Journal of Affective Disorders 212 (2017) 150–159

Contents lists available at ScienceDirect

Journal of Affective Disorders

journal homepage: www.elsevier.com/locate/jad

Research paper

Adolescent depressive symptoms in India, Australia and USA: Exploratory Structural Equation Modelling of cross-national invariance and predictions by gender and age

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ARTICLE INFO

Keywords:
Depression
Adolescence
Cross-national comparisons
Exploratory Structural Equation Modelling (ESEM)

ABSTRACT

Background: The present study compares depressive symptoms in adolescents from three countries: Mumbai, India; Seattle, United States; and Melbourne, Australia measured using the Short Moods and Feelings Questionnaire (SMFQ). The study cross nationally compares SMFQ depressive symptom responses by age and gender.

Methods: Data from a cross-nationally matched survey were used to compare factorial and measurement characteristics from samples of students from Grade 7 and 9 in Mumbai, India (n=3268) with the equivalent cohorts in the Washington State, USA (n=1907) and Victoria, Australia (n=1900). Exploratory Structural Equation Modelling (ESEM) was used to cross-nationally examine factor structure and measurement invariance.

Results: A number of reports suggesting that SMFQ is uni-dimensional were not supported in findings from any country. A model with two factors was a better fit and suggested a first factor clustering symptoms that were affective and physiologically based symptoms and a second factor of self-critical, cognitive symptoms. The two-factor model showed convincing cross national configural invariance and acceptable measurement invariance. The present findings revealed that adolescents in Mumbai, India, reported substantially higher depressive symptoms in both factors, but particularly for the self-critical dimension, as compared to their peers in Australia and the USA and that males in Mumbai report high levels of depressive symptoms than females in Mumbai.

Limitations: the cross sectional study collected data for adolescents in Melbourne and Seattle in 2002 and the data for adolescents in Mumbai was obtained in 2010–2011

Conclusions: These findings suggest that previous findings in developed nations of higher depressive symptoms amongst females compared to males may have an important cultural component and cannot be generalised as a universal feature of adolescent development.

1. . Introduction

The bulk of our knowledge of the course and predictors of psychopathology is derived from high income countries. Epidemiological studies mostly from high income countries indicate that depressive disorders are highly prevalent and have high rates of lifetime incidence, high chronicity, and considerable functional impairment (Richards, 2011). Depressive disorder and clinically significant symptom levels are well recognised as a major public health issue in both developed and developing countries. The early age of onset depression is closely related to issues of chronicity and lifetime recurrence. The onset of depression during adolescence predisposes

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http://dx.doi.org/10.1016/j.jad.2017.01.020
Received 11 September 2016; Received in revised form 11 January 2017; Accepted 19 January 2017
Available online 21 January 2017
0165-0327/

to lifetime recurrence of depressive episodes, particularly in women (Kessler, 2003). Data from lower and middle income countries offer major opportunities to test the universality of such findings (Hidaka, 2012).

Thapar et al. (2012) conducted one of the most comprehensive reviews to date of the global literature on the epidemiology of depression in adolescence. The majority of studies found a prevalence of depression of less than 1% in children and this increases substantially throughout adolescence, with an estimated 1 year prevalence of 4–5% in mid to late adolescence. Thapar et al. noted that one of the most robust findings across many studies, mostly conducted in Western nations, was a significantly higher rate of depression in females (approximately 2:1) and other studies have linked this increase to factors associated with puberty (Lewis et al., 2015a; Patton and Viner, 2007).

In most developing countries adolescents are a large proportion of the national population. In India for example, it is estimated that one fifth of India's population – an estimated 230 million people, is between the age of 10 and 19 years (Pillai et al., 2008a). As such, adolescent mental health is a central feature of the nation's overall health. Despite this, very few epidemiological studies of depression in adolescents have been undertaken in India (Srinath et al., 2005; Hackett et al., 1999; Pillai et al., 2008b). Nair et al. administered the Beck's Depression Inventory (BDI) via self-reported to 1014 adolescents aged between 10 and 19 in the Kerala state of India (Nair et al., 2004). 47% of females who had dropped out of school reported a BDI score reflecting a subclinical or higher grade of depression. 22% of female and 13% of male secondary students reported a subclinical or higher grade of depression, while 29% of female college students a borderline or higher grade of depression. Pillai et al. noted that previous research of mental disorders in adolescents in India reported a wide range of prevalence rates from 3% to 36% (Pillai et al., 2008a). Community-based studies of Indian adults have found prevalence rates of 61% for depressive symptoms and 16–34% for clinical depression (Sarkar et al., 2012). Generally prevalence rates reported in studies are higher for self-reported symptoms than for diagnostic interviews conducted directly with adolescents and this is consistent with wider studies of depression (Lewis et al., 2014a).

2. Cross-national measurement invariance

The recent publication of the DSM 5 showed an increased awareness of cross-cultural variation in psychopathology. However, cross-cultural validity of commonly used epidemiological measures is critical for population prevalence estimates, service planning and examination of how risk and protective factors operate across diverse cultures (Sadler, 2005). One of the major issues in making valid cross-cultural comparisons is the validity of the measures used.

One crucial factor to ensure accurate and reliable cross national studies of epidemiology is using cross-national data based on a common methodology, including participant selection, measures, and methods of administration. Then testing the invariance of measures can proceed with more confidence that differences found will not be attributable to method differences. In clinical research it is particularly important to establish differences in symptom levels between different groups (e.g., male vs. female; age groups; developed vs. developing nations) (Marsh et al., 2014). Thus, testing whether the underlying factor structure, scale metric and associations are the same for different groups should be routinely considered prior to any conclusion that there are indeed such group differences (Widaman et al., 2010). Testing for invariance is critical prior to making cross-national comparisons of mean levels otherwise differences in levels will not reflect true differences, but, rather, for example, semantic divergence and measurement error. So too the comparison of predictive modelling across cultures requires metric invariance without which comparisons using a common measure do not produce meaningful results (Byrne et al., 1989).

Recently, Exploratory Structural Equation Modelling (ESEM) has emerged as a flexible technique to examine between group invariance. ESEM was developed as an integration of Exploratory Factor analysis (EFA), Confirmatory Factor Analysis (CFA) and Structural Equation Modelling (SEM) and has wide applicability to clinical research (Marsh et al., 2014, 2009; Asparouhov and Muthén, 2009). ESEM allows cross factor loading and rotational strategies to more flexibly examine multidimensionality and to enhance the discriminate validity of derived latent variables (Marsh et al., 2009). ESEM differs from the more traditional CFA which typically assumes independent cluster models (CFA-ICM) in which cross-loadings are constrained to zero and any small cross factor loadings are assumed to be misspecifications. In contrast, ESEM allows all observed variables to load on all latent factors and cross-loadings are freely estimated. In clinical scales where latent factors are likely to draw heavily on cross factor loadings, ESEM is a good alternative to CFA.

The current study examines a large sample of Indian adolescents living in Mumbai and compares this to data from the same depression measure collected from North American and Australian adolescents. The study draws on the International Youth Development Study (IYDS) which use a standardised research design to cross-nationally assess levels and predictors of multiple adolescent child and adolescent behaviours (McMorris et al., 2007). The measure of depression used is the Short Moods and Feelings Questionnaire (SMFQ), which has been used extensively in high incomes countries. A number of studies have supported a uni-dimensional factor structure for the SMFQ (Angold et al., 1995; Sharp et al., 2006; Deeba et al., 2015) and one recent study of Bangladeshi adolescents also suggested the SMFQ was unidimensional.

The aims of the present study are threefold: First to examine the factor structure of the SMFQ using both CFA and the newly develop ESEM technique across the three national groupings. Here we expect that a unidimensional model will show the best fit for the SMFQ in all national groups. The second aim is to conduct the first cross-national comparison of depressive symptomology amongst metropolitan Indian, Australian and North American adolescents. The final aim is to consider the prediction of depressive symptoms by gender and age using a multi-group comparison model and we expect that Indian adolescents will show the internationally common pattern of high levels for females and that depression scores will increase with age in early adolescence.

3. Method

3.1. Participants and procedure

The data for this analysis was drawn from the International Youth Development Study (IYDS), a tri-national longitudinal study examining the development of youth health behaviour and social adjustment. Data were collected in Mumbai, India (n=3268) and compared with the equivalent cohorts in the Washington State, USA (n=1907) and Victoria, Australia (n=1900). IYDS collected data from representative state samples from Victoria and Washington State obtained using a two-stage cluster sampling design. In the first stage, within each state and year level, public and private schools containing grades 5, 7 or 9 were randomly selected using a probability proportionate to grade-level size-sampling procedure. A target classroom within each school was randomly selected in the second stage. The IYDS studies in Washington State and Victoria were administered in 2002. Sixty schools with students at each of the three grade levels were randomly selected, and one class was randomly selected at each school. For each grade level in each state, replacement schools were also selected to be contacted if recruitment of sampled schools was unsuccessful. This paper uses only data from the 7th and 9th grade cohorts. Permission to conduct the study in individual classes corresponding to Grades 7 and