.e., happiness, subjective well-being) and eudemonic (i.e., positive functioning) aspects of well-being (Clarke et al., 2011; Ryan and Deci, 2001; Tennant et al., 2007).

Within a United Kingdom (UK) context, the setting of strategic health priorities is the responsibility of devolved authorities in each of the four nations (England, Scotland, Wales, and Northern Ireland). In a

series of reports over many years, the Scottish Government have made the improvement of children's and young people's mental well-being a national priority (Scottish Government, 2009, 2012). In the Northern Irish context, the Bamford Review (2006) highlighted the relative lack of understanding of the levels of mental illness in Northern Ireland, and prioritized research on the mental health needs of children in Northern Ireland. There is a widespread belief that Northern Ireland is sufficiently different in its socio-political history from the rest of the UK to merit specific investigation (e.g., Ferry et al., 2008; Leavey et al., 2009). Subsequent to the Bamford Review (2006), others continued to call for a better understanding of the mental well-being of Northern Irish adolescents (e.g., MacDonald et al., 2011; Lloyd and Devine, 2012). The need for on-going investigation into the mental well-being of adolescents in Northern Ireland's post-conflict society, continues to be made within a variety of contexts including, academia (McAlister et al., 2013), politics (Ulster Unionist Party, 2016), and adolescent welfare (Commissioner for Children and Young People, NI, 2015).

While it is potentially important and instructive to assess adolescent well-being, the availability of a suitable assessment tool has historically hindered progress (Hu et al., 2007). Without an adequate index of mental well-being in hand, researchers have relied upon measures of mental illness (e.g., prevalence of depression or anxiety) as an indicator of mental well-being, despite the theoretical shortcomings (Hu et al.,

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2007). However, the development of the 14-item Warwick-Edinburgh Mental Well-being Scale (Stewart-Brown et al., 2011; Tennant et al., 2007) provided a potentially useful index of well-being. The WEMWBS accounts for both hedonic elements of positive mental well-being (e.g., ‘I’ve been feeling cheerful’, or ‘I have been feeling relaxed’) and eudemonic elements of positive mental well-being (e.g., ‘I’ve had energy to spare’, or ‘I’ve been thinking clearly’).

While a lot of data supporting the psychometric validity and internal consistency of WEMWBS scores has been derived from adult samples, an increasing number of studies have examined these indicators in adolescents. Additionally, studies to have employed the Rasch model have also found support for the unidimensionality of the WEMWBS scores, but in the form of a shortened seven-item version (Bartram et al., 2012; Stewart-Brown et al., 2009). In a sample of 1647 13- to 16-year-old adolescents in Scotland and England, Clarke et al. (2011) reported excellent fit statistics (GFI = 1.000, RMSEA = .003) and good internal consistency ($\alpha = .87$) for WEMWBS full form scores. In an Australian study, Hunter et al. (2015) administered the WEMWBS to a sample ($n = 829$) of Australian 13–16 year olds. Using confirmatory factor analyses these authors reported what they described as marginal fit (CFI = .93, TLI = .92, RMSEA = .080 [90% CI: .074, .087], SRMR = .041) for the full scale, and what they described as a good fit (CFI = .99, TLI = .99, RMSEA = .040 [90% CI: .022, .059], SRMR = .020) for the shortened version. However, it is noted that they permitted a correlated error term between items six and seven, and reported the scale to be internally consistent ($\alpha = .87$). In a Northern Ireland general population study on the WEMWBS full form (ages ranged from 16 to 24), Lloyd and Devine (2012) reported what they described as acceptable fit (GFI > .90; AGFI > .80; RMSEA = .09, and good internal consistency ($\alpha = .93$).

In a recent WEMWBS study among 13- to 15-year olds in Scotland, Campbell-Jack et al. (2015) reported significantly higher mean scores for males (Mean = 52.0) than females (Mean = 49.9). Similar gender differences were reported by the Health Behaviour of School Children (HBSC) survey (Currie et al., 2015) via the examination of psychological stress. Less is known about well-being in Northern Ireland, as many ‘UK’ studies do not provide Northern Ireland-specific data, and as Lloyd and Devine (2012) highlighted, given the relatively recent civil conflict and its potential impact on both mental health and well-being of the population, this could potentially be a serious omission. Some general population studies have compared well-being in Northern Ireland with well-being in other regions of the UK. These studies have included the General Health Questionnaire, and people living in Northern Ireland were shown to present with poorer mental health than those living in England and Scotland (Miller et al., 2003; Murphy and Lloyd, 2007; O’Reilly and Browne, 2001). Lloyd and Devine surmised that the combination of the extent data and known variance in mental health within the regions of the UK evinced the need for studies on the psychometric properties, and correlates, of WEMWBS scores in the various UK countries.

The present study sought to examine the psychometric validity, internal consistency and measurement invariance (gender and country) of the 14-item and the short 7-item WEMWBS scores in two large samples of adolescent in Scotland and Northern Ireland. We also employed measures of self-rated health, psychological and somatic well-being to examine construct validity. Given the dearth of adolescent-specific studies in a UK context, we made no hypotheses regarding the optimal nature of the full WEMWBS or the short form. Additionally we examined differences in mental well-being according to gender, region, and socio-economic status.

2. Methods

2.1. Participants

Participants were those 103 high schools in Scotland and Northern

Ireland. The Scottish pupils ($N = 2,721$) were those in 35 post-primary or high schools in Glasgow Local Authority area and Inverclyde Local Authority area (an area approximately 20 miles west of Glasgow City centre). These are two large urban centres. A total of 100% of local authority schools in Glasgow participated (30/30), and 83% of high schools in Inverclyde (5/6) participated. Northern Irish pupils were those in 68 high schools in a variety of urban, suburban and rural settings. This number represented 41% (68/167) of the total possible number of schools in the Northern Ireland Education Authority. Participants in Northern Irish schools ($N = 6,342$) were all those students in fifth form (Year 11; S5) at the time of data collection. Schools had previously been among those involved in a Randomized Controlled Trial (two participating schools in Northern Ireland withdrew immediately after the Trial was completed), and the majority of the cohort were persuaded to remain involved in this study of mental and psychological wellbeing. Paper-and-pencil surveys were administered under examination-like conditions in each individual school by one of three different researchers. Both pupil assent and parental consent were obtained before the data were collected.

2.2. Measures

The Warwick-Edinburgh Mental Well-being Scale (WEMWBS) was used to measure positive mental well-being. This is a 14 item scale assessing positive affect, satisfying interpersonal relationships and positive functioning (Tennant et al., 2007), summed to provide a single score ranging from 14 to 70 with higher scores reflecting greater well-being. The WEMWBS has displayed content and criterion validity, and acceptable test–retest reliability over one week (Tennant et al., 2007).

Psychosomatic symptoms were measured using the Health Behaviour of School Children symptom checklist (e.g., Currie et al., 2015), which includes eight common symptoms:

Headache, stomach-ache, dizziness, backache, feeling low, irritability/bad temper, difficulty sleeping, and nervousness. These symptoms can be thought of as constituting two dimensions that differ qualitatively; somatic and psychological symptoms (Haugland et al., 2001). Children were asked how often in the last six months they had felt any of the symptoms with the following response categories: about every day, more than once a week, about every week, about every month, and rarely or never. Items within the scale have shown adequate content validity and test-retest reliability (Haugland and Wold, 2001). Internal consistency coefficients were acceptable for both subscales: (a) Psychological ($\alpha_{\text{current study}} = .77$), and (b) Somatic ($\alpha_{\text{current study}} = .73$).

Self-rated health was assessed by asking participants, ‘‘In general, how would you rate your health? Responses options ranged from 1 = poor, to 5 = excellent (Currie et al., 2015).

2.3. Statistical analysis

Regarding the examination of the psychometric properties of WEMWBS scores, internal consistency and factor saturation of WEMWBS scores were planned to be examined, where .80 indicates internally consistent scores (Clark and Watson, 1995), though the authors were unable to locate recommendations for a factor saturation cutscore in the literature. Internal consistency accounts for the agreement among item scores, whereas factor saturation is the amount of variance in items’ scores attributed to the common factor. Confirmatory factor analysis (CFA) was plan to examine the factor structure of WEMWBS full and short form scores. Further still, multi-group CFA was planned to examine configural, metric, and scalar invariance of WEMWBS scores by gender and country. A number of statistical and associated recommendations were used to determine model fit: (a) CFI $\geq .90$, (b) TLI $\geq .90$, (c) RMSEA = .05 (good) to .08 (acceptable), and (d) SRMR $\leq .08$ (Bentler, 1990; Hu and Bentler, 1999; Marsh et al., 2004; Wang and Wang, 2012). Measurement invariance was

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