Validation of the Gujarati Version of Center for Epidemiological Studies Depression Scale for Children (CES-DC) and Prevalence of Depressive Symptoms amongst School Going Adolescents in Gujarat, India

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ABSTRACT

Introduction: Adolescents are at-risk for mental health issues especially depression. Center for Epidemiological Studies Depression scale for Children (CES-DC) is a validated scale to screen for depressive symptoms in population-based samples of children and adolescents. There is a need to validate available screening tools in local language to screen adolescents for depressive symptoms.

Aim: To validate CES-DC in Gujarati and to assess prevalence of depressive symptoms and its associated socio-demographic factors among school going adolescents.

Materials and Methods: A cross-sectional study was conducted among students studying in 8th to 12th standards (13 years to 17 years) from five Gujarati medium schools in Gujarat. CES-DC, Patient Health Questionnaire-9 and Rosenberg self-esteem scale were used for validation part of the study. Socio-demographic data was collected using a semi-structured questionnaire. Validity of the Gujarati version of CES-DC was assessed by checking for semantic, content equivalence, convergent and discriminant validity. The validated CES-DC scale, was used in a larger sample to assess prevalence of depressive symptoms. Descriptive analysis was done to assess prevalence of depressive symptoms among students and associations and were compared using chi-square test.

Results: Validation study was conducted among 300 participants. Gujarati translation of CES-DC scale was found to have acceptable semantic equivalence, content validity index, convergent, divergent validity and reliability. A total of 1000 students from urban and rural schools were surveyed, 53.2% students had a high CES-DC score. Prevalence of self-reported depressive symptoms increased with increase in class. Girls from 11th and 12th classes had more depressive symptoms.

Conclusion: The newly-translated scale can be used as self-reporting tool in detecting depressive symptoms of Gujarati children studying in 8th to 12th standard of school. Significant proportion of school going adolescents had depressive symptoms.

Keywords: Child, Depression, Epidemiology, Rating scale, Translating

INTRODUCTION

Mental health problems are common in adolescent population. Adolescent depression is defined at three levels: (1) Depressed mood, (2) Depressive syndrome, and (3) Clinical depression [1]. Depressed mood is persistent and pervasive sadness. Classical depressive syndrome in adults includes low mood, loss of interest in pleasurable activities, physical symptoms like changes in sleep, appetite, weight and feeling of energy and cognitive symptoms like difficulty in concentration and pessimistic thoughts (feeling unloved, worthlessness, hopelessness, guilt, self-harming thoughts). Clinical depression is manifestation of five or more depressive symptoms lasting continuously for two weeks and impairing social and occupational functioning. Depression in childhood and adolescent age group differs from adult's major depressive disorder. Instead of sadness of mood, excessive irritability, aggressive behaviour, impulsivity, self-destructive behaviours are commonly demonstrated by adolescents suffering from depression [1]. The prevalence of major depressive disorder in mid to late adolescence is around 4-5% [2,3].

Center for Epidemiological Studies Depression scale for Children (CES-DC) is a validated measure of depressive symptoms in children and adolescents and has been used from age 6 to 17 years [4,5]. CES-DC has been internationally used for depression screening in children [5,6]. A previous Indian study used the CES-DC to compare depression levels in children orphaned by AIDS versus other orphaned children [7]. They developed Hindi and Tamil versions for the study using translation and back-translation methods, however they did not statistically validate their translations. Another study used English version of CES-DC in school going adolescents in Bangalore [8]. Hence, there is a need to validate screening tools in local language in Gujarat which can then be used to screen adolescents for depressive symptoms early. Also assessing the prevalence of depression in school going adolescents would help in developing appropriate interventional strategies. Various interventions like training for positive thinking, conflict resolution, decision making skills have been shown to reduce rate of depressive symptoms in adolescents [9]. While a previous study has validated Strengths and Difficulties Questionnaire (SDQ; a measure of emotional problems in adolescents) in Gujarati, no previous study has been done for validation of CES-DC in Gujarati [10]. Thus we designed this study with the aims and objectives to validate CES-DC for Children in Gujarati, to assess the prevalence of depressive symptoms in school going adolescents studying in 8th to 12th standards in the schools using validated CES-DC scale and to assess any association between socio-demographic factors and depressive symptoms in school going adolescents.

MATERIALS AND METHODS

A cross-sectional study was conducted in two parts, in urban and rural schools of Anand, Gujarat, India. Schools within 15 km radius

of our Hospital were chosen for the study. Study was conducted over a period of one year from February 2016 to February 2017. The study was approved by the Institutional Ethics Committee vide approval letter no IEC/HMPCMCE/63/Faculty/6/41/16 dated 28/01/2016. Written informed assent was taken from the study participants and consent was taken from their teachers for each part of the study.

Part I
The first part of the study was to translate English version of CES-DC into Gujarati and validating the same.

Study population, sample size, inclusion criteria: The first part of the study population was 300 students who were sampled from one school. Inclusion criteria were: a) Gujarat medium student, b) 8th to 12th grade. This gave ethnic uniformity to the study sample.

Instruments
SCALE 1: Centre for Epidemiological Studies Depression Scale for Children (CES-DC) [5].
The CES-DC is a valid and reliable measure of various dimensions of depressive symptoms in adolescents. It uses 20 easy to understand statements that are rated on a 4-point Likert scale from 0 to 3 (0=not at all, 1=a little, 2=some, 3=a lot). Scale generates a total score out of 60, with higher scores indicating greater number of symptoms [Annexure 1].

SCALE 2: Rosenberg's Self-Esteem Scale
The Rosenberg's Self-Esteem Scale (RSES) is a 10-question scale used to measure self-esteem [11]. It has previously been widely used in Indian adolescents [12,13]. It has 5 positively and 5 negatively worded questions that are rated on a 4-point Likert scale from 0 to 3 (0=strongly disagree, 1=disagree, 2=agree, 3=strongly agree). The negatively worded items are reversed scored. Sum of all items generates a total score out of 30. Higher scores indicate higher levels of self-esteem [Annexure 2].

SCALE 3: Patient Health Questionnaire-9 (PHQ-9)
The PHQ-9 Modified for Teens [ages 11-17 years] is a screening instrument with 9-items modified from PHQ-9, which is a valid and reliable measure of depression in adults. [14] It is rated for depressive symptoms experienced keeping in mind last 2 weeks. Each question is rated from 0 to 4 (0=not at all, 1=several days, 2=more than half the days, 3=nearly every day). Scale generates a total score out of 27. Cut-off scores of 5, 10 and 15 are used for mild, moderate and severe level of depression [Annexure 3].

Translation
The items were first translated from English to Gujarati by one of the authors. Back-translation was carried out by another author. The back-translated version was compared with the original. A panel of experts evaluated the translated scale (two Psychiatrists, a Physician).

Procedures
The approved Gujarati version was printed and copies of the questionnaire were made. After obtaining prior permission of the authorities in charge of the concerned school and the assent of the individual students were taken, the translated Gujarati versions of the CES-DC and Rosenberg's scale and PHQ-9 administered to 300 students from 8th to 12th standard. of one Gujarati medium school. Questionnaires were given in the class and students were instructed by study team person on how to fill them. Responses were scored according to the scoring system of the respective questionnaires.

STATISTICAL ANALYSIS (PART 1)
Data analysis was done using SPSS version 16, SPSS Inc, Illinois, USA. The translated version was tested for semantic equivalence, content equivalence, construct validity, discriminant validity and reliability as done in the Chinese CES-DC translation study [6].

Semantic equivalence: The three experts rated each item on the translated version of the CES-DC and the translated version of RSES on a 4-point scale rating scale of semantic equivalence (1=not equivalent, 2=some equivalent, 3=equivalent, 4=most equivalent). Item that were scored as 1 or 2 by any expert were amended.

Content equivalence: The three experts rated each item on the translated version of the CES-DC and the translated version of RSES on a 4-point scale rating scale of content equivalence (1=not relevant, 2=somewhat relevant, 3=quite relevant, 4=very relevant). Item level content validity is calculated as the number of experts giving a rating of 3 or 4. As per Polit DF et al., for a three to five panel expert the acceptable item level content validity index (I-CVI) should be 1 [15].

Construct validity testing: The pearson product-moment correlation coefficient was used to judge correlation between translated CES-DC and PHQ-9 to establish construct validity. A positive correlation was hypothesised.

Discriminant validity testing: The correlation between the translated CES-DC and RSES was used to judge discriminant validity. A negative correlation was hypothesised.

Reliability testing: Cronbach's alpha was used to judge the reliability of the translated CES-DC.

Part II
The second part of the study comprised of administering the validated Gujarati CES-DC scale to school going adolescents of Gujarati medium school for assessing the prevalence of depression among them and identifying the factors associated with the same.

Study population, sample size and inclusion criteria: Urban and rural schools of Anand district, within 15 km radius of our Hospital were chosen for the study. Five schools were included in the study. All of them were co-educational. Permission was sought from the Head of the institutions and the respective class teachers of grades 8 to 12 of the selected schools. Convenience sampling method was used. The students were explained on how to fill the questionnaire and after obtaining individual assent, the questionnaires were distributed to them. Total of 1000 students in the age group of 13-17 years participated in the study. Students who participated in the initial study to validate the questionnaire were also included in prevalence study and the school drop-outs were excluded from the study.

Instruments
Study instrument consisted of validated CES-DC questionnaire and Socio-demographic profile. A cut-off score of >15 was used.

STATISTICAL ANALYSIS (PART 2)
Descriptive analysis was done to assess the prevalence of depressive symptoms among the students and to identify factors contributing to the same.

RESULTS
Part I
Demography of the participants from the validation study are shown in [Table/Fig-1].

Validity
Semantic validity: None of the items on the translated versions of CES-DC and RSES were rated by the panel of three experts as 1 or 2.

Demographic		Frequency	Percentage
Gender	Female	181	60.3
	Male	119	39.7
Standard	8th	44	14.7
	9th	48	16
	10th	52	17.3
	11th	95	31.7
	12th	61	20.3

[Table/Fig-1]: Participant demographics in validation study (n=300).

Content validity: All items on the translated versions of CES-DC and RSES were rated by the panel of three experts as 3 or 4, thus each item on both scales had a I-CVI of 1.

Construct and discriminant validity: As was hypothesised for construct validity, there was positive correlation between translated CES-DC and PHQ-9 (r= +0.596, n=300, p<0.001). Likewise, as hypothesised there was negative correlation between translated version of CES-DC and RSES (r= -0.254, n=300, p<0.001).

Reliability

The translated CES-DC had a Cronbach's alpha value of 0.708, which suggest good reliability. Sub-scale Cronbach's alpha coefficients were a) Somatic: 0.464 (7 items), b) Depression: 0.655 (7 items), c) Positive: 0.453 (4 items), and d) Interpersonal: 0.528 (2 items). Correlations ranging from 0.453 to 0.655 were found between individual items and total score on translated version.

Part II

A total of 1000 students studying in Class 8th to Class 12th were enrolled in the second part of the study, of which all the students submitted answers to all the questions. Out of all the participating students, 532 (53.2%) were found to be having depressive symptoms and 468 (46.8%) had no depressive symptoms as per the screening test CES-DC scale. The male-female ratio was comparable. Prevalence of depressive symptoms was found to be higher in boys in class 8th, class 9th, and class 10th as compared to girls in the same classes. But in class 11th and class 12th, prevalence of depressive symptoms was higher in girls as compared to boys. Higher the class more are the depressive symptoms. There was no association between students who had depressive symptoms and type of family. In this study, the depressive symptoms are lowest among students who were born first in the family, and peaked in students who were third, fourth and fifth [Table/Fig-2].

DISCUSSION

Part I

This study examines the validity of the CES-DC as a screening tool for school going adolescents from Gujarati medium schools.

Psychometric properties of the CES-DC

The study shows that translated version of CES-DC has good internal consistency with a Cronbach's alpha of 0.708. This finding suggests good reliability and comparable to Chinese version of CES-DC (0.80) and Kinyarwanda version of the CES-DC (0.86) [16,17]. Subscale Cronbach's alpha coefficient for the translated scale ranged from 0.46 to 0.65 and were comparable to Cronbach's alpha coefficients for the four subscales on the Chinese version range (0.39 to 0.57) [6].

The negative correlation between translated CES-DC and RSES (r=-0.254) indicates that those having low self-esteem had higher level of self-reported depressive symptoms. A study by Masselink

Variables			No depressive symptoms n (%)	Depressive symptoms n (%)
Standard	8th		137 (57.3)	102 (42.7)
	9th		202 (51.1)	193 (48.9)
	10th		38 (40.4)	56 (59.6)
	11th		53 (36.8)	91 (63.2)
	12th		38 (29.7)	90 (70.3)
Gender	8th	Males	74 (51.4)	70 (48.6)
		Females	63 (66.3)	32 (33.7)
	9th	Males	117 (46.4)	135 (53.6)
		Females	85 (59.4)	58 (40.6)
	10th	Males	20 (38.5)	32 (61.5)
		Females	18 (42.9)	24 (57.1)
	11th	Males	24 (37.5)	40 (62.5)
		Females	29 (36.3)	51 (63.8)
	12th	Males	27 (42.2)	37 (57.8)
		Females	11 (17.2)	53 (82.8)
Type of family	8th	Joint	57 (61.3)	36 (38.7)
		Nuclear	80 (54.2)	66 (45.2)
	9th	Joint	95 (49.7)	96 (50.3)
		Nuclear	107 (52.5)	97 (47.5)
	10th	Joint	24 (43.6)	31 (56.4)
		Nuclear	14 (35.9)	25 (64.1)
	11th	Joint	31 (40.8)	45 (59.2)
		Nuclear	22 (32.4)	46 (67.6)
	12th	Joint	34 (34.0)	66 (66.0)
		Nuclear	4 (14.3)	24 (85.7)
Birth order	First		245 (48.9)	246 (51.1)
	Second		168 (46.9)	190 (53.1)
	Third		42 (40.8)	61 (59.2)
	Fourth		11 (36.7)	19 (63.3)
	Fifth		2 (25.0)	6 (75.0)

[Table/Fig-2]: Comparison of depressive and non-depressive groups on various demographic parameters (n=1000).

M et al., has shown that low self-esteem is an enduring vulnerability for developing depressive symptoms [18]. Hence the translated scale has acceptable discriminant validity. However, this was not as strong as in the Chinese CES-DC validation study (r= -0.52) [6].

The positive correlation between CES-DC and PHQ-9 (r= +0.596) indicated that those having higher levels of self-reported depressive symptoms on PHQ-9 had higher self-reported depressive symptoms on the translated version of CES-DC. The Chinese translation had used an anxiety scale for demonstrating construct validity and had reported a correlation of r=0.63 [6]. Hence, the translated scale has acceptable convergent validity.

Part II

Adolescent period is often accompanied by new stress, behavioural change, and relationship problems and this affects psycho-social development. Adolescent mental health needs are a growing concern in both developed and developing nations. Depression in adolescents may affect their social as well as personal lives with potentially serious long-term consequences. Adolescent with depression is at high risk of mental disorders such as antisocial behaviour and substance abuse disorders [19]. The school is the most significant social context in the life of a child as almost one third of a day is spent here. Thus, it is essential to assess the prevalence of depression in school-going adolescents. Parents, teachers, school or college counsellors and other supportive adults need to be empowered to recognise and respond to emotional and behavioural difficulties among school going adolescent [20].

In the present study, a total of 1000 adolescent students studying in Class 8th to Class 12th were enrolled. They were studied using the validated Gujarati version of CES-DC. The study was carried out in both rural and urban Gujarati medium schools in Gujarat. The prevalence of depression among students was found to be 53.2% by using screening test. Another study showed lower prevalence (38%) of depression among adolescents [21]. In one another study by Jha KK et al., [22] prevalence of depression was found to be 49.2%. Studies in USA have found that 3-9% of adolescents meet criteria for depression at any one time, and at the end of adolescence, as many as 20% of adolescents reported a lifetime affliction of depression [23].

Boys and girls were equally distributed (57.6% and 42.4% each) in the study population, but prevalence of depression was found to be slightly higher among females than males with increasing standards (11th and 12th) which are consistent with the results of earlier studies [24,25]. They also mentioned high rate of depression in adolescent females attributed to hormonal differences [26]. Depression among the females was more prevalent (41.8%) as compared to that among males (35%). However, there was no statistical association between gender and depression. In one study, females had higher prevalence (62%) than the males (40.5%) [27]. Factors like self-esteem, coping ability, support from parents may explain these differences.

This study reported higher prevalence among students in class 10th, 11th and 12th students (59.6%, 63.2%, and 70.3% respectively) as compared to Class 8th and 9th (42.7%, 48.9% respectively). Similarly, other studies have also reported a higher prevalence of depression in 10th and 12th division students due to the pressure of academic performance in the board examinations [28]. In the present study, it was observed that prevalence of depression among students from nuclear families was higher as compared to those from joint families. Similar observation was found in the study by Jha KK et al., [22].

The study also shows lowest prevalence of depression among students who was born first in the family, and prevalence rate peaking in students who were third, fourth and fifth order. This is consistent with a previous study [29]. Percentage distribution of depression in relation to birth order in this study was: first (51.1%), second (53.1%), third (59.2%), fourth (63.3%), and fifth (75.0%) [Table/Fig-2]. Jha KK et al., reported lowest prevalence of depression among students who were born first in the family; prevalence rate peaking in students with birth order three, and then dipping in students with birth order fourth and above [22].

LIMITATION

The socio-economic status of the children enrolled in this study was not known. This was not done due to the practical problem of enquiring about the income of the family to minors who wouldn't be aware of it. This was a school-based study in which those registered with the school were enrolled for the study. The adolescents who were not registered in the school might be from vulnerable section of society who are more prone for depression. The study was based on the response to CES-DC Scale (in Gujarati) by the students themselves and there may be some inaccuracy in the results.

CONCLUSION

The translated version of the CES-DC is a valid and reliable tool to assess depressive symptoms in school going adolescents among Gujarati children. The CES-DC scale is simple, short, easy-to-use questionnaire, to identify at-risk population and associated factors, which could be utilised in a general practice setting to screen adolescents for depression. Students should receive life skills education in school to learn coping skills and to mitigate other factors responsible for depression. Raising awareness amongst stake holders [parents, teachers and students] is also required. Active, early intervention can help prevent worsening of depression and its impact on life.

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Annexure 1

Center for Epidemiological Studies Depression Scale for Children (CES-DC)

INSTRUCTIONS

Below is a list of the ways you might have felt or acted. Please check how much you have felt this way during the past week.

DURING THE PAST WEEK	Not At All	A Little	Some	A Lot
1. I was bothered by things that usually don't bother me.	_____	_____	_____	____
2. I did not feel like eating, I wasn't very hungry.	_____	_____	_____	____
3. I wasn't able to feel happy, even when my family or friends tried to help me feel better.	_____	_____	_____	____
4. I felt like I was just as good as other kids.	_____	_____	_____	____
5. I felt like I couldn't pay attention to what I was doing.	_____	_____	_____	____

DURING THE PAST WEEK	Not At All	A Little	Some	A Lot
6. I felt down and unhappy.	_____	_____	_____	____
7. I felt like I was too tired to do things.	_____	_____	_____	____
8. I felt like something good was going to happen.	_____	_____	_____	____
9. I felt like things I did before didn't work out right.	_____	_____	_____	____
10. I felt scared.	_____	_____	_____	____

DURING THE PAST WEEK	Not At All	A Little	Some	A Lot
11. I didn't sleep as well as I usually sleep.	_____	_____	_____	____
12. I was happy.	_____	_____	_____	____
13. I was more quiet than usual.	_____	_____	_____	____
14. I felt lonely, like I didn't have any friends.	_____	_____	_____	____
15. I felt like kids I know were not friendly or that they didn't want to be with me.	_____	_____	_____	____

DURING THE PAST WEEK	Not At All	A Little	Some	A Lot
16. I had a good time.	_____	_____	_____	____
17. I felt like crying.	_____	_____	_____	____
18. I felt sad.	_____	_____	_____	____
19. I felt people didn't like me.	_____	_____	_____	____
20. It was hard to get started doing things.	_____	_____	_____	____

Annexure 2
ROSENBERG SELF-ESTEEM SCALE
Instructions
Below is a list of statements dealing with your general feelings about yourself. Please indicate how strongly you agree or disagree with each statement.

Strongly agree   Agree   Disagree   Strongly disagree

1. On the whole, I am satisfied with myself.
2. At times I think I am no good at all.
3. I feel that I have a number of good qualities.
4. I am able to do things as well as most other people.
5. I feel I do not have much to be proud of.
6. I certainly feel useless at times.
7. I feel that I'm a person of worth, at least on an equal plane with others.
8. I wish I could have more respect for myself.
9. All in all, I am inclined to feel that I am a failure.
10. I take a positive attitude toward myself.

Annexure 3

PHQ-9: MODIFIED FOR TEENS

Name: _____ _____ _____ _____   Clinician: _____ _____ _____   Date: _____ _____

Instructions: How often have you been bothered by each of the following symptoms during the past **two weeks**? For each symptom put an "**X**" in the box beneath the answer that best describes how you have been feeling.

	(0) Not at all	(1) Several days	(2) More than half the days	(3) Nearly every day
1. Feeling down, depressed, irritable, or hopeless?				
2. Little interest or pleasure in doing things?				
3. Trouble falling asleep, staying asleep, or sleeping too much?				
4. Poor appetite, weight loss, or overeating?				
5. Feeling tired, or having little energy?				
6. Feeling bad about yourself- or feeling that you are a failure, or that you have let yourself or your family down?				
7. Trouble concentrating on things like school work, reading, or watching TV?				
8. Moving or speaking so slowly that other people could have noticed? Or the opposite- being so fidgety or restless that you were moving around a lot more than usual?				
9. Thoughts that you would be better off dead, or of hurting yourself in some way?				

In the past year have you felt depressed or sad most days, even if you felt okay sometimes?
[ ] Yes   [ ] No

If you are experiencing any of the problems on this form, how difficult have these problems made it for you to do your work, take care of things at home or get along with other people?
[ ] Not difficult at all   [ ] Somewhat difficult   [ ] Very difficult   [ ] Extremely difficult

Has there been a time in the past month when you have had serious thoughts about ending your life?
[ ] Yes   [ ] No

Have you EVER, in your WHOLE LIFE, tried to kill yourself or made a suicide attempt?
[ ] Yes   [ ] No